Strategic Activity And Email Interruptions:
The relationship between wellbeing, multi-goal priorities and individual differences in dealing with email interruptions in goal-directed work

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Abstract

Interruptions research is heavily reliant on a paradigm involving ‘enforced interruption’. Email use however constitutes a special form of ‘controlled interruption’. Because people have control over when and how they respond to incoming email, email interruptions provide an excellent tool for exploring strategic behaviour at work. This thesis uses the goal-directed theories of Action Regulation Theory (ART: Hacker, 1985; 1994) and Hockey’s (1997, 2000, 2002) cognitive-energetical compensatory control model to frame research into strategic behaviour across three research phases. Using a multi-methodological and multi-analysis approach, and in common with recommendations from the goal-directed theories, the experiences of 134 real email users, executing real strategies for dealing with email interruptions were examined within their authentic work environments. Semi-structured interviews and diary methodology, using content analysis and multilevel random coefficient modelling (MRCM), revealed that:

- **Wellbeing** is both an antecedent and consequence of strategic behaviour in dealing with email interruptions.

- **Individual differences** — measured using structured, taxonomical personality and motivational style inventories — are directly linked to strategy choice, consequential wellbeing, and the prioritisation of different goals at work, when dealing with email interruptions. They also moderate the relationship between strategy choice and wellbeing.

- In **multi-goal** environments, people's strategies for dealing with email interruptions depend in part on how they prioritise the email against the task (in a stage labelled the negotiation lag), and whether this relates to decisions to satisfy their current task goals, other work goals and wellbeing goals. In satisfying one goal (e.g., a work goal) this doesn't necessarily mean that other goals (e.g., for wellbeing) will suffer.

This thesis asserts that such findings are novel and unique, and that they address shortcomings in the goal-directed theories, and in the way that interruptions have been studied to date. Implications for theory and practice are highlighted.
Summary

This thesis examines strategic action in dealing with email interruptions in goal-directed work. The overall aims of this research programme were fourfold: (1) to utilise controlled interruptions (such as email interruptions) as a study tool for identifying strategic responding at work; (2) to explain whether (and which) internal factors are involved in strategic action from a multi-goal viewpoint, using the perspectives of Action Regulation Theory (ART), and Hockey's compensatory control cognitive-energetic framework; (3) to emphasise the potentially positive benefits of email interruptions, by extending theoretical definitions of efficiency to include wellbeing and multi-goal consideration; (4) to conduct research that reflects actual and naturalistic behaviour, and which has meaningful benefits for email users in the workplace.

Semi-structured interview techniques and in situ diary-study methodology were used across three research phases. Phase One involved exploratory analysis of how email was currently being managed at work (Study One). Measures used in the second and third phases were validated in Studies Two and Three. Phase Two examined the role of wellbeing and personality in strategic responding to email interruptions (Study Four). The ecological validity of the approach taken was examined in Study Five. Phase Three dealt with multi-goal prioritisation issues and examined goal achievement from the perspective of the current task, other tasks and wellbeing (Study Six). Findings from multilevel random coefficient modelling (MRCM) techniques and content analysis were used to evaluate the relative efficacy of ART and Hockey's model, to understand and explain strategic responding to email interruptions. The thesis concludes that:

1. The focus on controllable, asynchronous interruptions (email) indicates how interruptions can have positive, as well as negative, implications for wellbeing and efficiency at work. This challenges assumptions prevalent within the interruptions research domain.
2. Wellbeing is both an antecedent and consequence of strategic responses to email interruptions – these studies are the first to
SUMMARY

demonstrate this and it is recommended that this finding is structurally incorporated into theories of goal-directed behaviour.

3. People weigh up goal priorities of the task and their wellbeing in choosing a strategic approach to deal with email interruptions – this gives empirical weight to the largely theoretical literature examining goal prioritisation in multi-goal environments, and offers firm support to Hockey's perspective.

4. There are personality differences between those who experience positive or negative benefits from email interruptions. Individual differences have not been explored using structured, taxonomical approaches in the context of goal-directed work theories before. Both ART and Hockey's model would arguably benefit from including such a focus to their studies of goal-directed work behaviour now.

In light of the thesis's four main objectives, it was firstly concluded that using controllable interruptions is an effective tool for studying strategic behaviour, because they allow for the examination of multiple goals in action. Secondly, it was concluded that strategic action is influenced by wellbeing, personality differences, and personal priorities for multiple goals. This offers particular support to Hockey, but such findings could be used to extend both theories, in terms of how these internal factors are conceptualised and measured. Thirdly, it is concluded that whilst ART provides an excellent 'grand theory' approach to describing the life cycle and regulatory processes involved in managing strategic action, it is limited because of how it defines efficiency. By developing definitions of efficiency, using Hockey's model and an 'amalgamated approach' - to incorporate an appreciation of wellbeing, individual differences and multi-goal achievement - goal-directed work activity can be more fully explained and understood. Finally, using diary-study methodology, a naturalistic work environment was observed. Using naturally occurring email interruptions as a study tool ensures that strategies are recorded in the context of authentic multi-goal activity. This is key to both ART and Hockey's research perspectives. Amendments to goal-directed theories are interpreted according to implications for managing email interruptions, but also in terms of how understanding across a wider research context can be informed.
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Abbreviations index

ART Action Regulation Theory
FFM Five Factor Model
HPI Hogan Personality Inventory
MRCM Multilevel Random Coefficient Modelling
MVPI Motives, Values, Preferences Inventory
NA Negative Affectivity
OIS Operative Image System
PA Positive Affectivity
Chapter One:
The Study of Interruptions at Work

Introduction

The purpose of this thesis is to explore the relative efficacy of Action Regulation Theory (ART) and Hockey's model of compensatory control in explaining strategic activity in goal-directed behaviour at work. These theories are explored and tested using studies of email interruptions as they naturally occur during people's normal work activity. Email interruptions are a special form of controllable interruption that has largely been overlooked in the interruptions research domain. However, email interruptions are now a dominant part of working life. Additionally, because they are delivered in a two-stage 'controllable' format, observing people's responses to them provides an insight into strategic behaviour. Email interruptions constitute additional demands or activity above and beyond that afforded by a current task, and so examination of people's strategic responding to email interruptions allows one to observe how multiple goals compete for attention, and how people's allocation of attention then affects success at work. Taking a multi-goal perspective in exploring work activity, and using a controllable interruption format, ensures that ART and Hockey's model can be discussed and interpreted in a novel research domain; a domain that has direct relevance to the real pressures and demands faced by people in modern working environments.

In this opening chapter the domain of interruptions research will firstly be discussed, to elucidate why email interruptions are of particular interest, and to provide a context for studying the goal-directed theories. These theories will then be introduced and outlined in some depth in Chapter Two, before being returned to again in Chapter Four, following the conclusions made in an exploratory study of email use at work (Chapter Three). In Chapter Four, using ART and Hockey's model, the theoretical aims of the thesis are formulated and the empirical research agenda is developed. In particular, this agenda is concerned with using email interruptions as a tool for studying
'efficiency' in work activity, using **wellbeing**, **individual differences** and **multi-goal prioritisation** concepts. These concepts are under-developed in ART and Hockey’s models (to different extents), and warrant research attention. Chapter Five provides the methodological context for this thesis, and Chapters Six and Seven contain the main empirical studies of email interruptions, shaped and interpreted differently according to ART and Hockey’s perspectives. In Chapter Eight, the key conclusions of the thesis are made, and related to relative implications for these goal-directed theories, practical implications for email users at work, and a wider research agenda.

As will be explained in this opening chapter then, email use, and email interruptions in particular, have received scant empirical attention to date, and when interruptions have been studied, this has mainly been in context-devoid experimental studies, that ‘force’ the interrupting email (or task) upon the participant. As such, there is little research available that, (a) looks at how email is being used within real workplaces, (b) examines how people attempt to deal with ‘controllable’ email interruptions in their multi-goal and personally meaningful work environments, and, (c) considers how strategies for dealing with interruptions are related to internal factors (such as well-being or personality) rather than external measures (such as task complexity or interruption length).

This chapter outlines the key findings that have emerged from the interruptions research domain, before turning attention to how this body of work relates to the study of email interruptions, as a special form of controllable and asynchronous interruption. The importance of studying email interruptions is argued, and contextualised within a discussion of how email has become so prevalent at work now for many people.

By the end of the chapter a case is made for conducting specific research into how email interruptions are managed and dealt with at work, as the current field for studying interruptions has largely overlooked the special features of this form of interruption. As a tool for studying strategic behaviour, email interruptions are examined as both relevant and appropriate therefore.
Interruptions and mental information work – a review

Interruptions are, "...externally generated, temporary cessation[s] in the current flow of behaviour, typically meant for the subject to execute activities that belong to a secondary set of actions." (van den Berg, Roe, Zijlstra & Krediet, 1996, p.236). "Another person, object, or event creates an interruption, the timing of which is beyond a decision maker's control. Furthermore, an interruption breaks a decision maker's attention on a primary task and forces the decision maker to turn his or her attention toward the interruption – if only temporarily." (Speier, Vessey & Valacich, 2003, p.773). Interruptions are considered to be events that divert an individual’s attention away from a task or processing sequence (however briefly) in order to engage with another activity. The individual has no control over their emergence, as an interruption is triggered by something or someone external to the individual’s cognitive world.

Studying the phenomenon of interruptions is a primary investigative method for researchers interested in mental information work. Interruptions essentially 'break into' the cognitive processing that individuals are engaged in at any one time, and so by examining what individuals are doing at the point of being interrupted, and what they need to do following an interruption to get back to that point, psychologists can explore what processes are involved in mental information work (Zijlstra & Krediet, 1999). With the interruptions afforded by new technology, in the form of incoming email, mobile telephone calls, computer breakdown, etc., such a research focus is both ecologically valid and highly relevant to the way individuals process their work today (Bailey, Konstan & Carlis, 2000). Speier et al. (2003) comment that "E-mail interruptions may be more prevalent than phone and human interruptions... an interrupted work environment is commonplace for a typical knowledge worker" (p.772). Before discussing the concept of email interruptions specifically, it is useful first to review the research literature available on 'interruptions' in general. This will provide context to this study of email interruptions at work.
Studies of interruptions to cognitive tasks
Since Zeigarnik (1927) concluded that interrupted tasks are more likely to be remembered, because mental closure of the task has not been achieved, interruptions have been an interesting focus of study for Cognitive Psychologists. Since her seminal work, two approaches to studying interruptions within the research literature, appear to have emerged, although "there is no uniform paradigm for the study of interruptions during work processes" (Burmistrov & Leonova, 1996. p.21). One approach is more top-down and theory-driven. It starts with an interest in cognitive processing and uses interruptions as a tool for exploring what processes an individual is going through in mental information work at the point when they are interrupted (Eyrolle & Cellier, 2000; Gillie & Broadbent, 1989; Roe, van den Berg, Zijlstra, Schalk, Taillieu, & van der Wielen, 1995; Zijlstra, Roe, Leonova, & Krediet, 1999). The other approach is more bottom-up and practical. This starts with interruptions as the point of interest, with experiments designed to establish the effect that interruptions in the workplace and daily life have on one's ability to achieve their goals (Bailey, Konstan & Carlis, 2001; Cutrell, Czerwinski, Horvitz, 2001; Czerwinski, Horvitz, & Willhite, 2004; Czerwinski, Cutrell, & Horvitz, 2000b; Einstein, McDaniel, Williford, Pagan, & Dismukes, 2003; Fischbach, Friedman, & Kruglanski, 2003; McFarlane, 2002; Speier et al., 2003; Trafton, Altmann, Brock, & Mintz, 2003).

Whichever approach is followed there are two main conclusions. The first conclusion suggests that interruptions are beneficial to one's work, as they can actually help people to achieve their goals faster (Robertson, 2003) often because they force people to eliminate subsidiary activity when they feel under pressure to get a task done (Fishbach et al., 2003; Zijlstra et al., 1999), or because they increase stimulation in undemanding situations (Fisher, 1998; Speier et al., 2003). The second, and clearly most prevalent conclusion (Walji, Brixey, Johnson-Throop, & Zhang, 2004), is that interruptions are highly disruptive because: they force people to switch attention between goals, which can be demanding and time consuming (Altmann & Trafton, 2002; Czerwinski et al., 2000b; Eyrolle & Cellier, 2000; Trafton et al., 2003); induce decay in the memory for the current task (Altmann & Trafton, 2002; Czerwinski et al., 2004; Einstein et al., 2003); cause people to spend longer on their work and/or commit more errors (Bailey et al., 2001; Speier et al., 2003); induce anxiety or annoyance (Bailey
et al., 2001); and, encourage perception that an interrupted task is more difficult (Bailey et al., 2001; Czerwinski et al, 2004).

Other variables that have been manipulated to understand whether and how interruptions are either disruptive or beneficial to the efficiency of work tasks, include:

- The familiarity of the interruption or task (Eyrolle & Cellier, 2000).
- The cognitive demands of the interruption compared to the task (Burmistrov & Leonova, 2003; Burmistrov & Leonova, 1996; Cutrell et al., 2001; Einstein et al., 2003; Gillie & Broadbent, 1989; Speier et al., 2003)
- The length of the interruption (Einstein et al., 2003; Gillie & Broadbent, 1989)
- The similarity of the interruption to the task (Czerwinski et al., 2000b; Gillie & Broadbent, 1989; Hess & Detweiler, 1994; Speier et al., 2003)

Results have been extremely mixed in both strength and significance. For example, both similarity (Hess & Detweiler, 1994; Gillie & Broadbent, 1989) and dissimilarity (Czerwinski et al., 2000b) of interruptions to tasks have been found to be disruptive, although Gillie & Broadbent's results were weak and inconclusive between trials. Some of the studies investigating these different variables are now outlined below.

**Familiarity**

Eyrolle & Cellier (2000) studied the cognitive processes involved in dealing with activities that interrupt the flow of thought in both a field (naturalistic) setting and within the laboratory. In the laboratory study (consisting of short, number selection tasks presented on a PC), rather than allowing people to return to the task they were working on before the interrupting task arrived, participants were forced to abandon the first task completely as the new one was administered. This meant that some degree of closure could occur, even though the first task was unfinished, therefore allowing the authors to establish how closure processes effect memory, according to the Zeigarnik Effect. Interestingly, Eyrolle & Cellier (2000) found that in the first 30 seconds of attending to the interrupting new task, participants made more errors. The authors concluded that attentional switching between tasks is cognitively tiring, requiring effort and resources to re-set the memory store each time. However, they also reported results whereby, if the same secondary task was
introduced later on in the experiment, error rate was very low. This suggests that attentional switching (inhibition of task one and activation of task two) per se is not cognitively effortful. Rather, switching from a familiar to an unfamiliar mode of operating or processing is effortful (indicating that the memory store hasn't experienced complete closure on previous tasks as traces of past activity linger and impinge on the new task). The errors that occur when dealing with new tasks appear to be a result of participants following rules that applied in the previous task inappropriately. When the new task's rules are correct and known, switching is more efficient. Eyrolle & Cellier (2000) found that the memory tension system still exists, even if the participant genuinely does not think they will have to deal with that task again.\footnote{This study could be seen as lacking somewhat in validity, because if a similar task is brought up later in the experiment, the participant may soon learn that they do in fact need to retain some knowledge about the tasks they are working on as this knowledge could well be useful further down the line. As such, the experimenters may have failed to really create a situation where closure occurred.} This indicates that when familiar tasks interrupt work they may be dealt with more efficiently than unfamiliar tasks because their rules and parameters are better known, linger in memory, and require less effort to orient towards.

Zijlstra et al. (1999) would concur with this. Participants in their study were required to carry out a text-editing task, and were then interrupted by telephone calls asking them to attend to another piece of information. Their participants came from two different cultures (Russian and Dutch), and the Dutch participants were much more familiar with the task than the Russian participants. Zijlstra et al. found that when the Dutch participants were interrupted their performance on the original task actually improved, whereas the Russian participants experienced a decline in performance. It is likely that the unfamiliarity with the tasks for the Russian participants meant that switching from one domain to another was especially effortful, causing their work to suffer.

Thus, the research suggests that working on a task or interruption that is familiar will place fewer demands on memory. In such circumstances a familiar interruption is therefore considered to be less disruptive than an unfamiliar interruption.
**Cognitive demands and complexity**

Zijlstra et al. (1999) and Eyrolle & Cellier (2000)'s studies demonstrate how cognitive demands influence how disruptive an interruption might be. Altmann & Trafton (2002)'s Goal Activation model asserts that in order to pursue a task a goal must be activated in memory and then maintained in memory if the task is to progress until the goal’s conclusion. Goal activation means that a goal will be readily returned to following a switch of attention to another task (i.e., when processing an interruption), but it does require space in memory. However, over-activation of a goal can cause problems in multi-goal environments because if it is too prominent in consciousness it will interfere with the pursuit of other goals when an individual switches attention, even if the original goal has been satisfied. This is because a goal that is prominent in consciousness uses up memory space and creates mental clutter in the memory system. To overcome problems associated with mental clutter of strong, old goals Altmann & Trafton (2002) argue that people need to be given a short period of time before switching to a new task to temporarily suspend the old task (priming it for future retrieval) and to orient towards and activate the new goal in memory. In the case of interruptions, this time (known as an "interruption lag" – Trafton et al., 2003) is rarely available, as people may be forced abruptly away from their current task (as in Eyrolle & Cellier's study). Trafton et al. (2003) present a timeline of when the interruption lag is likely to occur, during the life span of a primary task being interrupted by a secondary activity.

**Figure One:** The interruption and resumption process, involving a primary (interrupted) and a secondary (interrupting) task. (Trafton, Altmann, Brock, & Mintz, 2003)

<table>
<thead>
<tr>
<th>Begin Primary Task</th>
<th>Alert for Secondary Task</th>
<th>Begin Secondary Task</th>
<th>End Secondary Task</th>
<th>Resume Primary Task</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Interruption Lag</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resumption Lag</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Gillie & Broadbent (1989) forced people away from a current task with an interruption by clearing the computer screen without warning and found that
interruptions were disruptive. However, when they allowed subjects to choose when to attend to the interruption in another condition (thus giving the opportunity to rehearse the main task for resumption) the interruption was still disruptive. They concluded that this must be so because of the complexity involved - in other words because the interruption characteristics placed higher demands on the memory system. It is difficult to make firm conclusions from Gillie & Broadbent's study as variables were not strictly controlled between conditions (i.e., variables other than the IV changed from condition to condition), and because of the low number of participants included in their trials (N=10). However, it seems logical to deduce that tasks that are complex, and interruptions that are complex, require more cognitive resource if they are to be processed effectively. If one only has a finite amount of cognitive capacity available (Speier et al., 2003; see Hockey, 2000 for a review of perspectives on this topic) then both the interruption and the task will be competing for scarce resources. The more resources they require the more strain this may put on performance. For example, Zijlstra et al. (1999) found that their Dutch participants changed their strategy for dealing with interruptions when demands on cognitive resources increased. When interruptions to a task increased (from 1 to 3) participants changed from dealing immediately with the interruption, to allowing a short delay before switching. According to Altmann & Trafton's (2002) model, they may have used this delay to prime the task for resumption later, thus freeing up some memory capacity for dealing with the interruption.

Czerwinski et al. (2004) found that tasks that are returned to following an interruption are lengthier, more complex, and more prone to revisitation, compared to tasks that are not 'interrupted'. However, it is not clear from their study as to whether it was the complex and lengthy nature of the task in the first instance that prompted people to respond to an interruption (see van Solingen, Berghout, & van Latum, 1998, for example), or whether it was the switching itself that made the task longer and more complex. In a previous experimental study however, Czerwinski et al. (2000b) explored the disruption effects of interruptions according to the level of complexity afforded by the main task. Participants were required to undertake a list-based search task, administered by computer, in one of two conditions. In the first condition participants had to search for the title of a book from a list stored alphabetically on computer and note its location. In condition two, they were
required to undertake the same search task but this time were only given the gist of what the book was about. Thus the second condition was considered to be cognitively more demanding as it required some degree of semantic understanding and a deeper level of processing. Participants were interrupted by an electronic message that presented them with a simple mathematics problem. Interestingly, they found that title search tasks were harmed by interruptions to a greater degree than the gist search tasks. They suggest that this may be due to the fact that when engaged in high speed scanning (as afforded by the title search) being interrupted means scanning mechanisms must be fully disengaged and then fully re-engaged on resumption, which is effortful. However, they do not assert whether this is more effortful than working on a gist search task.

In a second study replicating Czerwinski et al. (2000b), but with an additional measure of disruptiveness (requests for reminders), Cutrell et al. (2001) agreed that the cost to the title task was greater than the cost to the gist task when comparing interrupted with non-interrupted conditions in terms of time taken. However, they also found that participants requested far more reminders in the gist condition when interrupted compared to when they were not interrupted in the gist condition. This suggests that although timing suffers more when an automated, sequential task is interrupted (because of the disruption to memory sequencing and scanning mechanisms), deeper thought processes appear to suffer more when more complex activities are disrupted.

Speier et al. (2003) gave undergraduate students either simple (e.g., information acquisition) or complex (e.g., aggregate planning) computer-based tasks, and offered cash incentives to the highest performing participants. Then, 7 to 15 seconds into carrying out the task, participants were forcibly interrupted by a secondary task requiring an immediate response. The interrupting task was manipulated to use either the same or different sensory channel to the main task. Once completed, participants returned to finish the main task. They found that on complex tasks (especially those using symbolic sensory channels) being interrupted affected decision accuracy, but not decision time. When the interruption contained a graphical presentation (i.e., a symbolic mode) the interruption was less deleterious
compared to when the interruption was a tabular presentation (i.e., visual mode).

To clarify whether interruptions are disruptive when working on demanding tasks, the reverse situation has also been studied. Burmistrov & Leonova (2003) noted that interruptions inhibit performance on complex tasks, but do not affect performance on simple tasks. Fisher (1998) looked at how externally generated and internally generated interruptions affect performance when people are under-stimulated at work – i.e., when they are working on boring or mundane activities. Participants in her externally generated interruption experiment were asked to work on either a repetitive manual assembly task (simple, low attention demands) a proof reading task (simple, high attention demands), or an in-tray exercise requiring decision making skills (complex demands). Participants were then assigned to one of three interruption conditions – a no interruption condition, an irrelevant interruption condition (e.g., where someone came in to talk to the experimenter) and a concern-related interruption condition (e.g., where a student came in to talk to participants about their concerns in order to recruit them for an experiment). She found that external interruptions prevented boredom on simple low attention tasks (regardless of the type of interruption).

In Fisher's (1998) second study about internal interruptions participants were asked to infer how bored a job incumbent was at work by reading about the job-incumbents' frequent non-task related thoughts, occasional non-task related thoughts, or 'no' non-task related thoughts. Individuals engaging in frequent non-task related interruptions were rated as significantly more bored and less satisfied with their work, indicating that people recognise how boring work is associated with cognitive interference, although causal direction could not be established. Additionally, in Speier et al.'s (2003) study discussed above, they found that being interrupted on simple tasks increased decision accuracy and decreased decision time (i.e., people worked faster and with fewer errors, having been interrupted). As discussed, Zijlstra et al. (1999) found that Dutch participants who were very familiar with the task and the interruption actively improved task output when interruptions were increased, as subsidiary activities were accordingly reduced.
These findings indicate that interruptions enhance performance when task demands are low and impair performance when task demands are high. Task demands may be high because of the complexity of a task, or because of the demands a task places on memory.

**Interruption length**

How memory is involved in maintaining intentions towards an interrupted task was explored by Einstein et al. (2003), who were interested in Reason's (1990) finding that prospective memory failure (forgetting of intentions) is one of the greatest causes of human error. They summarised three hypotheses about how memory is involved in intention maintenance. The first hypothesis claims that maintaining a memory for intentions is not demanding and that the length or demands of an interruption do not affect ability to recall on resumption (Minimal Demands View). The second hypothesis postures that remembering an intention is highly demanding as it requires memory to remain activated throughout attending to an interrupting task. The longer the interruption, the more likely it is that the intention will decay, especially if the interrupting task is also cognitively demanding (Prohibitively Expensive View). The third hypothesis, the Active Maintenance View, asserts that remembering an intention is demanding and memory must be actively rehearsed and reactivated during the life span of an interrupting task in order to ensure recall on resumption does not suffer. The interrupting task may contain cues to remind people about their main task intention, and if so these cues must be acknowledged. When the interrupting task contains lapses or gaps this provides an opportunity to rehearse the intention. According to this view the length of an interruption would not affect prospective memory, but the demands of an interruption would as it can prevent active rehearsal.

Einstein et al. (2003) gave participants a series of numerical, verbal and trivia based computer tasks. When participants saw a red screen appear on the computer they had to press a button that would provide them with an interrupting task lasting 15 seconds (pattern comparisons), but not until they finished the main task. The main task would then continue for between 5 and 40 seconds (and of course the intention to press the button had to remain activated during that time). The 40-second delay condition was the only one that led participants to the interrupting task. However, in all the delay conditions participants might also be asked to monitor a series of beeps by
pressing a button, in order to divide attention during the delay. According to earlier definitions, the beep-monitoring task wouldn’t be considered an interruption as although it demands attention, participants do not deviate from their main task in order to process it.

Einstein et al. (2003) found that forgetting of intentions was not associated with the length of delay between 5 and 40 seconds. In other words, because longer delays did not impact on memory for the task, the Prohibitively Expensive view is refuted. However, additional demands during the delay period (the presence of the beep monitoring task) did affect intention recall (i.e., it was inhibited) and performance of the interruption activity (presented following the button press) was also affected. This indicated that recall resources interfered with cognitive resources needed to perform the task. Interruption activities (lasting just 15 seconds) also exacerbated the difficulty in retrieving an intention. This was especially pertinent when attention wasn’t divided. This seems odd at first but Einstein et al. explain it as being due to the degree of context change between a focused singular task and an interruption. When attention is divided one is in a different operative mode and may be maintaining the intention memory by non-task related cues because of this switching and dividing. (i.e., context is too fragile to rely upon as a cue).

Einstein et al.’s experiments supported the Active Maintenance View - task performance was constant over the delay interval (i.e., it did not reduce as time went by) and performance declined when attention was divided (suggesting participants had less opportunity to practice and rehearse). They say, “It seems probable that both contextual cueing and periodic checks of memory are more likely during lulls or less-demanding periods in the cover task” (p.160). Interestingly, in a later experiment, Einstein et al. (2003) also found that the negative effect of interruptions on intention recall can be completely overcome by using a small blue dot in the corner of the screen to remind participants they have something to do. This supports the need for environmental cues to aid recall, and also indicates - from an email perspective - how useful the envelope icon in the corner of the screen may be. They conclude that when busily engaged in other activities forgetting of intentions even after a 5 second delay is easy. Indeed forgetting rates were
8% in the standard experiment, 20-25% in the demanding condition (beep monitoring) and 30-40% when interruption activity was introduced.

Gillie & Broadbent (1989) manipulated the length of the interruption task in their experiments, whereby participants were forced towards a new task, which they had to complete before resuming the original task. The length of the interruption ranged from 30 seconds to 2 minutes 45 seconds, but did not affect performance on the main tasks.

Even though, people perceive it to be very difficult to return to a task when they have been engaged in a lengthy interruption (Czerwinski et al., 2004), results from Gillie & Broadbent and Einstein et al. suggest that it is not the length of time away from a main task that affects efficiency in resumption, but the demands placed on people during the delay period.

**Similarity**

Zijlstra & Krediet (1999) report that when interruptions are similar in content to the demands of a main task, the more time individuals spend processing the main task, and the more errors are made. Similarity between task and interruptions is considered to be demanding because of the commonality in rules and processes required to attend to each task that can get confused in rapidly switching situations. Alternatively similarity may be a problem if one’s cognitive resource stores are content dependent (again see Hockey, 2000 for a review of perspectives on this topic) – i.e., we have a finite amount of resource available to process verbal information, and when those resources are spent extra reserves cannot be taken from another ‘store’ (e.g., for processing numerical information). Rather than attempt to decipher what makes similarity disruptive in interruption research it is important first to establish whether this is always the case. For example, Gillie & Broadbent (1989) found that when a task was similar to an interruption, performance on the task suffered. Yet they also found that performance suffered in another condition when a task was dissimilar to an interruption. Problems with their experiment have already been noted above, but nevertheless, their contradictory findings highlight how the similarity issue has not yet been resolved.
Summary
Research into interruptions to mental information work has to date been informative, with regards to understanding elements of memory processes, attentional switching and cognitive resources. It has also aided insight into what characteristics of an interruption or a task will result in disruption or enhancement of performance. In particular, according to the above discussion, one might conclude that:

- Attentional switching is more difficult when there is no ‘interruption lag’ (Trafton et al., 2003) to prime a task for resumption and orient towards a new task. This is because memory about current activity impinges on new activity if an orientation period is omitted. This is noticeable especially when switching between unfamiliar tasks (because orientation requires more attention).

- Memory for an interrupted task must be maintained if resumption of the original task is to be successful. Maintenance can take place during lapses in an interrupting task, or by associating the intention memory with an external cue². When an interruption task places high demands on an individual, active maintenance of the memory will suffer. Thus, memory for an interrupted task does not decay with time or length of an interruption, but according to the demands placed on someone during the interruption period/lag.

- When memory has been strongly primed and activated for an original task it can interfere with performance on an interrupting task, even if the original task is closed. This may be especially so when the interrupting task is similar to the interrupted task, as there appears to be an overspill in rule activation.

- Demands on cognitive resources operate on an inverse U basis (see the Yerkes & Dodson law, 1908) where too few or too many demands can result in poor performance. Interruptions place more demands on a person, and so when working on undemanding tasks they may assist in bolstering performance, and when working on demanding tasks they may assist in inhibiting performance.

- When interrupted, inflexible processing may suffer more in terms of time taken to re-engage, and cognitive processing may suffer more in

² However, note that Czerwinski et al. (2000b) and Cutrell et al. (2001), although theoretically in agreement with the principle of environmental cues or ‘markers’ in aiding recall, failed to find that they significantly reduced the disruptive effects of interruptions in their studies.
terms of memory for the intention. Thus, complex tasks need more reminders and automated tasks need more time, to overcome the disruptive elements of an interruption.

In general, the research has focused on exploring how interruptions affect performance by:

1. using the experimental method
2. using enforced interruptions as the object of study (by 'forcing' interruptions onto people, or instructing people to respond immediately to interruptions)
3. concentrating on manipulating external parameters (such as task or interruption characteristics) and measuring external outcomes (such as error rate, task length in time taken, or resumption speed).

This approach has meant that interruptions have been viewed as largely negative and disruptive to one's work. It has also meant that because of the contrived nature of the interruptions studied, results cannot readily be generalised to how people experience email interruptions in the real world. As will be outlined below - email interruptions are a special form of 'controlled interruption', and therefore warrant a different empirical approach. Before addressing this issue however, an introduction to the phenomenon of email at work will be presented, in order to pitch why studying email interruptions is of particular interest to this thesis.

Electronic mail and its dominance in modern working life

Over the last twenty years the world has experienced a technological revolution, which has observed technological capabilities become operational realities in the workplace. From personal computers adorning individual desk space, to mobile phones and electronic mail ensuring communication is quicker, more immediate and more accessible, this surge has infiltrated all of organisational life and has had an all-encompassing effect on the way working life is now structured. Socially, physically, economically, technically and cognitively, the new technology revolution means that our work
experience has changed substantially (Butera, 1995; Majchrzak & Borys, 1998; Symon, 2000a).

Since the 1990s, we have witnessed the widespread implementation of electronic mail (email) systems into the workplace, supporting and influencing the global community that has emerged in the developed world. Email has revolutionised the way that we work, providing opportunities to contact anybody, anywhere in the world, at any time. It has removed contact barriers, bypassed traditional gatekeepers, and provided an immediate communication tool (Arlidge, 2002; Symon, 2000a). In 2001, British Telecom announced for the first time that email traffic was exceeding voice traffic across the BT telephone network, supporting reports of an email explosion. Estimates of the extent of email traffic vary. It is thought that between 49 (Whittaker & Sidner, 1997) and 150 (Arlidge, 2002) emails per day are received by the average office worker, with a ratio of 2.7 emails received to every email sent (Kraut & Attewell, 1997). Alongside such phenomenal growth in popularity and usage, comes the human implications. As we attempt to adapt our working methods to accommodate this new communication device, it is clear that a number of psychological issues are arising.

Current research suggests that email often creates more problems than it solves (such as information overload and communication intrusion – Kraut & Attewell, 1997) because it is being used today in a manner that is quite deviant from original expectation. The elegant functionality of the email system means that workers have been able to exploit its capabilities, well above and beyond the initial specifications (or predictions) dictating its use. Indeed, technological advances mean that people can now engage in multiple activities in parallel, even though cognitive capabilities have not necessarily changed at the same rate or pace (McFarlane & Latorella, 2002). Email has changed the ‘molecular building block’ of operations (Butera, 1995) and become a task in its own right, rather than simply a medium for communication. A 2004 five-day diary study revealed that after dealing with routine tasks, people allocate most of their time each working day (23% of their time) to dealing with email (Czerwinski et al., 2004). Its dominance in the workplace seems indisputable:
In the 5 years since it became common place in homes and offices, email has gone from being the fastest-growing new communications technology to the bane of our working lives. (Arlidge, 2002, p.18).

Yet it is clear that email should not be presented as a failure of new technology. Indeed, if email can be dealt with effectively it appears to have many benefits to workers. For example, Kraut & Attewell’s (1997) questionnaire study of 973 workers found that email users reported to feeling better informed and more committed since its introduction (see also McFarlane & Latorella, 2002). El-Shinnawy & Markus’s (1997) more modest interview-based study of 31 email users found that email was beneficial to workers because:

a) Textual communication allows for editing, thought and manipulation.

b) Email omits the additional processing demands of interpreting accents, voice audibility and voice speed.

c) If the recipient wants to keep a record of the message email affords this instantly.

d) Email acts as a tracker or reference point that can be printed, recorded and filed.

e) Email has permanence.

f) With multi-authored documents and projects, email allows a record to be accessed with reference to the discussion.

Having a communication format that affords the user such a multitude of benefits is unique, and El-Shinnawy & Markus’s (1997) summary thus indicates why email has proven to be so popular in recent years. Since its introduction to the workplace, the way that we receive our email has also evolved. In the early years, an office might have set-up one, single email address to which occasional correspondence was received and downloaded periodically at set times in a day. Today most mental information workers have their own email address and most organisations are connected via ‘broadband’ to the email server at all times. This has increased the flexibility of the email system, and means that as soon as a message is sent, it is also received. Due to the capabilities of broadband, people remain on-line and connected to their email throughout their working day. This has major implications for the study of how email is perceived and managed. For,
whereas people may previously have occasionally checked a generic email inbox, today people are subject to receiving email interruptions continuously and immediately (Pastore, 2001).

Email as a communications device is also, in the most part, now acting as another form of 'interruption'. Most people will be interrupted by an email at least once in the course of completing a work task (Czerwinski et al., 2004). Indeed, email interruptions may now be the dominant form of interruption for people at work (Bailey et al., 2000). As such, advancing the study of interruptions to include this 'new' and unique form (email interruption) appears to be the next logical step for this research domain to take. In doing so, an acknowledgement that email affords a special form of controllable and asynchronous interruption is made.

Email – a controllable form of interruption

For an email to be considered to be an 'interruption', it should not be received via the active checking method. Rather, it constitutes an interruption to another task if it unexpectedly alerts a worker to its presence. This is the case when people are connected to their email server and working away on another task. At such times, as an email is received by the server, an alert will inform the worker of the email presence, and the worker then chooses whether or not to read or respond to the message. Alerts appear in various shapes and forms, but so long as this is received unexpectedly, then the arrival of email conforms to the definition of an interruption. However, as will be discussed below, this is a special form of interruption as the two-stage receipt process differentiates email from other interruptions that have been studied (as discussed above). An email interruption is, alternatively, a form of 'controllable' interruption.

The interruptions studies reported above have all (with the exception of Eyrolle & Cellier's field study) used the experimental method to test hypotheses about when and whether interruptions are disruptive. In most cases, the participant has performed a computer-based task, designed for the purpose of the experiment, and has then been forcibly interrupted with a
secondary task demanding attention, or else instructed to attend to an
task on receipt. Gillie & Broadbent concluded (although on weak
evidence in their 1989 study) that when individuals were given control over
when to attend to an interruption, the interruption was just as disruptive to
their current task. They also stated that the opportunity to control when the
task stops and the interruption starts “...are not important factors in
determining whether or not an interruption will disrupt performance.” (p.249).
Yet, in other studies, when the participant had control over when or whether
to respond to the interruption, it appears that the interruption is less
disruptive, and may even have positive effects on performance (Fisher, 1998;
Katz, 1995; Zijlstra et al., 1999). Thus, despite Gillie & Broadbent’s (1989)
assertion that having control over interruptions is not important, it seems, on
the contrary, to be an area that warrants more research attention. Indeed, it
could well be that ‘control’ is the defining feature that differentiates between
whether an interruption is disruptive or not. As is discussed, email
interruptions are controlled interruptions.

McFarlane (2002) says, “...interrupting people can degrade their performance
and cause them to make serious mistakes” (p.107). When interruptions are
uncontrollable and unpredictable this can induce feelings of stress and
reduced wellbeing (McFarland & Latorella, 2002; Cohen, 1980). Latorella
(1996b, 1998) says that the extent to which an interruption diverts from,
distracts, disturbs and disrupts a main task, depends upon how the system
and recipient manages the interruption. In other words, the strategy chosen
to deal with an interruption will affect how problematic it is likely to be. In
Burmistrov & Leonova’s (1996) experiment, people were interrupted by
telephone when they were working on either simple or complex text-editing
tasks, by either a simple or complex interruption. A complex task took longer,
when interrupted, especially if the interruption was also complex. Burmistrov
& Leonova (1996) concluded that this was due to the fact that people
engaged in ‘extra’ activity on such occasions. The extra activity involved
developing a strategy to deal with the disruptive effects of the interruption.
Their study reveals that even in experimental studies, where there is no
‘designed for’ interruption lag, people will try to exert control over an
interruption by developing strategies to deal with it.
Although interruptions by their nature cannot be controlled (otherwise they would simply be another form of planned activity – McFarlane, 2002), how they are coordinated can be controlled in most real-world situations. McFarlane (2002) identified four methods of coordination (ways of controlling how interruptions are received):

1. Immediate – the interruption arrives immediately and with no warning.
2. Negotiated – the intention to interrupt is announced (e.g., via an ‘alert’ or notification) and the recipient then controls when to attend to the interruption proper. In normal life this is the most common method of coordination as people decide whether or not they wish to accept an interruption.
3. Mediated – A personal broker is interrupted, who then decides how and when to interrupt the recipient. This method adds demands, in that the broker needs to be monitored and supervised to ensure they are performing sensibly.
4. Scheduled – interruptions are only made in pre-designated time slots and therefore are expected. McFarlane says that a situation of ‘constant interruption’ is considered to be scheduled because people expect to be interrupted all the time.

It may be disputed as to whether all of the above methods of coordination still allow the interruption to be considered an ‘interruption’, but according to van den Berg et al.’s (1996) and Speier et al.’s (2003) definitions each method still afford a temporary discontinuation of current behaviour in the event of attending to a secondary set of actions. McFarlane (2002) tested which of these methods of coordination was most and least disruptive by assigning people a relatively undemanding computer game task that could not be automated. Interruptions were then coordinated to occur in four conditions, with each condition testing one of the above methods: immediate, negotiated, mediated and scheduled. The interrupting task was a ‘stroop’ type computer test and once it had begun, it could not be stopped until it had been completed (except in the negotiated condition). Whilst the stroop test was underway, the current task (the computer game) was left to run, thus building up a backlog of events to attend to on resumption.
Overall, the best performance (in terms of accuracy, efficiency and completeness) was found in the negotiated condition, but participants were quicker in the immediate condition. Thus, control appears to limit disruptive effects. In Zijlstra et al.'s (1999) study participants received a telephone interruption by the 'negotiated' format. In the main, participants responded immediately to the telephone interruption, but as the number of interruptions increased (from 1 to 3) in different conditions, participants moved from an immediate to a delayed response. This suggests that when demands are high, and people have control, they will adopt a strategy to extend the interruption lag. In most of the other interruptions experiments this freedom isn't given to participants and so such a strategy is overlooked.

In Katz's (1995) study of telephone interruption control, it was noted that people work better when they do not have to make a decision about whether to receive information about an interruption, so long as they have control over whether to process it. McFarlane's (2002) and Zijlstra et al.'s (1999) findings would concur with this; what people seem to want control over is not how they are interrupted, but what happens once they have been interrupted, i.e., to be able to choose whether to process, delay or ignore the interruption. Email interruptions nearly always afford people this choice. If one considers how email interruptions are normally received - they are coordinated in two stages. Initially people will receive some form of an alert and will then actively make a choice about whether to respond to it. This is a negotiated form of interruption, and although the receipt of the alert cannot be controlled, the ensuing response can:

Several e-mail applications give users some level of control over when to read their incoming e-mail messages. For example, when a new e-mail message arrives, the program can get the user's attention by interrupting them with a signal notification, like a beep and a modeless dialogue box. The user can then decide to immediately allow the interruption or handle it later. (McFarlane & Latorella, 2002, p.32).

An email is not an interruption however if it is actively downloaded. It will only be classified as an interruption if it is preceded by an alert that occurs unpredictably (in order to fit with the definitions of an interruption provided earlier in the chapter). Email is also an asynchronous medium, and may be a preferable form of interruption because, as well as being controllable, it is less
intrusive than synchronous media - such as telephone contact (O’Conaill & Frohlich, 1995). Being a controllable and asynchronous form of interruption, email appears to be a ‘unique’ type of interruption, because, on alert, an interruption can be checked before one decides whether to process it. Katz’s study indicates how important this might be for people.

The previous studies of interruptions, that do not give people an opportunity to control how they deal with them, are not only invalid when it comes to studying email interruptions (as most email systems use a negotiated delivery method – McFarlane & Latorella, 2002), but may also present a situation that is invalid for studying interruptions (and our interruption handling capabilities), per se:

Waiting for an opportune moment before interrupting someone’s task is a social behavior commonly found in human-human interaction. Interrupting a person who is visibly concentrating on a task, except in the most extreme circumstances, is considered rude and socially unacceptable behavior, as it disrupts that person’s concentration. Analogously, we argue that it is equally rude and distracting for an automating application to unnecessarily interrupt a user’s current task. (Bailey et al., 2001, page numbers omitted).

The review of interruptions literature above is useful for providing a context to this thesis, but in reality, the results cited cannot be generalised to our understanding about how email interruptions affect work experience in real-world environments. Rather, in order to understand how response to email interruptions is organised, research on controlled and asynchronous interruptions is required.

Although there is some research available that has used controlled (or negotiated) interruptions, this is still often experimental, or participants are ‘instructed’ to respond. McFarlane’s (2002) participants reported that they preferred the negotiated condition because they felt they didn’t make as many errors and that they were interrupted less often. They also perceived the interruption notifications to have come at more convenient times in the computer game task (although conditions were strictly controlled in each condition). Such results strongly favour the conclusion that having control over one’s interruptions makes a difference to performance overall. Interestingly, in McFarlane (2002)’s study, although the negotiated condition
was the one in which individual control was the highest, up to 25% of participants reported that this was not their 'best' condition. Indeed, McFarlane found that whichever condition participants reported to like the best was the condition in which they gave their best performance. As such, he concludes that individual differences must be allowed for so that people can control interruptions in the way that suits them:

If a critical system cannot be made individually adjustable, it may be necessary to restrict the set of human operators to only those people that 'fit' with the given system design. (McFarlane, 2002, p.98).

This is an interesting distinction to make - the distinction between having decision latitude over one's choice of receiving method, and, being obliged to control the receipt of an interruption. In van Solingen et al. (1998)'s study, when people were informed about how best to respond and were then given the freedom to handle interruptions how they wanted, it was found that people were more efficient. This is in contrast to Miller (2002) who told participants what to do in the interruption lag and found people tried to develop their own strategies anyway. If people want to be interrupted with no warning, and to be forced away from their current task then this, according to McFarlane (2002), is the best way for them to work. Indeed, several studies have recently revealed that the majority of people will respond to an email interruption 'immediately' whilst undertaking their normal work (Jackson, Dawson & Wilson, 2003; van Solingen et al., 1998) Removing choice for people about how to deal with interruptions also removes the opportunity for people's 'innate coordination capabilities' (McFarlane & Latorella, 2002, p.24) to be utilised:

People have a meta-cognitive awareness of their own interruptibility. This is why they sometimes turn off sources of interruption by shutting office doors, turning off telephones, or putting up "do not disturb" signs. ((McFarlane & Latorella, 2002, p.36).

Some researchers have recommended that email systems should be turned off for set periods each day, to overcome the disruptive effects of being interrupted (for example, Jackson et al., 2003). However, such a blanket approach (O'Conaill & Frohlich, 1995) is considered to be inappropriate by other researchers (Speier et al., 2003; van Solingen et al., 1998; Walji et al.,
2004) as an email interruption has the potential to be highly beneficial – so long as people have control over its receipt.

In studying email interruptions to work, it is thus desirable to ensure that a valid delivery method of the interruption is observed. If most email systems are set up to provide a 'negotiated' method of coordination, studying enforced interruptions may bear results that cannot be convincingly generalised to the 'real world', even if in the real world people choose to respond immediately.

Summary

In the existing experimental research on interruptions to mental information work, the interruption is forced into an individuals' conscious awareness. Elements of the task or interruption are manipulated, and external variables that enhance or reduce disruption to goals are consequently noted. A review of this research has been presented, to provide a background to the current concern. However, in dealing with email interruptions, whilst most people tend to have the email 'alert' forced into conscious awareness, they then, a) have a choice about whether to attend to the alert, and b) following a 'checking' procedure, can choose whether to process the interruption or not, before returning to their main task.

The literature review of interruptions research indicates that interruptions will be disruptive to performance when interruptions are similar to the interrupted task, when interruptions are unfamiliar and when task demands are high. Demands may be high because cognitive resources are under pressure due to memory constraints, processing requirements or capacity. However, having decision latitude – and not enforced control (see McFarlane, 2002) - over when and how to deal with an interruption may make them more manageable. In dealing with email interruptions, most people do indeed have control over whether or not to respond.

It seems then that email interruptions are a special form of interruption, because they are controllable. In McFarlane's (2002) terms, the interruption arrival method is 'negotiated'. Having control over one's interruptions appears
to remove some of their deleterious effects. It also appears to be the most 'natural' way that people receive their interruptions (McFarlane & Latorella, 2002). Yet, the research precedent to studying interruptions has rarely acknowledged this, with the majority of findings emerging from studies of enforced interruptions to experimental tasks.

This thesis aims to study email interruptions in negotiated format – a form of interruption that appears to be both suited to our natural dispensation of receiving interruptions, and a form that is perhaps most dominant in today’s workplace (Bailey et al., 2000; Czerwinski et al., 2004). Thus, the focus of this thesis attempts to move away from the current interruptions research precedent of:

- using experimental methodology
- measuring external performance variables
- manipulating external task/interruption characteristics
- assuming interruptions are disruptive

Instead, this thesis aims to concentrate on:

- controllable email interruptions
- studying people's naturalistic responses to email interruptions in the workplace
- how people choose to respond to such email in goal directed work – conceptualised as strategies and action programs (see Chapter Two)
- measuring and understanding non-task influences and consequences in interruptions response
- possible positive features of email interruptions to work.

The next chapter will discuss strategic responses in goal directed behaviour, as a means for framing the research on interruptions. Two theories about how action is regulated in controllable work environments will be presented – Action Regulation Theory (Hacker, 1985, 1994; Frese & Zapf, 1994) and Hockey's compensatory control cognitive-energetical framework (1997, 2000, 2002).
Chapter Two: 
A Theoretical Framework

Introduction

As noted in Chapter One, most of the previous research on interruptions has been based on enforced interruptions and/or experimental designs. This is argued to be unhelpful when studying email interruptions in particular. People can usually control their response to email interruptions in the 'real world', and so if people are controlling their response, assessing that response gives an insight into strategic action. A strategy is a goal-specific cognitive plan or program. Goals are interdependent on each other, so using one strategy necessitates that other goals may be inhibited or facilitated (Dewe, 2003; Hockey, 1997, 2000, 2002). There is no precedent set in the literature for studying strategic responses to email interruptions, and yet studying email interruptions provides an ideal tool for understanding people's adaptive behaviour as work demands and their related goals, change and shift.

In this chapter then, a theoretical framework for exploring how email interruptions are dealt with in goal-directed work will be presented. There is no theoretical model in existence in the interruptions domain (Burmistrov & Leonova, 1996) that explains how or why people deal with email interruptions in the way that we do. In order to understand the impact of this new communication medium upon working life and goal-directed activity, a comprehensive outlook on this topic is necessitated. The theories of Hockey, with his compensatory control framework (1997, 2000, 2002) and the German Action Regulation Theory (Hacker, 1985, 1994; Frese & Zapf, 1994) will be described in some detail and discussed in terms of their appropriateness as guiding models for understanding strategic responses to email interruptions. By the close of the chapter, a comparison of both theories will have been made and related to a series of questions worthy of investigation in an exploratory study of email-related activity at work. Although Chapter Two is the 'theoretical' chapter in this thesis, key aims and hypotheses for the research programme will not be formulated here. It is only
after conducting an initial exploratory study (see Chapter Three), and relating preliminary findings back to the theoretical and empirical context, that the guiding principles for this research programme will be crystallised and synthesised. These will be presented in Chapter Four. As there is currently a dearth of empirical evidence available to explain what strategies are used for dealing with email interruptions in goal-directed work - and why - and because there is no theoretical precedence to explain this, conducting an exploratory study was considered to be the natural first step for generating hypotheses to shape and direct this thesis.

Theories of action in goal-directed work

Hockey's (1997) compensatory control cognitive-energetical framework looks at how individuals employ active strategy response to deal with differences in work demands, according to an assessment of the costs and benefits involved in adjusting their effort expenditure. As such, individuals are portrayed as dynamic and in control - aware of their environment and the changing parameters that may affect their performance, and conscious in deciding how to respond to this. Work demands are seen to be ever-changing and requiring an ever-changing response. Hockey (1997) emphasises that this response is contingent on the level of cognitive processing chosen by individuals to deal with task demands. The adaptive use of strategies for dealing with environmental changes, in order to prevent inefficiency at work and to maximise goal-achievement is also an approach that is central to the German Action Regulation Theory (Hacker, 1985, 1994; Frese & Sabini, 1985; Frese, Stewart, & Hannover, 1987; Frese & Zapf, 1994). Interpreting studies of interruptions in mental information work, according to Hockey’s cognitive-energetical framework and Action Regulation Theory, may provide useful in illuminating our understanding of how email interruptions affect strategies for dealing with work activity effectively. Both theories are now explained in depth below.

Hockey’s Compensatory Control Model

Hockey’s (1997, 2000, 2002) compensatory control cognitive-energetical framework argues that people have finite cognitive resources and a finite
amount of compensatory energy to exploit when situations become tough. He suggests that human beings are goal-oriented and that under pressure or increased demands we actively engage in compensatory control to ensure performance does not decline.

Hockey says that we have a dual processor involved in regulating the distribution of our cognitive resources. The upper loop (high level cognitive processor: Loop B) generates extra energy reserves to cope with extra demands when the lower loop (an automatic, low level system: Loop A), which operates on rudimentary and well-practised activities, exceeds its designated energy quota required to attain a goal. Most normal work activity is conducted in Loop A, but when demands increase an 'effort monitor' is triggered to indicate that more energy is required than can be provided by Loop A. This trigger indicates that it may be necessary to move to Loop B to draw on extra reserves (compensatory energy). A person will then decide whether to activate the upper loop to expend the energy needed to meet the goals of high pressure, difficult or important goals, and whether to switch back to Loop A if energy levels in Loop B need replenishing (sustained effort over a period of time can rarely be maintained continuously). By moving back to Loop A after a period operating in Loop B, means that people may engage in automated behaviours that require little cognitive effort. Energy reserves can then be re-stocked so that the upper loop can kick back in, if necessary. Hockey stresses that such activity is actively decided upon, and is not an automatic response to the situation.

Most of human behaviour may be regarded as automatic, requiring little active control. This is managed by a lower-level control loop (A). However, to deal with unexpected or emergency situations, or tasks that are not highly automated, a second, upper-level, mechanism (B) is also included. This supervisory (or executive) process determines the mode of control adopted to resolve discrepancies, based on decisions of goal orientation and effort regulation, and is assumed to be under voluntary control. (Hockey, 2002, p.219).

According to Hockey's compensatory control cognitive–energetical model (1997, 2000, 2002) there is an effort budget set for each task, based on goal priorities, previous experience, anticipated demand and current state. He says that in working towards goals people may exert additional effort in the face of
increased demands in order to protect performance against disruption. However, because this is at the cost of increased strain to other bodily systems and other elements of work, the application of any strategy involves a trade-off relationship between the use of effort in the service of performance goals and maintaining personal wellbeing. Hockey's model purports that, "The requirement to maintain work goals (or any other cognitive plan) in the face of high workload and environmental stress effectively means having to take on additional emotional demands associated with managing the stress" (Hockey, 2000, p.212).

Effort is regulated to avoid major shortfalls between goals and current performance, especially when under the threat of increasing task demands. When effort exceeds the set point budgeted by the task either effort allocation must be extended (taking the actor into Loop B, with the potential side effect of strain) or the target goals reduced (with the potential side effect of disengagement). Disengagement may involve neglecting subsidiary activity (for example in attentional narrowing), reducing performance output, and reducing self-esteem (because of worry that job isn't done well). However, strain may involve increasing effort at the expense of wellbeing, where people feel tense and weary after exerting extra effort, or may find it difficult to sleep and relax. Hence, even in executing interesting work people may desire to change action or rest, in order to stave off fatigue (Hockey, 2000). Thus, a disengagement strategy protects personal goals at the expense of work goals. A strain strategy protects work goals at the expense of personal goals. Therefore choice of operating mode is influenced both by task goals and personal wellbeing goals with individuals appraising strategic action according to the relative balance and importance of each. These parameters of control operate at an individual level and are moderated by individual differences, such as coping style and stress tolerance (Hockey, 2002). For example, Hockey asserts that 'emotion-focused' people tend towards protecting wellbeing at the expense of performance, and 'problem-focused' people tend to protect performance at the expense of wellbeing.

The emphasis here then is on active management of demands by workers, and Hockey assumes that individuals have choices about how to interpret and deal with environmental factors. Hockey (2000) says that other models often portray workers as passive recipients of stress or demands, whereas his
model asserts that people will actively adjust strategies to deal with increased demands. Such strategic approaches to dealing with increased demands have been explored by Schellekens, Sijtsma, Vetger & Meijman, (2000). They conducted a study of the after effects of mentally demanding work and set up two conditions whereby participants were asked to engage in either mentally demanding (difficult) or mentally undemanding (easy) tasks for a full day (thus representing a realistic time frame of activity engagement). However, interestingly the authors also offered participants financial rewards - dependent on task performance - in the difficult condition, to encourage them to exert greater effort and try hard.

Schellekens et al. (2000) found that in the difficult condition, adrenaline excretion (a measure of stress and effort) increased as the day wore on, and two hours after the experiment had finished, participants in the difficult condition reported feeling more exhausted than those in the easy condition. When the participants reported feeling tired, both speed and accuracy were impaired, but the decrease in accuracy, "...was accompanied with a tendency to speed up reaction time. The shift in speed-accuracy trade-off in favour of speed was related to a drop in effort" (p. 53). Essentially, Schellekens et al. (2000) concluded that although effort and speed increased during difficult activities, so too did fatigue and error rates. This study clearly supports Hockey's (1997, 2000, 2002) notion that people engage in cost-benefit assessments in adapting to changing workload, and that sustained effort can have longer-term repercussions to wellbeing and performance.

Interruptions and new technology demands
Arguably, a major source of demands and increased workload is the presence of interruptions to work (Hockey, 2000). As interruptions are unexpected and because they place additional demands on people already engaged in tasks, studying people's strategic responses to interruptions assists in supporting or refuting Hockey's model. The active management of demands, when dealing with interruptions, can be noted in the work of McFarlane (2002) who observed a change in participants' strategy when interruptions were introduced. He found that the most effective performers were those who were able to respond flexibly to the change in situation, for example by multi-tasking or utilising environmental cues, whereas the least effective performers continued with their original course of behaviour, even when it was proving to
be detrimental. Additionally, Zijlstra et al. (1999) found that as demands increased (i.e., interruptions increased in frequency) people adopted a strategic approach to their activity by reducing the time spent dealing with subsidiary activity (which could be due to attentional narrowing). This performance protection strategy resulted in lowered wellbeing, a finding that clearly supports Hockey's claims that protecting performance goals will be at the expense of wellbeing goals.

Zijlstra et al.'s study also supports Hockey's assertion that experimental studies are limiting because the strategies observed can rarely be generalised to the real-world. In the real-world Hockey says that people are more likely to protect *emotional* goals, because these have an adaptive element. People often choose to rest or take a break from demanding work in order to boost energy and avoid becoming tired (Hockey, 2000). However, in experiments tasks are transient and personally meaningless and people will tend to work 'flat-out' towards experimental goals in a way that may not reflect reality (Hockey, 2000). Chapter Five continues this discussion.

Mental and attention demands at work are experienced when the relationship between input variables (e.g., individual effort) and output variables (e.g., accomplishment of goal) are inconsistent or variable, or when one's cognitive resources are stretched and offer limited capacity (Gaillard & Wientjes, 1994). Woods & Patterson (2001) note how many new technological systems let the user down as work demands exceed the operating scope of the design. Whilst not specifically discussing the features of email interruptions, Woods & Patterson (2001) nevertheless provide some interesting insights into how email users might respond at work during times of overload. They discuss the concept of 'escalation', a cascade of effects that result when demands on a system suddenly emerge all at once and place cognitive and coordinative demands on the user. When related to email, escalation may refer to times when multiple messages are received, creating a bottleneck of demands that an individual must deal with in order to ensure work is carried out effectively.

Woods & Patterson (2001) suggest that such bottlenecks are dealt with by:

- eliminating communication or coordination with others
- tailoring the system to reduce cognitive burdens
- adapting strategies for carrying out tasks
• abandoning systems or workloads altogether.

These are clearly adaptive responses relating to attentional narrowing (performance protection), and disengagement (wellbeing protection), and would fit with the conclusions made by Hockey (1997, 2000, 2002) that people are as dynamic as changes in workload, and that a weighing up process between cognitive resources, wellbeing and work demands are actively applied in order to control the effects of incoming pressures that interruptions might afford.

Adaptive behaviour has its costs then, and indeed Schönpflug (1992) explicitly states that effort regulation usually involves some trade-off with speed and accuracy and wellbeing. *Usually* is the operative word here though, for if there is unused 'space' available in one’s cognitive resource capacity, exerting effort may well increase speed, accuracy, the difficulty level of a task and desire for feedback all at the same time. This is because Schönpflug says that increasing effort can motivate one to achieve, so long as one isn’t overloaded. To test this, he allocated participants to one of two conditions in his experiment in 1992. In one condition participants were instructed to exert a high level of effort, and in the other condition they were asked to relax. They were then either given the freedom to choose from a range of easy or difficult tasks, or else were allocated these tasks with no choice. Participants were encouraged to work swiftly and accurately, and were told they could receive feedback on the performance throughout if required.

Schönpflug (1992) found that exerting effort resulted in reports of lower concentration and higher fatigue, but also higher accuracy (especially if time was unlimited). Exerting effort also led people to choose easier tasks and reduce their call for feedback *unless* they had extra reserves of cognitive resource available. Thus, the difficult tasks were pursued and more feedback was required. Schönpflug concludes that a trade-off will usually exist between exerting effort and the tasks one chooses to work on, and the level of performance exhibited, that is, unless one has the cognitive resources available whereby exerting effort becomes linearly enriching - enhancing performance levels, wellbeing and task choice. Zijlstra et al. (1999) and Speier et al. (2003) would concur that increasing demands can be motivating. In their studies of interruptions to tasks they found that when cognitive demands of the task were low, increasing demands (i.e., via the presentation
of interrupting tasks) meant people worked faster (Speier et al., 2003; Zijlstra et al., 1999) and more accurately (Speier et al., 2003).

**Underload and strategic response**

Although interruptions affect the pace and complexity of our work, in the absence of task demands we can also experience problems of underload - in particular this manifests as feelings of boredom (Hill & Perkins, 1985). Boredom appears to result when individuals are required to continue working on mundane activity well beyond satiation point (the point when they would choose to abandon the work activity - Barmack, 1939, Scerbo, 2001). As Robertson (2003) says, “Fluctuations in vigilant attention are often most readily and quickly seen in the context of routines... where the monotony of well-practised routine tends to lull the brain systems needed to maintain alertness into quiescence” (p.477). Under such circumstances, when underload appears to be setting in, novelty, challenge and difficulty may increase arousal and prevent the decline from boredom into stress (Robertson, 2003). The inverse U relationship between arousal and stress is important to consider here (see Yerkes & Dodson, 1908), as increasing stimulation when working on routine and non-demanding tasks can improve performance, but the same level of stimulation applied when people are engaged in complex or demanding tasks can impair performance (Robertson, 2003). Again, a key feature here is that of control. If people have no control or choice over whether to increase task demands, then stress or boredom may be felt most acutely.

Hockey's model does not explicitly discuss underload or the notion that a lack of energy or effort applied to a task may require extra reserves to stave off boredom. However, Parasuraman & Hancock (2001) do discuss underload in their model of adaptive behaviour to changing work demands. They note that during periods of decreased task load fewer cognitive resources are required, which, over time, can result in feelings of boredom as individuals are understimulated. At such times people may actively attempt to increase their load to increase their energy levels (Hancock & Warm, 1989). This is not something that Hockey discusses, as he refers to people's decision to move into an upper loop as being based on the triggering of an effort monitor, which indicates that more energy is required to cope when demands are too high. According to Hancock & Warm (1989) if demands are too low then this
may also trigger activity. They say that when people are understimulated they increase activity in an adaptive fashion to heighten arousal and energy. This would fit in with the findings that people seem to need stimulation from interruptions when they are bored (Fisher, 1998), or when tasks are undemanding (Speier et al., 2003; Zijlstra et al., 1999). It may be that Hockey could consider a lack of demands as another reason for why people may move from a lower to an upper loop. In studying interruptions, it may be that email interruptions can have positive implications for people engaged in boring or understimulating work as it raises their energy levels.

Stating that, "...the stress of vigilance is a result of both task demands and boredom" (p.276), Scerbo (2001) has made a study of satiation points in vigilance that can lead to perceptions of stress if ignored. Scerbo & Sawin (1994) found that 17% of participants in their study continued with a task even when it had become boring, in order to please the experimenter. Whilst task variety (which might be offered with the introduction of interruptive tasks) may delay the onset of boredom, once satiation point has been reached, feelings of boredom are then replaced by feelings of strain (Scerbo, 2001). This appears to be due to the fact that individuals feel they cannot control the situation – they have to keep working even though they don’t want to – and this could make them feel helpless and stressed.

In light of this, although an interruption during a ‘boring’ task may be welcomed and could prevent the onset of satiation point and perceptions of stress (Fisher, 1998), if the interruption does not come soon enough the boredom satiation point may have already been met and feelings of stress could already exist (without having anything to do with the interruption itself). Thus interruptions in experimental studies will not always be stimulating when one is working on routine and monotonous tasks. If the monotony cannot be controlled and has provoked boredom that is about to be interpreted as ‘stress’, then the presence of an email interruption could be enough to result in the individual developing a full-blown ‘stressed’ reaction. Control over task demands, interruption demands and current levels of stimulation may all need to be assessed if one wishes to predict when interruptions will disrupt performance.
Time pressure
Along with the workload demands associated with meeting task goals in the face of interruptions, there is evidence to suggest that time pressure can add an extra burden (as seen in Schellekens et al.'s study whereby speed was played off against accuracy and effort when people worked towards a deadline). It appears to be the case that there is an inverse U relationship between time pressure and task performance or satisfaction. Too little time pressure causes boredom and a lack of efficiency (as people are under-aroused), but too much time pressure can cause overload and dissatisfaction. Freedman & Edwards (1988) demonstrated that this inverse U relationship existed between time pressure and:

- task enjoyment
- task productivity
- personal discomfort
- feelings of boredom.

However, a linear relationship existed between time pressure and tension. In their experiments, Freedman & Edwards found that the optimal point of time pressure depends upon the type of task engaged in, individual differences (e.g., personality characteristics), consequences of failure, and the duration of the activity. Being interrupted when under a deadline per se need not necessarily result in lowered task enjoyment, productivity, personal discomfort and boredom then.

Seshadri & Shapira (2001) present a model of how managers, attending to a long-term project, deal with short-term processes requiring their attention. They especially concentrate on the effect of interruptions to the long-term project goal. In their model they consider an effective strategy to be one that ensures satisfaction of both the long-term goal and the short-term processes. They note how working under time pressure leads to strategy changes in working towards one's goals, and in particular negative cues are given more emphasis. They say that under time pressure, sequential (rather than parallel) processing is best for guiding attention allocation when complex tasks are involved. This is similar to Hockey's conclusion that people may engage attentional narrowing to protect performance when demands increase. Accordingly then, this may be a strategy that is especially useful, when working under a deadline.
However, Seshadri & Shapira (2001) also say that effective managers need to set a contingency into their system for prioritising tasks because they should expect to receive interruptions during task activity. So, those who expect interruptions and have this worked into their strategy should be able to shift back and forth amongst projects, and therefore engage in parallel processing more easily. In today’s modern work environment, where we can expect to be interrupted by email, the phone or a colleague every 11 minutes (McCarthy, 2006), planning for interruptions may mean that effort expenditure allocated to any work task also includes a reserve for dealing with these additional demands, at least in effective workers (Seshadri & Shapira, 2001).

Summary

If we concur that interruptions to one’s work provide a source of demands, then Hockey’s compensatory control cognitive-energetical model (1997, 2000, 2002) provides a means for exploring how people are likely to deal with such demands – when they have control. One of the few types of interruption that naturally occur at work, and that appear to offer people control over whether to and how to respond, are email interruptions.

Hockey emphasises that people are strategic and that in the face of demands they attempt to adopt active coping strategies, selected according to how they prioritise work (performance) and wellbeing goals. Strategies for coping with extra demands, such as interruptions, may include disengagement with a task goal, exerting extra effort (moving into an upper, compensatory energy loop) and attentional narrowing. However, to understand why any strategy is adopted, one has to understand the whole person-environment interchange. For example, attentional narrowing (such as by ignoring the interruption) may be adopted either to protect performance of the main task and/or to reduce strain experienced by increased demands (protecting wellbeing goals). Thus, whilst email interruptions may provide a useful way of investigating strategic action in goal directed behaviour, it seems that one also has to ask people why they adopt such strategies to fully understand the reasons for their emergence.

Whilst Hockey’s model clearly explains what happens when people are faced with too many demands at work, it doesn’t adequately conclude how people cope with too few demands. This is where Hancock & Warm’s (1989), and
Parasuraman & Hancock’s (2001) approach is useful to consider, as they indicate that people may attempt to increase energy levels when underloaded. This would provide an explanation for Fisher’s (1998) findings – that interruptions can, in fact, be desirable when people are bored at work. If one finds that email interruptions increase energy and arousal levels when bored, this may be a case for Hockey to include a consideration of applying extra energy to deal with underload as part of his model.

German Action Regulation Theory will now be presented as an alternative to Hockey’s. This is a grand theory of behaviour in goal-directed work, developed to bridge the gap between cognitive and motivational frameworks, and between cognitive and behaviourist schools of thought (Hacker, 1994). As such, this theory also attempts to explain strategic behaviour at work, as one attempts to reach one’s goals. Further, it aims to provide guidelines in the design of work, accordingly. Thus, such a theory lends itself to the study of email interruptions, and may also assist in helping to generate policies relating to how best to manage them.

**Action Regulation Theory**

Winfried Hacker’s Activity Theory provides an explanation for how individuals plan and regulate their work activities. Hacker (1985) and his colleagues, Frese & Zapf (1994), Frese et al. (1987), Frese & Sabini (1985) with their Activity Theory (Hacker, 1985, 1994) and Action Theory (Frese and his colleagues) explain how individuals engaged in mental information work are oriented towards achieving goals that have a personal and organisational value. These goals are worked towards using plans and strategies that are regulated at different levels according to how automated or complex they are, whilst dealing with environmental changes (such as interruptions) and social influences en route. What is apparently unique about Action Regulation Theory is the concentration on how goals and activity are mentally represented, and how actions and strategies are regulated in order to maximise efficiency at work. Pervin (1989) states that goals are seen as basic

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3 Hailing from the German school, non-German speakers may find it difficult to access Hacker’s work as he usually writes in his native tongue. This means that studying his theory requires an assessment of other bi-lingual theorists’ interpretations of his work (namely Frese & Sabini, 1985; Frese & Zapf, 1994; and Zijlstra, 1993) or a study of translated work (e.g., Frese & Sabini’s translation of Hacker’s 1985 chapter). This is not an ideal situation for fully appreciating what Hacker’s individual point of view is, but does enable the non-German speaker to grasp a general overview of his work.
organising categories, used to organise information about situations and social interaction; i.e., we interpret our world according to the goals that we have active at any point. According to Hacker (1985) in understanding goal-directed activity, one must understand that a goal:

- Is a, "...reality that does not yet exist"
- Is connecting the present with the future
- Is coordinating motivation with cognition
- Is both an anticipation and an intention
- Regulates individual activity
- Is socially derived
- Involves object-oriented activity
- Does not occur concurrently with many other goals (or else working memory may be overloaded).

Hacker (1985) positions his theory within the discipline of Occupational/Industrial Psychology, and discusses employees' work plans, strategies and cognitive processes from an applied perspective. He places his theory in the context of mental information work and distinguishes his approach from traditional cognitive approaches by emphasising how Action Regulation Theory is concerned with looking at: a) the whole activity cycle from orientation towards a goal, to enacting, environmental feedback, and goal outcome; and, b) how actions influence and are influenced by social and normative values at work. The emergence of Action Regulation Theory has complimented the rise of mental information work and provides a useful structure for studying email interruptions within such a context.

What is Action Regulation Theory?
In his 1994 paper, Hacker reviews the work on Activity Theory and Action Theory, using the all-encompassing term of 'Action Regulation Theory', describing this as:

...a couple of approaches dealing with the mental regulation of goal-oriented actions and the organization of the regulating mental processes and representations (p.91).
He pitches Action Regulation Theory (ART) as being routed in German Psychology, and related to goal-oriented work activity. In particular he states that ART attempts to overcome limitations of behaviourism and pure cognitive perspectives, which are inadequate in their ability to explain goal-oriented behaviour and provide guidance for the design of tasks and work. Hacker (1994) explains that ART insists on looking at activity at work as being more than a stimulus-response relationship, thus going beyond the confines of traditional behaviourist approaches. He says that activity at work is goal-oriented, and motivational. Cognitive and economic values associated with such goals indicate that individuals who are able to exercise 'decision-latitude' or control over their work are usually attempting to work optimally and produce the most efficient behaviour by use of conscious strategies and action plans. As such, they do not simply respond to familiar situations automatically and sub-consciously. Their action has a purpose and is actively decided upon:

Action Theory stresses the way we go about creating specific plans in specific environments to reach specific goals.... It also suggests we have at hand abstract, schematic plans [telling us what environmental information is needed to hone these plans], and heuristics telling us how to proceed once we have that initial information. (Frese & Sabini, 1985, p.xxiv).

Acting is seen as a cognitively regulated, goal-directed process based on programs and flexible strategies. (Zijlstra, 1993, p.24).

Hacker's use of the term 'activity' goes beyond looking at cognitively derived behaviour therefore, ensuring that the precursors to that behaviour, the context of the behaviour and the implications of the behaviour are all considered at an individual and organisational/social level. Although Hacker does break activity into stages and units of cognitive and motivational components, he stresses that any component part of a complete activity is influenced by all of the other component parts and consequently cannot be studied in isolation if one is to fully appreciate how such activity occurred and was maintained.

The Action Regulation Theorists are keen to emphasise the importance of complete activity. Only by studying a complete cycle of activity and goal-oriented behaviour can one understand why people have undertaken the
course that they have and how this relates to the value attributed to their goals and action sequences.

Decision latitude, activity latitude, or autonomy is the most important variable in tasks as far as the Action Theories are concerned. Complete activity, for example, offers the decision latitude needed for self-set goals, comprehensive cognitive task accomplishment, and intrinsic motivation. (Hacker, 1994, p.102).

This means that, like Hockey, rather than simply looking at strategies used to deal with email interruptions, one also has to consider why such strategies were used, and how this relates to personal concerns and goal priorities. Hacker accordingly emphasises the future-focus of his theory – he is concerned with understanding the influences on, and effects of, work activity in order to improve how work is designed to get the best out of people and improve efficiency and learning. He contrasts this with the traditional cognitive perspective, stating that such a perspective tends to be concerned with how individual units of cognitive processes occur in the present, devoid of a contextual appreciation.

The activity cycle
Essentially "Activity" is arranged hierarchically. The broadest category of behaviour is "activity" – the complete action cycle that is motivated and regulated by superordinate goals (Hacker, 1985). Activities are realised through "actions", which are individual behavioural programs that have their own sub-goals linking into the superordinate activity goals (Hacker, 1985). In addition, actions themselves have subordinate components – "operations" – that do not have goals of their own, but are basic movement patterns or cognitive operations (Hacker, 1985; Zijlstra, 1993) required to enact an action program. There are five stages involved in planning and regulating work activity, and these stages tend to be controlled by anticipations (of likely outcome) and mental representations of executions (and their likely viability) (Hacker, 1985). There is some dispute as to whether people really move sequentially through this series of stages in executing action (Lazarus, 1985), but nevertheless, broadly they provide a means for understanding how one moves from orienting towards a goal to enacting an action program. These stages are as follows:
1. **Defining the goal**

The individual takes a work task and redefines it as a ‘goal’ requiring achievement. Autonomous goal-setting was found by Hacker (1985) to be one of the most important determinants of performance, wellbeing and motivation. Impediments to personal goal setting cause stress and reduce workers health. The more active we are in setting goals and controlling goal-related activity, it appears the more satisfied and efficient we are too. In much of the previous work on interruptions the goals of the task and the interruption are set by the experimenter. Thus the activity observed is not complete, and so does not represent the way people usually work towards goals.

2. **Conditions of execution**

Activity is led and controlled by conditions of execution. The worker assesses: what the environment affords to help or hinder the achievement of the goal; what characterises the external world and how this may influence goal pursuit; and, what elements (e.g. heuristics, skills or memories) the worker holds that may be of use in tackling the goal. The worker must also assess their object or activity partners, as the “rules of transformation” associated with these need to be known in order to manipulate or work with them. Objects or activity partners can include tools (such as a computer or email system) or a person (such as a colleague or team member with his/her own goals and priorities). All such considerations are known as ‘conditions of execution’ to which the worker must orient towards in order to devise their action programs.

3. **Orientation towards sub-goals and action programs**

With an appreciation of the goal, and the conditions of execution the worker can construct appropriate sequences of sub-goals and action programs. The execution of these action programs relies on component operations. Frese & Sabini (1985) say that plans (action programs) are developed from limited heuristics already in existence in memory that are called upon when situational parameters match the parameters associated with the plan. The most major source of new plans or action programs is old plans or action programs. We shape and amend our own plans, and also borrow from other people’s plans (Miller, Galanter & Pribram, 1960). Essentially, the worker holds a library of action programs and plans in
memory, represented simply and schematically to be applied to a range of situations once they have been tweaked and adjusted appropriately (Zijlstra, 1993). The library is known as the Operative Image System (OIS).

Strategic knowledge about a situation has a, "...decisive, action-preparing role" (p.99), helping knowledge holders decide what specific action plans they need to formulate or use in relation to the demands (Hacker, 1994). So, strategic knowledge4, according to ART, makes a difference between creating and using rough, general plans, and more specific, informed plans. Strategies differ according to the complexity of a problem and the expertise of the worker; they also differ according to the familiarity the worker has with the problem. In this sense, experts have been found to verbalise more strategies relating to problem situations compared to non-experts.

In dealing with problems, two types of strategy may be used – opening up and narrowing strategies. When faced with routine and familiar problems, stored solutions and strategies are drawn on at a low level of regulation to check, or open-up, the problem-solving situation. However, when these opening-up checks fail to offer a solution and the checks draw a blank, the worker is faced with a novel problem, for which there is unlikely to be a stored solution readily available. As such, they need to narrow their attention, ask more specific questions and engage in active, strategic problem-solving at a more intellectual level. At such times, information from other goals (such as afforded by an email interruptions) may be ignored.

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4 Miller et al. (1960) define knowledge as the 'image' (what one knows), and action as the 'plan' (what one does/intends to do). They note that:
- A plan (action) can be learned and so can become part of the image. This relates strongly to how action programs are stored within the OIS.
- Images (knowledge) help to form the plan in the first place, as it is through knowledge that guides for behaviour are created.
- One's image can be changed/amended/added to via plans for gaining, exploring, storing and interpreting information. (i.e., knowledge is only gained by actively deciding to go and seek it and incorporate it back into 'schema').
- One's plans will be changed only by taking information from one's image (i.e., only through knowledge of the environment/action/boundaries/goal will a plan be amended. 
4. Decision making

Assuming the worker has the freedom to choose (decision latitude), decisions are made between different variants of execution (i.e., the different action programs available in the OIS), according to what is most appropriate and most likely to result in success at the sub-goal and superordinate goal level. Individuals will choose an action program after establishing which program best matches the parameters of the situation or task. There are a number of parameters to be considered, including difficulty, specificity, valence and time range (Frese & Zapf, 1994). An action program's rules or sequence may change, depending on each of these. Frese et al. (1987) state that there are hierarchical arrangements of goals and plans usually consisting of minor and major goals and subgoals, plans and subplans. I.e., a major goal may require specification of smaller subgoals, which lead towards the main goal. Additionally the plans used to achieve the major goal must also comprise subplans to achieve the subgoals en route. These decisions are also operations.

5. Execution

Once the decision has been made, action programs are executed, whilst the goal, the conditions for execution, the sequence of sub-goals and action programs are constantly being re-assessed in light of environmental feedback. At any point a decision to change the execution of the action program may be made if the desired end result looks unattainable (or looks as if it could be attained more efficiently). Frese & Sabini (1985) state that the execution stage can be embarked on even if stages 1 to 4 are incomplete, so long as one has a general goal and a general plan to follow. They state that the details of an action can be considered once it has started, as feedback from the environment affects our appraisal of the efficacy of what one is doing. In this way, once a program has been accessed and applied it is then amended and shaped as the action is underway, as new environmental parameters come into awareness (such as interruptions). Feedback about how effectively an action program has been applied will then be re-admitted to the OIS for future reference (Zijlstra, 1993). In addition, how closely one regulates execution depends upon one's experience of that situation and action program. Well practised programs and highly familiar situations, may involve less mental
regulation\textsuperscript{5} than challenging programs applied in novel circumstances (Zijlstra, 1993).

Hacker (1985) feels that questions are unanswered about how action is kick-started. In other words, at what point do mental representations (cognitions, goals, intentions and plans) lead to action itself? Frese & Sabini (1985) suggest that the key determinant that kick-starts action is opportunity. The presence of an obstacle may inhibit the development from planning (or a 'wish', in Frese & Sabini's terms) to acting (or 'intention to act', in Frese & Sabini's terms). Opportunity for action may frequently present but will presumably require some level of evaluation before action is carried out. Miller et al. (1960) say that the presence of intention enables us to differentiate between a chain of actions and a plan of actions. With a chain of action, one does not have an internal representation (an image, or 'knowledge') of what its complete course is, and so is spurred on from one stage to the next by the previous stage. A plan of action suggests we have an internal representation of the complete activity, and all of the stages to be enacted to reach the desired outcome.

As seen, action programs, goals and feedback from the environment (and other conditions of execution) are being consciously regulated, anticipated and processed throughout the activity's life span. Frese & Zapf (1994) say that the core of action planning lies in the feedback cycle – the continuous comparison of the goal to the actual outcome (comparing the ideal with the reality). The level of congruence between one's expected outcome and the likelihood of reaching it, according to current enacting of an action plan, will influence whether an action plan or goal needs to be reappraised.

Action Regulation Theory suggests that the TOTE unit – Miller et al.'s (1960) unit of analysis that can be applied when studying all aspects of action – is central to our appraisal of congruence. TOTE stands for Test -> Operate -> Test -> Exit; the organism tests the status quo, assesses proximity to the desired result, and 'operates' or acts to increase proximity, before testing the status quo again. When satisfied that the status quo matches the desired end state, action stops – the behaviour is exited and the goal (usually sub-goal)

\textsuperscript{5} Forms of mental regulation are discussed later.
has been reached. The test phase is the feedback phase, reporting back on whether the strategy for action is working. If the action program is not appropriate to the situation (which is often ever-changing) then an alternative operation must be found. This means that any operation needs to have test phases built into it, continuing as a loop until the end state has been reached. This ensures the appropriate outcome is met, with control transferred from the test to the operational and then to the exit phase. Miller et al. (1960) say that where a TOTE unit exists, this indicates that a plan is available - an organising and co-ordinating unit for behaving.

Thus a complete activity cycle involves preparation, organisation, execution of intention and checking results against valued goals. Email interruptions may intrude upon an action program already in operation, and, if the goal of the email is accepted, will then require an action program to be satisfied in its own right. Assessing the strategy used to deal with an email interruption, within the ART framework thus appears to be a useful way of understanding how complete activity is arranged, structured and processed as people at work attempt to achieve their goals.

Levels of regulation
Hacker (1994) notes that there are three levels involved in the mental regulation of activity, each producing a different degree of mental/cognitive activity (output) appropriate to environmental demands and requirements (input).6 These levels are represented in Figure Two:

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6 Frese & Sabini (1985) did not agree that mental regulation of activity has three distinct stages, but rather suggested that there is a continuum of mental representation from automated action to directly controlled action. Indeed, they state that actions that were once under direct control may become automated as plans are rehearsed and practised, i.e., until they require a lower level of conscious attention. However, by 1994, Frese (with Zapf) was arguing that there were distinct stages involved in regulating action, but that there were four rather than three of these. Whilst levels 1 and 2 seem to roughly agree with Hacker (1985, 1994), level 3 had been split into two distinct arenas: The intellectual level: whereby a complex analysis of strategy is required. Knowledge, rule and skill-based strategies are applicable at this level - as one consciously appraises which is best for the situation; and The heuristic level: the use of meta-cognitions - testing cognitions and developing abstract strategies and heuristics for overseeing all representations.
Figure Two: The three levels of regulation

<table>
<thead>
<tr>
<th>Level</th>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Senso-motoric</td>
<td>Unconscious regulating processes and</td>
<td>Programs for elementary movement patterns,</td>
</tr>
<tr>
<td></td>
<td>representations</td>
<td>almost entirely automatic and barely regulated</td>
</tr>
<tr>
<td></td>
<td>Kinesthetic signals requiring little</td>
<td></td>
</tr>
<tr>
<td></td>
<td>conscious attention</td>
<td></td>
</tr>
<tr>
<td>2 Perceptual-</td>
<td>Familiar perceptual classifications</td>
<td>Previously developed and</td>
</tr>
<tr>
<td>conceptual</td>
<td></td>
<td>sometimes conscious</td>
</tr>
<tr>
<td></td>
<td>Processes one can regulate consciously but</td>
<td>action schemata are reproduced based on brief</td>
</tr>
<tr>
<td></td>
<td>is not obliged to have in</td>
<td>analysis of the situation.</td>
</tr>
<tr>
<td></td>
<td>consciousness</td>
<td></td>
</tr>
<tr>
<td>3 Intellectual</td>
<td>Intellectual operations of analysing and</td>
<td>Conscious plans, meta-</td>
</tr>
<tr>
<td></td>
<td>synthesizing, often novel and unexpected</td>
<td>plans and strategies are chosen and developed</td>
</tr>
<tr>
<td></td>
<td>situations</td>
<td>based on complex analysis of the situation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedback is interpreted at every stage to track</td>
</tr>
<tr>
<td></td>
<td></td>
<td>progress</td>
</tr>
</tbody>
</table>

(After Hacker, 1985; Zijlstra, 1993)

When one is unfamiliar with a situation a higher level of regulation is adopted to minimise the likelihood of error and to ensure a more thorough assessment of a situation (Zijlstra, 1993). The level of regulation used may change during the life cycle of an action program as the individual adapts their behaviour to be more efficient at any point and as environmental or goal parameters change. It is worth noting here that Zijlstra (1993) does not feel that Hacker adequately explains how the three different levels of regulation are themselves regulated; i.e., when applying an intellectual level of regulation, how does the worker keep a check on how effective this is? Zijlstra (1993) suggests that one regulates the level of regulation by using the next level of regulation up (e.g., the execution at the senso-motoric level would be regulated by the perceptual-conceptual level):

...monitoring is regulated at the level next highest to the one where the actual operations are executed (p.22).

However, Zijlstra (1993) does not explain how the intellectual level of regulation can be regulated, as there is no higher agency to monitor it. An interpretation of Hacker's (1985) chapter might suggest that feedback and monitoring of the efficacy of any activity sequence is regulated by the level of
regulation also involved in execution. Frese & Zapf (1994) however suggest the presence of a fourth level of regulation that, in agreement with Miller et al.'s (1960) work on plans and meta-plans, suggests there is a heuristic level acting as a broad overseer of all strategies and executions.

The number of levels involved in regulating activity may be contested by the Action Regulation theorists, but the general point is that the more familiar one is with a strategy the lower the level of regulation that is required to deal with it, and the less cognitively demanding this is. It is desirable for activity to involve higher levels of regulation as this indicates activity is complete rather than partialised (i.e., a complete activity loop is involved) which promotes learning, knowledge and self-development (Hacker, 1994). In more cognitively demanding jobs higher levels of regulation are required in order to carry out intellectual activities. In jobs that do not require a great deal of cognitive thought, such as automated jobs in factory lines or unskilled manual jobs, lower levels of regulation are mainly used. In such jobs learning is not a regular occurrence; once the demands of the job have been initially learned there is little conscious regulation involved.

Essentially automated plans for action are stored schematically and almost unquestioningly applied day-to-day as situations and parameters remain unchanged (Frese & Sabini, 1985). However, in intellectually demanding work, existing strategies may need to be adapted according to new demands and new strategies or heuristics devised to deal with novel situations. Workers need also to be continually appraising likely consequences and anticipating the effects of their actions on goal accomplishment to ensure they adapt appropriately to a challenging environment (Beach, 1985). Thus activity has a role in developing learning opportunities. Hacker (1985) says that personal enhancement is most likely to occur when the mental processes regulating activity are of a high level, requiring intellectual thought and conscious

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7 Miller et al. (1960) find the concept of metaplan interesting, almost from a philosophical perspective, because if one has a metaplan for executing another plan or set of plans, it indicates a hierarchical arrangement that is potentially never-ending. They try to explain that one generally has a heuristic - a broad set of principles about how to do something - that can apply to a range of plans and that this is the top-most level. The plans that are created from such an heuristic will be hierarchically established down the chain but not upwards. They say that, "Working backwards is one of many heuristic methods known to all good problem solvers." In a sense, like Hacker (1985, 1994), this suggests that the problem solver will start with an end goal and then work from there.
processing of strategies. Such regulation would usually occur when the worker is facing novel and challenging situations (Zijlstra, 1993).

ART also says, however, that people try to optimise efficiency in working towards their task goals. "Efficient" working, from ART's perspective, involves working at the lowest level of regulation possible, and using the fewest transformational steps to achieve a task goal successfully (Hacker, 1985). So, whilst operating at high levels of regulation promotes learning, the aim is to automate one's action programs, as this promotes efficiency - a key construct in ART. Efficiency is discussed at length in Chapter Four, but its conceptual importance to ART is noted here.

**ART and interruptions**

Returning to the studies of interruptions outlined in Chapter One, ART allows us to hypothesise that how people deal with an email interruption to work may depend upon what level of regulation is being applied to an existing work task. When people were engaged in demanding work, which is likely to require operating an action program at a high level of regulation, interruptions may be avoided or ignored, when people have control over their response (Burmistrov & Leonova, 2003; Eyrolle & Cellier, 2000; Zijlstra et al., 1999). However, when people are working on simple or boring tasks, that probably require a low level of regulation, they appear to be receptive to interruptions (Fisher, 1998) or at least don't find them to be disruptive (Speier et al., 2003). Indeed, Biner & Hannon (1988) found that easy tasks are considered to be more attractive when they are interrupted, compared to when they are not interrupted, especially if the interruption is longer. Email interruptions that occur when people are operating at a low level of regulation compared to a high level of regulation may thus afford different strategic responses from people.

If email interruptions also afford their own goals then they may require enacting of an action program in their own right. Most of the previous work on interruptions has conceptualised interruptions as hassles or obstacles to current task achievement (Bailey et al., 2001, 2000; Jackson et al., 2003; McFarlane & Latorella, 2002; Zohar, 1999), but ART allows us to consider that an interruption may itself have task fulfilment requirements. Indeed, in the context of complete activity, the goal of the email interruption may even be
more important than the goal of the task. In which case, when people have control over their response they may choose to abandon the current task and formulate an action program for achieving the interruption. ART thus adds theoretical credence to the suggestions of Walji et al. (2004), and O'Conaill & Frohlich (1995), that interruptions need not always be construed as negative, but as tasks in their own right. Thus, it is not recommended that effectiveness at work should simply concentrate on measuring how an existing task is affected by an interruption. Rather, it is encouraged that the focus be on how complete activity – work as a whole – profits or loses from one's strategic response to interruptions. Moreover, strategic response can only be studied if the interruption itself is controllable – as indeed email interruptions are.

Summary
Action Regulation Theory is a theory that can be applied to workplace situations where people have control over their activity. At such times, observing their strategic response to situations and goals can inform understanding about how goals are represented, how activity is regulated, and how work can be better designed to enhance learning (adopting higher levels of regulation) and efficiency (adopting lower levels of regulation). ART states that if people have decision latitude at work, and if they are engaged in complete activity then they will want to optimise efficiency in working towards their goals – by using the best action programs available, and by achieving goals as well as possible, with the fewest transformational steps. From this perspective, "experts" are not necessarily the most motivated or energetic workers, but the workers who have the best action programs for achieving their goals.

Within this context, an email interruption may either be viewed as something negative that disrupts the potential to achieve the goal of an action program, or, as affording another goal that needs its own action program. However, as strategic responses to email interruptions do not have a research precedent to date, it is difficult to understand, firstly, how they are perceived and dealt with by people at work, and secondly, how their presence can be 'tailored' to ensure work design in this area is as effective as can be. The current research on interruptions does little to help our understanding, because of the fact that such interruptions have not been within the realms of control of participants,
and because experimental tasks have not been embedded in a complete cycle of activity.

In short, ART not only assists us in understanding how strategic behaviour is structured, but it also assists us in understanding how strategic behaviour could best be studied. If email interruptions can normally be controlled by people, and if they occur within the context of people's work with all of the norms, values and personal history associated with such work, then this is where they ought to be studied. If ART is valid in its assumptions, we should observe that whatever strategies are being used to deal with email interruptions, if such interruptions are within the control of participants then such action programs are likely to be chosen because they have been found to work in the past for people, and because participants genuinely believe them to be an efficient way of achieving their goals. If we can identify the strategies that people use to ensure goals are achieved with minimum disruption to both work and psychological cost, then workers can be trained and thus enriched in these strategies — consequently making a difference to the design of activity at work, the key aim of Action Regulation Theory (Hacker, 1985, 1994).

Overall summary

The regulation of strategies used in goal directed behaviour was outlined in terms of Hockey's compensatory control cognitive-energetical model and Action Regulation Theory (ART), the key theoretical frameworks for this research. Both theories purport that individuals are active determinants of their behaviour — choosing courses of action that will be most likely to achieve the goals that are important to them. ART says that goal success is attributed to choosing the best strategies, whereas, Hockey states that goal success is down to the exertion of effort towards personally important goals. Observing the strategies used for dealing with email interruptions is likely to give an insight into what is important to people at work, and how this is pursued.

What influences strategy choice?
Action Regulation Theory stipulates that people implement strategies or action programs that have proven to be useful in the past, in the same or similar
circumstances. The degree to which we pursue such strategies and action programs to reach goal achievement depends on a number of factors, such as individual knowledge and expertise, environmental feedback, the value attributed to the goal itself, and the degree to which we can exercise control or decision latitude over the complete activity. Hockey's theory meanwhile looks at how people deal with increasing demands, and concludes that in working towards goals people are differentially concerned with performance protection and wellbeing. When extra effort is required to deal with a demanding situation (such as when an interruption occurs) people decide whether the extra effort is worth it in terms of how this will affect task goal success and wellbeing goals. If one set of goals (e.g., task goal success) is considered more important than the other (e.g., wellbeing), then the strategy chosen will reflect this.

In pursuing a goal, Action Regulation Theory states that we are involved in a continuous process of mental regulation - monitoring action at an intellectual level (requiring conscious processing and cognitive appraisal), a perceptual-conceptual level (requiring some conscious and cognitive decision making, but also allowing more automated and practised strategies to take control), and/or at a senso-motoric level (unconscious, automated actions that kick in and require little or no monitoring). Hockey discusses two levels - Loop A and Loop B. We normally operate in Loop A, which requires automatic attention and few cognitive resources. However, as demands increase an effort monitor is triggered, which an individual will pay heed to, deciding whether to move into compensatory control (use extra effort and energy stocks to pay closer attention and maintain performance) or not. ART says that the task or situation will determine an individual's choice of action program, and level of regulation. Hockey's theory acknowledges that internal factors are also involved - as personal wellbeing will influence the regulatory mode and consequent strategic action, and there are individual differences in whether people are biased towards performance protection or wellbeing protection. What Hockey does not cover however, is how action is created and decided upon, as his model does not go beyond looking at how people respond to changing demands.
Wellbeing, boredom and stress

Hockey's model is also limited as it does not appreciate how an absence of demands may be stressful in itself. Hancock & Warm (1989) indicate that when demands are too low people try to increase activity. ART, on the other hand, notes that when working at a senso-motoric level of regulation (similar to Hockey's Loop A) people may actively attempt to move up to a higher level to avoid becoming bored, and to promote learning (a key goal for many people). With this in mind, dealing with email interruptions when bored may be a way of increasing one's level of regulation used, which could promote learning and enhance activity (thus potentially explaining the rare, positive impact of interruptions reported by Fisher, 1998, Speier et al., 2003, and Zijlstra et al., 1999).

Where Hockey's model *is* useful, beyond that presented by ART, is in his acknowledgement of wellbeing goals, and the notion that people may choose to protect these at the expense of performance, if wellbeing is more important to an individual. Hockey's theory has emphasised the importance not just of studying strategies but also in studying the reasons behind people's choice of strategies. ART suggests that parameters of a situation and knowledge of a worker will influence choice of action program. Accordingly if someone ignores an email interruption, ART might well conclude this is because the worker 'knows' this to be the best way of achieving work goals. However, in Hockey's terms such a strategy may be borne from a desire to prevent experiencing overload, stress or exertion, beyond a comfortable level.

Both models remind us that workers are not passive recipients of situational changes, but are active determinants of work and goal success - so long as one has control over work. People choose strategies they believe will optimise their efficiency. One might expect that when demands at work are high, or one is working on an important goal, that strategies for dealing with email interruptions may include ignoring those interruptions due to attentional narrowing (Hockey), or else people may be even more alert to them (ART) because working at high levels of regulation makes one more attuned to environmental cues.

Hockey suggests that as people operate in Loop B they expend more energy, which, over time, can increase strain and reduce wellbeing. Yet in ART terms,
moving into a higher level of regulation is desirable as it promotes learning, and people find that challenges improve performance and can be inherently satisfying (Earley & Lituchy, 1991; Locke, Shaw, Saari, & Latham, 1981; Tubbs, 1986). Zohar (1999) indicates that complex tasks have a negative relationship with mood. However, ART differentiates between complex and complicated tasks (Frese, 1987, 1989). ART highlights that complex tasks are likely to be satisfying because they require a high level of regulation and goal fulfilment and learning will be more rewarding. However, complicated tasks are undesirable, because it is then that people lose control over the outcome, which has negative repercussions (Hacker, 1994).

Although ART doesn’t explicitly refer to wellbeing, it may well be that operating at higher levels of regulation can enhance wellbeing. So, moving into Loop B (Hockey’s higher mode of regulation) need not always be related to negative wellbeing side effects, as Hockey purports, especially if the deployment of extra energy reserves does result in goal achievement. If one assumes that the presentation of an email interruption might move regulatory activity into a higher mode (because they are unexpected and place demands upon people) establishing whether they result in increased or decreased wellbeing experience will help us to appreciate how Hockey’s and ART’s differing perspectives pan out in reality.

**Differences between the theories – a summary**

In a number of areas then the theories do not fully converge in terms of what factors influence strategy choice:

- Whereas ART focuses on how external parameters influence choice of action program, Hockey acknowledges that wellbeing goal preservation is also an important determinant of strategy choice.

- In Hockey’s model, individual differences in coping style and people’s preferences for different goals affect strategy choice. In ART differences between people are only really relevant in terms of people’s relative expertise/ownership of ‘better’ strategies.

- Whereas moving into a higher level of regulation is considered to be preferential, in terms of how it promotes learning and development in ART, Hockey’s theory suggests that higher levels of regulation require more energy, which can cause fatigue and strain.
Whereas ART discusses how people look for opportunities to move from low levels of regulation (sensor-motoric mode) to promote learning and development, Hockey does not explicitly discuss underload as a reason why people may move into a higher regulatory loop.

Whilst ART discusses complete activity at work, including how strategies are formed, stored and executed, Hockey limits his discussion to how people cope with change demands by moving from one regulatory mode to another.

**The next step**

In light of the poor empirical background to the study of controllable email interruptions, and this theoretical dichotomy, it was decided that an exploratory study needed to be conducted in order to get a better idea about how email is being used in organisations today. In particular the concern was to understand:

1. How email is being used in organisations today
2. To what extent email is interrupting people’s work
3. If email is seen to be purely disruptive (as most of the previous work on interruptions suggests) or, whether it is perceived to have positive implications
4. What strategies people use to deal with interruptions
5. Whether strategies for dealing with interruptions change as demands or parameters differ
6. Whether people feel overloaded by email interruptions – and how this affects strategic response
7. How people feel about the strategies they use – and how email use can be improved
8. How email use relates to Hockey’s and ART’s theories about strategic action in goal-directed behaviour.

Ultimately these issues relate to an understanding of efficiency in email behaviour – the weighing up of the best way to deal with email, attain one’s work goals and minimise psychological costs, and it is this concept that will be central to this research project, central to the working question, *How do strategies for dealing with email interruptions affect wellbeing and goal*
achievement in goal-directed work? The next chapter discusses the exploratory study and highlights how the findings relate to the two theoretical frameworks presented here. Chapter Four returns to the theory to build on the findings, and provides a comprehensive discussion of what efficient behaviour in strategic action involves. Hypotheses to be tested in two further phases will then be outlined.
Chapter Three:  
An Exploratory Study of Email Use at Work

Introduction

Chapter One demonstrated how interruptions research is heavily reliant on a paradigm involving ‘enforced interruption’. Email use however constitutes a special form of ‘controlled interruption’. An email interruption (as opposed to a downloaded email) is delivered in two stages. Firstly an alert of some type will unpredictably break into an individual’s consciousness, informing them, via a beep, icon or other method, that a new email awaits their attention. The individual then secondly makes a choice about whether or not to check and/or respond to the email. It is in this second stage that one can observe strategic behaviour, as the activity adopted by someone who has control over their work reveals how their goal priorities are arranged.

Chapter Two summarised two main approaches to studying strategic activity in goal-directed behaviour. Hockey (1997, 2000, 2002) presents a model of compensatory control within a cognitive-energetical framework, to explain how individuals purposefully and actively adapt the regulation of their behaviour as demands (such as interruptions) to work increase. People adopt strategies either to protect performance on a task, which can be draining, or to protect wellbeing and emotion, perhaps by disengaging from a goal. What determines the decision is related to individual differences in coping style, along with how people differentially prioritise work and wellbeing goals.

Action Regulation Theory (Hacker, 1985, 1994; Frese & Zapf, 1994) is a grand theory of job design and activity. It states that individuals engaged in goal-directed work activity use action programs, or strategies, that have previously proved to be successful in achieving similar tasks. Action programs are regulated at different levels, according to various parameters such as how familiar or difficult a situation or task is. By assessing the conditions required to execute a strategy before and throughout undertaking activity, individuals at work attempt to retrieve the plan that will enable them to work as
efficiently as possible (i.e., at the lowest level of regulation without compromising goal achievement) given the circumstances (Frese & Zapf, 1994). A detailed review of these theories is outlined in Chapter Two.

As there is a dearth of empirical evidence describing what strategies people use when an email interruption intrudes upon their work activity, it was decided that an exploratory interview study be conducted to examine: (i) firstly, how email interruptions are dealt with at work, and what characterises people's use of email in 'real-world' organisational settings; (ii) secondly, what strategies people attempt to use when dealing with email in general, and (iii) thirdly, to establish which strategies are applied to deal with email interruptions when situational parameters change. In addition, it was deemed to be important to understand if email interruptions might be construed as positive at any time, because previous interruptions research (on enforced interruptions) almost uniformly concludes that interruptions are disruptive. Indeed, interruptions are often referred to as 'daily hassles' (Zohar, 1999).

A range of situational or task parameters were highlighted as potentially relevant for study, because (as noted in Chapters One and Two) they have previously been found to affect one's strategic adaptation to interruptions or to other work demands. These parameters are task difficulty or importance (Cutrell et al., 2001; Zijlstra et al., 1999), workload implications (Woods & Patterson, 2001), task deadlines (Freedman & Edwards, 1988; Seshadri & Shapira, 2001), and task boredom (Scherbo, 2001; Fisher, 1998). However, it must be noted that because these variables have not been studied within the context of controllable email interruptions they invite research attention from this perspective. A final parameter of email relevance was also included on the assumption that not all interruptions are necessarily in conflict with a current task, and in fact that some interruptions may convey information that aids completion of the current task more effectively (van Solingen et al., 1998; Waiji et al., 2004). These parameters will now be discussed below, and it should become clear that an exploratory study is justified at this stage, because of the current lack of evidence to indicate how such variables will affect strategic responses to email interruptions.
Task difficulty and importance
Several studies have explored the degree to which an interruption affects performance when working on a task that is construed as personally important and/or difficult, complex or challenging – see Chapter One for a review. The consensus appears to be that when a task is important or difficult, interruptions are more disruptive – i.e., they have a negative effect on performance. Theoretically, people probably engage a high (e.g., intellectual) level of regulation to deal with important or difficult tasks (Hacker, 1985, 1994; Frese & Zapf, 1994), or may need to engage extra reserves of effort or energy (Hockey, 1997, 2000, 2002) to protect performance at such times. Under these circumstances interruptions enforced in experiments place extra demands upon someone, which can disrupt performance. However, when given control over how to deal with an interruption (as applies with email) it is difficult to predict what strategy might be applied. For example, attention may narrow (Hockey, 2000) to cut out the additional demand of an interruption, or people may become more aware of environmental cues that could potentially threaten goal success (Hacker, 1994). As such it is difficult to predict whether people would be more or less likely to ignore email interruptions, and whether people would adopt strategies to minimise the extent to which they are distracted from the main task.

Task deadlines
When people are working in time pressured situations they often speed up their work. Interruptions to work can increase time pressure and result in people working at an even faster pace, which may make them more productive on the task in question (Zijlstra et al., 1999). However, time pressure also appears to affect strategies as people may choose to cut out extraneous activity, or may increase pace at the expense of accuracy (Zijlstra et al., 1999; Schellekens et al., 2000). Seshadri & Shapira (2001) state that it is best for people to work on tasks in sequence, rather than in parallel, when time is pressured. This suggests that the ‘best’ strategy for dealing with interruptions at these times is to put them off until the interrupted task has been satisfied. However, Seshadri & Shapira (2001) acknowledge it isn’t as simple as this because the short-term strategy adopted must be balanced against long-term goals. In other words it may not always be the case that ignoring an interruption is best in the long-run. If people are attempting to
work to optimise efficiency at work it is difficult to predict what strategies may be applied to deal with email interruptions when working to a deadline. Interruptions may be welcomed as they help keep the pace of work up or because they may present goals that are more important in the long run, compared to the interrupted task. Alternatively, they may be ignored or restricted, because they are too demanding.

**Task boredom**
The research on underload and stress in vigilance indicates that when work is dull or monotonous an interruption may help to boost demands and potentially prevent strain or error. Hancock & Warm (1989) claim that when people are experiencing too few demands they will seek out opportunities to increase demands to raise stimulation levels. According to this view an email interruption may be especially welcome during mundane activity. Fisher (1998) found that interruptions prevent boredom on simple, low attention tasks, and Speier et al. (2003) found that being interrupted when working on simple tasks increased accuracy and speed in making decisions. However, in neither experiment was the participant able to control the interruption, and so, it will be interesting to note whether people actively choose to attend to an interruption when working on monotonous tasks. ART suggests that when engaging a low level of regulation (e.g., senso-motoric) - as one might when operating routine, dull tasks - people are less aware of external cues (Hacker, 1985, 1994) perhaps because brain activity is reduced to a level of subconscious awareness (Robertson, 2003). On this premise one might find that people are less attentive to email interruptions when working on boring tasks.

**When email is relevant to the task**
Although there is little research available looking at how interruptions affect performance when they are desired and of importance to a task, Walji et al. (2004) have acknowledged that some interruptions are welcomed. van Solingen et al. (1998) observed that software developers are readily interrupted by email, because email often contains information that is important for their work. They explain that developers are creative people who benefit from the sharing of ideas and information. Within their field, email has become a vital tool by which such information is disseminated. As such, it will be interesting to note how people deal with email interruptions when they are awaiting an email that is central to their current task. One
would anticipate, in concurrence with ART, that people would be more aware of environmental cues (such as the email alert) under such circumstances.

**Workload implications**

People who are unable to control their work demands - because of either internal (e.g., strategy generation, adaptability and personal characteristics) or external limitations (interruptions, task requirements, etc.) - experience a decline in productivity and job satisfaction and a rise in the experience of stress and overload (Hacker, 1985, 1994). Even those who have large volumes of complex work to deal with can avoid feeling stressed or dissatisfied, so long as they are able to control their work demands (Dollard, Winefield, Winefield & de Jonge, 2000; Karasek, 1979). Indeed, stress essentially results from mismatches between the perception of task demands and the resources required to meet them (Stokes & Kite, 1994). Consequently email interruptions may be considered stressful if one does not perceive that they can control them, perhaps because they do not have enough time, capacity or energy to deal with them, as well as their main task. Therefore it will be of interest to assess whether people do feel overloaded by email interruptions at work. If they do it will be interesting to understand why, and how they attempt to deal with this. If people don’t feel overloaded, then again it will be of interest to ask why, and to understand what strategies are used by people who are not overloaded. ART suggests that when people have control over their work, they are less likely to experience negative effects such as overload. Thus, it may be that the people who feel overloaded also feel email is out of their control.

**Summary**

Evidently these parameters are worthy of study, as it is difficult to predict how they will affect the strategies used to deal with email interruptions at work. Since predictions cannot convincingly be made, this exploratory study is an essential first stage to this research project. This will allow an identification of how email is currently being experienced in the field, and how people respond to email interruptions, when they are able to control them, within the context of their everyday work tasks and priorities. To ensure that strategies identified are ‘real’ strategies used by people in their normal day-to-day work (i.e., have ecological validity), the current study was executed with authentic computer-based workers who deal with email interruptions on a daily basis.
CHAPTER THREE

Face-to-face interviews are a useful way of acquiring direct contact with 'real' email users (as opposed to utilising questionnaires, or email and telephone interviews), and therefore they allow the interviewer to be more responsive and exploratory than is usual in observational or experimental situations. Due to the novelty of this research topic, it was decided that semi-structured, open interviews be applied. The issues identified above were explored in a series of formalised questions. The flexibility to deviate and probe further was employed as necessary.

To summarise, this exploratory interview study is believed to be a necessary first stage in a project about email interruptions in goal directed work, because of the novelty of the research topic and the lack of current empirical evidence to predict what strategies are used to deal with controllable email interruptions in the field. The exploratory interviews were designed to be as open and exploratory as possible (whilst being structured around the key research topics of interest) in order to identify the variables that may be of importance to research further. In subsequent studies (see Studies Two to Six) such variables form the basis of hypotheses about how strategic responses to email interruptions relate to people's pursuit of efficiency in acting.

Method

Interview construction
Owing to the novelty of this research topic, coupled with the desire to give participants scope to answer flexibly and with personal insight, it was decided that a semi-structured interview format with generally open (as opposed to closed) questions would be used. The potential problem of using closed questions in this research would lie in the restriction to answer flexibly placed on interviewees. It would also present a problem in that the research to date would need to supply a comprehensive range of answer options for each question – and with the brevity of existing research in this area such an undertaking would be difficult to fulfil (Bryman, 2001).
However, open questions do have their drawbacks as there is potential for subjectivity and lack of standardisation to impinge on the process. Bryman (2001) identifies a range of disadvantages to open questioning, including the time consuming nature of 'flexible' interviews, the time consuming nature of transcribing and then coding answers to open questions, the potential for unreliability in conducting the coding analysis, and unreliability when other researchers/interviewers are used. In this study little could be done to limit the time-consuming nature of the preliminary interviews; giving interviewees free reign to express their thoughts and experiences in an open way means it would be inappropriate to put a time bar on this. Also, the time-consuming process of taping and then transcribing interviews reduces potential sources of subjectivity. The alternative - summarising or 'coding' the interview as it progresses (either directly or through playback) - means that interpretation occurs before all of the information has been gathered. By ensuring each interviewed is fully transcribed each script can be considered and coded afresh and in fullness.

A copy of the interview guide can be found in Appendix One, and it is worth noting that several questions were permanently changed once the interviews were underway. For example, Question Three changed from, "What sorts of email do you tend to send?" to, "If you could categorise them yourself, what sorts of email do you tend to send?" Such changes were adopted if several interviewees had asked for clarification on any particular question. An amendment was made to prevent the need for future clarification as the interviews progressed. In addition, answers to some questions are not reported here, as on progression of this research programme, certain questions were deemed to be no longer relevant for inclusion.

The general interview guide contained questions on five main areas, reduced later to four main topic areas, relating to the issues discussed above. These four topic areas are:

1. Characteristics of email use
   Questions in this section were designed to ascertain how email is being used at work, and what typifies email use in this sample. Questions related to how many email people send and receive in an average day and what categories of email people send and receive. People were also asked
how they know whether they have a new email (e.g., what method of alert is used) and how immediately they respond to an email alert. In addition, participants were asked what sort of email they like and dislike receiving, and at what times they are glad or annoyed to receive new email.

2. Strategies used in dealing with email
Picking up on the notion that we enact action programs in the pursuit of goals, according to the parameters of different situations (Hacker, 1985, 1994), this section asked about the action programs (or strategies) used in dealing with email. A general question was first asked, to establish what strategies people used when dealing with email, ordinarily. Following on from this, a range of specific scenarios was postulated for participants to interpret. These scenarios asked about the strategies people used to deal with email when parameters change - under a deadline; when working on an important or difficult task; when working on a boring task; and, when the email itself was central to the completion of an important work task.

3. Email and workload
In this section participants were asked whether they had experienced feeling overloaded by the amount of email they had to deal with. This was to ascertain the extent to which the extra information and communication received since the arrival of email in the modern workplace (Kraut & Attewell, 1997; Woods & Patterson, 2001) may affect people's load experience. Specific questions were then designed to ask overloaded participants why or when they felt overloaded by email, and what strategies they adopted to resolve the overload. Those who didn't feel overloaded were asked why they didn't think they experienced email overload, and whether this related to the volume of email they had to deal with.

4. Overall impressions
Finally, participants were asked to discuss their personal experience of email and interruptions, compared to colleagues. They were then asked to sum up how they generally felt about email, in terms of whether they would rather be with or without it, what its advantages and disadvantages were for them, and how the use of email could be improved (in terms of policy design) in the future. This section was included as a means for
participants to discuss any elements that had not already been considered.

In addition to the interview sections mentioned above, a series of personal factual questions (Bryman, 2001) were generated to gather descriptive data about the participants. These questions asked for information about the participant's age, job level, etc. Some of the questions were open (i.e., without pre-specified answer categories), such as in asking for a 'Job Title'. However, most of them were closed, with pre-specified answer options given. For example, in asking the participants' age, they were given several ranges as answer options – Aged 21-30, 31-40, 41-50, and so on.

Pilot interviews were not conducted, simply because, as these were exploratory interviews, it was not deemed prudent or necessary. Also, as the interviews were semi-structured and contained open questions, any misunderstandings or difficult phrasing could be amended during the questioning as part of the conversational process.

Sample
Participants were recruited from three different organisations, each covering different market sectors. These provided a wide range of circumstances in which email is used. In total, 28 participants from three participating organisations agreed to take part in the exploratory interviews, having been informed of the project rationale, logistics and issues of confidentiality. Eleven participants were recruited from organisation X (an international development charity), ten from organisation Y (an armed forces consultancy), and six from organisation Z (a multi-national blue-chip). One candidate volunteered from a fourth organisation (referred to as organisation Zb, because of its similarity to organisation Z).

Of the respondents, six worked at an administrative job level (two of whom were part-time), six worked at a senior administration or junior managerial level, ten worked at a middle or project management level, and six worked at a professional or senior managerial level. Ten participants were men. Eleven participants were in the age range from 21-30 years, eight were in age range 31-40 years, four were in age range 41-50 years, four were in age range 51-60 years, and one was aged over 61 years. The majority of participants
(seventeen out of twenty eight) had been using email at work for between 4 and 7 years. Just two people had been using email at work for 3 years or less, with six people using email at work for 12 to 15 years, and three people using it for 16 years or more. Finally, 26 of the 28 participants used Microsoft Outlook as their email operating system, with just 2 participants using Lotus Notes.

**Equipment, environment and materials**
The interviews were held on the premises of each organisation, within suitable private interview rooms or offices (specified to be quiet, airy, light and comfortable, with adequate space). Aside from the interview guide, the usual transcription materials were required (pen and paper, a transcribing machine, blank audio-cassettes and spare batteries).

**Procedure**
At least one week before their interview, each participant was sent a letter thanking them for their interest in the research and clarifying the date, time and location of the interviews. Issues of confidentiality and feedback were covered in the letter and contact details were provided. Participants were also asked to think about their use of email before attending the interview, in particular focusing on how many email they send and receive in an average day, and what these email are like. This was designed to focus them on the research questions in advance.

On interviewing each participant, the interviewer ensured the participant was informed and comfortable, and then the standardised instructions were administered. Any questions were dealt with before consent was sought to tape record the interview (all participants obliged). The interview proper, based on the interview guide (see Appendix One for the full guide, although again, please note not all questions remained relevant and have been omitted from this analysis), then began. Probes, prompts and clarifications were included as necessary, in order to ensure that the interviewee was fully congruous with the question semantics. Once the interview proper was over, the interviewee was invited to discuss any related topic that he/she felt had not been covered. The participant was then thanked and debriefed and the session drew to a close.
Transcribing and coding the interviews

From the outset it was decided that a content analysis would be used to analyse the findings of these preliminary interviews. Content analysis is,

...an approach to the analysis of documents and texts that seeks to quantify content in terms of pre-determined categories and in a systematic and replicable manner. (Bryman, 2001, p.183).

Content analysis is considered to be a useful way of gathering quantifiable information from a qualitative data collection method. It thus appears to address the needs outlined by Sonnetag (2000) that qualitative research should be analysed using quantitative methods. Content analysis is made possible with the production of a coding frame – a guide to scoring and recording all of the answers that participants have provided in interviews, questionnaires, etc. ‘Scoring’ completed interview transcripts according to a coding frame makes it possible to run statistics on the data. In this research such a benefit is highly important as it means that specific variables and issues can be pinpointed as relevant and appropriate to research further on in the following stages of this research programme.

To produce a coding frame in the first instance requires the perusal of a script. Therefore, all interviews were fully transcribed from tape recordings. Full transcription means that no comments or concepts should be overlooked; this is deemed important when conducting exploratory analysis of a topic. The potential for unreliability in coding the answers can be a problem in content analysis, but this is less likely when dealing with large volumes of interview transcripts, by using a coding framework to ensure that the same criteria is available for coding each interview. Although it is desirable to use multiple raters to avoid problems of subjectivity in coding the transcripts, practical constraints meant that this was not achieved here. However, strict coding rules were applied, in order to maximise consistency, avoid problems of bias, and to make the project manageable (see Figure Three – Coding rules, below).
Figure Three: Coding rules

1. Some of the participants' pausing/thinking expressions were included (e.g., "umm...", or "errr...") but these were not religiously recorded, especially for those who used such expressions very frequently.
2. The length of the pauses was not recorded unless they were tangibly long (e.g., lasting for several seconds).
3. When sentences did not make sense or were mixed up in terms of tense etc., minor corrections were made in the transcribing, solely to make the transcripts comprehensible.
4. When the participant's voice was obscured by the recording or by background noise, this was recorded in the transcript as 'inaudible'.
5. If a question was re-phrased, repeated or re-worded by the interviewer it was not included. The interviewer's comments were only recorded if they were relevant or non-standardised prompts and comments.
6. Non-verbal cues were not noted, although, on occasion, in order to ensure the 'sense' of the sentence was preserved the tone of voice or intention of participant was recorded (e.g., 'laughter', or 'in agreement' following a "Mmm").
7. In order to maintain the participants' confidence and anonymity, any personal or identifying information mentioned in the interview was neutralised for the sake of the transcript.

Interview answers were grouped and coded following transcription. All answer options were noted and, where appropriate, grouped into themes. Once the total range of answers for each question had been coded into 'themes' they formed the coding frame (see Appendix Two). In creating the coded themes it was important to strike a balance between generality and specificity. To make a theme too general would distort subtle differences in answers that could be relevant; to be too specific in a theme would result in an unmanageable number of codes and difficulty in appreciating the general picture. In summarising themes then, the author attempted to maintain diversity in answers, whilst producing a practical framework. The interview scripts were then read through again, and participants' answers were 'scored' according to the coding frame.

This process meets with the definition of what is involved in a content analysis, as given above. Although painstaking and time-consuming, this approach does ensure that the full range of answers can be noted, with obscure and unusual comments and replies represented as 'outliers', whilst ensuring that common thoughts and themes are uncovered. Some researchers have been criticised in the past for relying on analysis methods that omit or overlook unusual and deviant answers, as they do not fit with general trends and are thus considered irrelevant (Crossley, 2000). Equally, other
Researchers have been criticised for ignoring what the 'masses' say, to concentrate on the more obscure or incongruent responses, as potential sources of future study, despite their apparent low relevance to the general picture (Crossley, 2000). Using coding frames helps to overcome these issues, as all answers are recorded and therefore given equal research focus.

Results were entered into a spreadsheet by noting a '1' in the appropriate case-by-code cell, when the participant's answer related to the particular code. If a participant did not give an answer relating to a particular code the case-by-code cell was left blank. This meant that for each question, the number of participants that reported each possible answer could be summed. This gave a frequency of reports per code. Percentages were also calculated to ascertain what proportion of participants reported each answer. There were several answers (and, therefore, codes) available for each question, and because participants could be allocated more than one code for their answers to each question (depending on their coverage of each topic) frequencies and percentages calculated could only summarise which answers had been reported with greatest frequency. So, to say that 35% of participants positively reported answer 5.2 does not mean that 65% of remaining participants positively reported a different answer to question 5. It only means that 65% of participants did not positively report answer 5.2. Each answer was considered in isolation from the others. Coded answers were based on participants' reports, rather than participants' actual experiences.

In summary, the descriptive statistics calculated on this data describe the number of participants who reported any particular coded answer to each question, i.e., frequencies. As such the results that follow represent the typical (and indeed atypical) experiences of individuals dealing with email at work, based on what they have chosen or remembered to report. A number of participants may well have reported several answers (and therefore will have

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For example, Participant One may answer question 5 by saying that they use email because it is fast, in which case he/she would be attributed code 5.1 "Convenience" for their answer. Participant Two may report that they use email because it is fast and therefore they can get documents straight out to people who are working on the other side of the world. Participant Two would therefore be attributed with the code 5.1 "Convenience" as well as 5.6 "Ease of dispersion". Clearly there is overlap between the two codes, but two codes need to exist to take into account the differences in what 'speed' means to different participants. This relates to the generality/specificity of coding issue referred to earlier.
been represented several times) for each question. Due to this, and the reliance on reported answers, inferential statistics could not be justified.

In presenting the results from the interviews, additional information was provided from the actual narrative comments made by participants. These comments help to illustrate the findings and also provide direct reference to how email is seen and used at work.

**Results**

Results from the interviews are presented in the form of frequencies, with illustrative quotes. Frequencies are summarised across all categories relevant to the current research in Appendix Two. Frequencies are represented in percentage terms. Note that the total percentage presented for each answer group does not necessarily add up to 100%: each participant could report multiple answers to each question and will therefore be represented by several codes.

**Characteristics of email use**

The number of email being sent and received per day was equitable (see Questions 1 and 2), with 54% of participants reported to be receiving and sending between 11 and 30 email per day. This is a lower level than has been reported by other sources – see Chapter One (Arlidge, 2002; Kraut & Attewell, 1997; Whittaker & Sidner, 1997).

**Email categories**

Of the email being sent (see Question 3), the most typical reported categories were personal or social type email (reported by 68% of participants and including jokes, arranging social excursions, etc.), for example:

...personal email would be things like um, again arranging to meet friends, arranging things to do, and more recently – as people get digital cameras – receiving photos and things like that via email. (*Participant 14, Organisation X*).

Next most popular were job or project related email (reported by 64% of participants):
...I tend to conduct pretty much all my business by email now, apart from face-to-face meetings, so they vary from short notes like, "come and see me this afternoon", to drafts or policy papers for comments, to...the final version of my audit report. (Participant 19, Organisation X).

Finally, information email (reported by 57% of participants) were another popular category of email being sent. These percentages do not suggest that personal and social email are the type of email most often sent at work. Rather, personal and social email is the category of email most commonly reported. People may actually only send such an email once a week.

The most popular categories of received email (see Question 4) were job or project related (reported by 79% of participants), personal or social type (reported by 64% of participants), impersonal but relevant email (again reported by 64% of participants, and including group-wide email and 'cc'd' correspondence, for example), and queries (reported by 61% of participants). The category of 'impersonal but relevant' email did not feature in the categories of sent email. This suggests that those sampled saw cc'd and group-wide email as being in a different category when sent (perhaps considering them to be information or queries) than when received. Junk email was also reported to be a category of email received but not sent. It seems that one person's joke or forward (from sent categories) is another person's "junk" (when it actually lands in their inbox).

Choice of communication medium
Participants were asked what influences their choice of communication (see Questions 5 and 6). 71% of participants reported that they used email to communicate because it was the most convenient method. For example, it is quick, operates in real-time and saves participants from having to leave their computer terminal:

Umm... sometimes it's quicker to, if you're talking to ten people, it is quicker just to write one question to ten people than to make ten phone calls. (Participant 2, Organisation X).

I can sit there and go straight from brain to keyboard to send button, you don't have to leave the desk. It's the immediacy of it. (Participant 11, Organisation Y).
64% of participants reported that email allowed them to monitor and record their correspondence, with 43% reporting that using email enabled them to metaphorically ‘clear their desk’ of the communication. This is beneficial compared to the phone. For example, where one may need to call someone several times before they can get hold of them, this can prevent closure of the task, as highlighted by the following participants:

Sometimes telephone messages can be quite long-winded, so it sometimes is easier to put it all down in an email. I suppose for my own-, so I can sort of clear my work, you know, if I can’t get them by telephone, I would get them by email to know that I’ve actioned certain things. (Participant 4, Organisation Z).

Historically, before email was such a big medium, you know, I remember the times when you’d sort of phone ten times to get hold of somebody, and you know it would sit there mounting up.... Whereas, this way it’s done, it’s gone and you can get on with something else and not have to worry about it...in the back of your mind, saying, “I still haven’t resolved that issue”. (Participant 8, Organisation Y).

For some, email is useful for personal reasons, because it suits their personality or communication style:

...I’m not a particularly extravert kind of person...so I prefer anonymity in email. I can even send email to people in the next room rather than actually getting out of my chair and talking to them. (Participant 5, Organisation X).

I know this is horrible, it gets to a point where you don’t want to talk to people very much. So that’s another reason why I like email.... I’ve known people for a very long time and a lot of the times you have to be nice at the beginning before you say what you really have to say. Whereas with email it’s fine, you just say it. (Participant 21, Organisation X).

...in an open plan office, I find I don’t like talking on the phone if I can avoid it. So that’s anonymity. I’m quite shy. (Participant 24, Organisation Zb).

The strategy chosen by participants then may often be related to their individual personality, rather than the demands of the task. It may be easier and more appropriate for Participant 21 or 24 to telephone somebody and speak to them about an issue, but if they are not high on extraversion or agreeableness scales by nature, email offers them a communication medium
that removes the unpleasantness of having to be engaged in small talk or 'public' speaking (as noted in the above comments).

Email is not always the communication of choice however. As seen in Question 6, 57% of participants reported that they would rather use an alternative method of communicating if they wanted to inject some personal or social presence into the message (e.g., in a face-to-face meeting or on the telephone):

...the problem with email is it does tend to be a bit, um, bland, and you lose that personal relationship with the person. (Participant 8, Organisation Y).

With this job it's more and more important to get out of the email culture and go around and see people... I find sending email to people or phoning someone who is on the opposite side of the room a bit silly, but people have definitely got into that culture. (Participant 9, Organisation X).

On the other hand, the lack of personal cues in email may be one of the reasons why it suits certain people as a medium (e.g., Participants 21 and 24 above). Again, this reflects how individual differences and personal style come into play as a force for choosing one's preferred communication medium. Participant 9 above also notes how in his/her organisation a culture has developed whereby email is used for most communication, regardless of the proximity of the recipient. This supports Social Influence Theory (El-Shinnawy, 1993; Orlikowski, Wanda & Yates, 1994) - the idea that culture may influence communication strategy and expectation.

In addition to personal style and culture, other reasons for choosing to use alternatives to email include an awareness of the email content. If the message or issue being conveyed was serious, such as in legal, commercial or confidential correspondence, then email would be substituted (as reported by 54% of participants - see Question 6) often in favour of the letter:

The only things that I would go to hard copy are things that for various commercial or contractual reasons have to be in hard copy. Everything else I do electronically, simply because it's convenient. (Participant 11, Organisation Y).

This suggests that email may not offer the authority, kudos or weight of a more formal piece of documentation, and in particular does not allow for the
presentation of an ink signature. Either attitudes towards email as a valid and authoritative medium needs to change for this to be overcome, or attitudes towards the supremacy and security of the ink signature need attention.

The third most popular reason for using an alternative to email was when the issue or message was complex or subtle, or when a 'sub-text' needed to be revealed (as reported by 46% of participants). For example, if participants had been sending email back and forth with a correspondent and the issue was becoming long-winded or nebulous (chaining), then they may choose to pick up the phone to clarify things:

> Sometimes email can be a bit convoluted. You know if you need to sort of bounce ideas around, it's sometimes quite-, it can be quicker just to have that conversation with someone and bat out the issues. (Participant 4, Organisation Z).

> ...sometimes you get into some sort of crazy email situation where you email back and forth three or four times, and if you actually just sat down with the person and phoned them you could sort it out a lot easier. (Participant 13, Organisation X).

In these cases the convenience of email, as reported in Question 5 has become inconvenient. Email has led to communication mismanagement that requires extra communication in order to sort it out.

Despite the clearly reported reasons from participants about when or why they choose to use email or another form of communication, the issue of communication choice is inevitably a problem area for email users. Some participants reported that they found it difficult to decide when and whether they should use email or other communication techniques. This indicates that email action programs (Hacker, 1985) may not yet be well developed at a lower level of regulation, with each situation requiring a fresh and conscious appraisal before an appropriate communication strategy is adopted:

> ...I think email is used too much, so I attempt to stop clogging people's inboxes up with things that perhaps can just as easily be sorted out on the phone. I find it difficult to know when I should and shouldn't do that though, because people have different opinions of its use. Some people don't like to speak on the telephone, others don't mind, some people prefer it. So it's a bit tricky to know which one to choose. (Participant 14, Organisation X).
This statement also clearly shows that as personal style seems to play a part in why or how we use particular communication strategies. We also need to know the personal preferences of each communication partner before making a decision. This relates to Hacker’s (1985) laws of transformation regarding activity partners, and his comments that the more knowledge one has about a situation, the more appropriate the strategy (or action program) chosen will be.

Preference for incoming email type

Having established the nature of email use and the reasons for choosing to correspond in this way, participants were also asked about their email preferences: what do they like and dislike receiving (Questions 7 and 8)? One’s attitude towards different email could well reveal how one is likely to deal with an email, and thus the choice of strategy. The most frequently reported ‘likeable’ email to be received were personal and social email (reported by 46% of participants):

I like to receive email from my work colleagues - the jokes [laughter] - I like those a lot. (Participant 21, Organisation X).

Next most popular were knowledge and information sharing email, reported by 38% of participants, including the following:

I like ones that are sort of information about the company - the grapevine I suppose - that tells you about events and things like that. I find them interesting. (Participant 24, Organisation Z).

One of the virtues of email is that it enables people to be better informed about organisational life now, compared to in the past (Whittaker & Sidner 1997). The fact that people report liking to receive information email shows that this is a development that may well have been met with approval from employees.

Also popular are “positive” email (reported by 31% of participants, and including such items as ‘thank-you’s or good news):

9 This category neatly illustrates the problem of overlap in categories. After all a personal/social email, or an information email could be construed as ‘positive’. But whilst some participants
I love the ones that say "thank you". When someone just hits reply and says, "Thank you!" - I love those, they make me feel good. (Participant 12, Organisation Z).

By a large majority, the email type that most participants reported to dislike receiving was the irrelevant, unsolicited email and circulars (including 'SPAM', and reported by 57% of participants):

...if anyone in our team gets invited to a meeting, the whole team gets the meeting request, which...can be a bit of a pain, especially when you’re waiting for something and the little thing pops up and says, "You have an email", and so you stop what you’re doing and go into it and check it and it’s absolutely irrelevant. (Participant 12, Organisation Z).

...for example, I’m copied within a group and you get people replying to everyone, and the conversation goes on, say between two or three people about a subject that you didn’t really find that interesting in the first place and yet you have been copied in on all the responses.... But I just find people replying for the sake of replying almost and that’s the sort of stuff I don’t like to see. You know if they haven’t got anything, you know ‘cos they’re making you open it, you’re spending time opening it and then you look at it and go, well, "Why?” (Participant 9, Organisation X).

Long and un-summarised email were also unpopular (reported by 25% of participants) and summed up in the following statements:

I don’t like to receive email actually that contain too much, or lots of information that needs printing off and stuff like that. Um, because basically, why didn’t that person just send it by hard copy or in the post or whatever? (Participant 1, Organisation Z).

...anything really more than ten lines of text is an immediate visual turn-off. So the first couple of lines should really say what I actually need to read in this email and what I need to do, if anything, if that isn’t already clear from the subject line. (Participant 6, Organisation X).

I know when I first took up this job in the first couple of months I was getting out some big email.... But people were complaining that they were getting a lot to read, you know that could be condensed a lot more. (Participant 9, Organisation X).

concentrated on the content theme of the email (e.g., information, personal or social content) to report what they like, other participants reported on the feeling theme (e.g., the positive feeling).
Email that intruded on the participant's work or created extra and un-agreed workload (reported by 21% of participants) were also unpopular:

...people nowadays just sort of email and say something like, "can you do this?", "can you do that?". You suddenly find you've got, you know, things that you're just expected to have done by Wednesday because people emailed.... And sometimes I don't pick them up until the Wednesday or the day afterwards, and then you are already under pressure to do things. (Participant 24, Organisation Zb).

It seems that email is most unwelcome when it is irrelevant, long or when it creates extra demands on a person. Despite email being a medium that allows one access to almost anybody anywhere, this accessibility is futile if the form of the email is unsuitable. When in receipt of passed-on work, people dislike being unable to formally 'accept' the work. In ART terms, this is likely to be due to the fact that people have a lack of control or decision latitude about what they have been allocated to do - their activity cycle is incomplete, and they are merely 'pawns' in somebody else's activity cycle. Again, irritability at people's style of communicating by email indicates there is no dominant genre being obeyed about how to write an email.

**Method of email interruption**

The next section indicates how people find out that they have new email (i.e., the degree to which it interrupts their work) and whether this works or suits them. Questions 9 to 9c reveal what the most popular reported email alert systems are, and how swiftly participants respond to these. 79% of participants reported that they know they have new email thanks to an audible system alert (such as a ping or beep). 57% of participants receive an icon (such as an envelope) on their computer screen, providing a visual cue to the presence of a new email. Other reported methods of alert included the presence of a message box (e.g., 'you have new email'), physically seeing the email arrive in an open inbox, and a change to the cursor movement. All methods constitute a negotiated interruption (McFarlane, 2002), and the most popular reported category (the beep) is also the category most likely to be noticed immediately.

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ey got from the email as being relevant to whether they like receiving the email or not.
Eighty-five percent of participants reported that the method of alert that they had on their system suited them, with 33% stating that they had actually programmed the system to report the presence of email in this way:

I get the little envelope in the bottom right hand corner. I've turned off the noise because I don't like to be interrupted when I'm doing something. (Participant 13, Organisation X).

As the system of alert suits most people, this indicates that people probably don't mind being interrupted by the audible alert (the ping) as this is the most popular alert category. However, as only 33% of people reported that they specifically set their systems up to receive email in any particular manner, it could also indicate that many people don't know that they have an option to change the alert system. On the basis of these interviews however, just 7% of participants (a total of 2 people) were unhappy with the way their new email alert was delivered:

...if you're in a meeting in the office and you can hear that beep, beep, beep and all those email coming through, so you think, "Oh God!" you know, you're distracted...when you actually are in a meeting and you hear the beep, beep, beep and there's a crisis going on! You know that something's going on, and you know that people are copying you and you can feel the pressure with that, and you don't know what it is about. (Participant 16, Organisation Y).

Following an alert, the second stage in receiving an email interruption involves checking the email message. It seems that new email is picked up swiftly by the majority of participants. 64% reported that they check their inbox immediately in response to an alert, even though this is not always considered to be a favourable approach:

I've got into the culture of wanting to, to regularly look at my email, and I wish I hadn't. I want to try and wean myself off that. (Participant 9, Organisation X).

Twenty-five percent of participants said that they checked their inbox frequently (e.g., every 10-15 minutes) but not necessarily immediately as they receive an alert. Just 14% of participants said that they checked their inbox infrequently (e.g., every 1-2 hours), perhaps preferring to get on with their other tasks until such time as it is convenient to check.
Regardless of how quickly they check the email inbox after receiving an email alert, participants were asked how quickly they then actually responded to new email. Most participants (46%) reported that whether they respond to the email depends on their current task (for example, whether they have time to leave their task and respond to an email). 29% of participants reported that the nature of the email itself influences whether they will respond to it straight away, and 29% of participants reported that they may preview the email immediately, but not necessarily respond to it immediately (often because of the reasons just stated):

Um, I tend to have a look at the mail straight away, but not necessarily respond to it though. It's really a case of prioritising. If it's something really, really urgent that I know I can answer just like that I will go back to them. But if it's something that needs some investigation or further work on, I normally leave it. (Participant 1, Organisation Z).

I'd look at the subject line. If it's something that I'm waiting for a response on then I would possibly read it there and then. If I can see immediately that it's something that can wait then I'll just read it. (Participant 15, Organisation Z).

It seems that people like to open the email and see what it is about, but will not necessarily respond to it. Indeed, just 7% of participants (N=2) resisted going in to open, read or respond to their new email because they had set times for such a task integrated into their working day. This certainly seems to suggest that people appear to engage in the process of weighing up conflicting goals and priorities at work, in assessing the continued strength of their current goal and action program against other concerns.

Attitudes to email interruptions
32% of participants reported that new email is especially welcome when they need some stimulation at work, perhaps because they feel bored, or it is a slow or quiet day:

When it is really quiet when I am not busy, yeah, you almost say, "oh will someone please send me an email", and um, at times when things are really, really, when I'm really busy and I'm looking for a break, then I can be glad to have email. (Participant 21, Organisation X).
This response would indicate that interruptions are especially tempting when one is bored or under-stimulated at work. 25% report to being glad to receive email when it is something they have been waiting for. An equal proportion (25%) of participants report, however, that they are not generally glad to receive email.

More participants report that they are not annoyed to receive new email (39% of participants), with some suggesting that receiving email means that people are thinking of them:

If I didn’t hear anything for a day, I’d wonder if the actual system was down, or if they forgot that I exist. (Participant 9, Organisation X).

Those who are annoyed to receive new email claim that this is when they need to focus on something else - such as when they are busy or are working on a high concentration task - (reported by 36% of participants), for example:

...whenever I’m trying to think about something, whenever I’m involved in a complicated piece of work, and I try to think about something - and there’s more than enough noise and distraction going on in the office - and the beep and the presence of that irritating little envelope, um, is-, can be very distracting.... (Participant 6, Organisation X).

...if it’s a bad day and you’re just getting constant email all the time and you’re just trying to focus on something else, it is a distraction for me, because I find it easier to switch off, and I just think, “aaah, I’m going to leave it”. (Participant 15, Organisation Z).

These comments appear to back up the earlier comments made by Participant 16, who disliked hearing the beep of an email when in a meeting. This suggests that interruptions are more disruptive when they arrive during high demand periods. The workload affordance of email was mentioned again as an annoyance with participants who have a backlog of email building up (an annoyance reported by 14% of participants):

Well, when I’m away from the office and it’s already six in the evening, or later, then to receive six or seven email you’ve got to sort out that evening, it’s a pain in the neck, because you don’t just fit it into your normal day. You end up
The following participant also highlighted how annoying email can be when it inadvertently interrupts a task that one is working on:

...I'm trying to concentrate on something and the thing keeps coming up on my screen. Because it pops up, and it's set up that if you hit the wrong key, it will automatically go into an email. It will automatically open it for you. So you'll be typing a letter and then you just happen to hit 'return' at the wrong time and you go, "What?!". (Participant 12, Organisation Z).

Section discussion
This section clearly illustrates that email interruptions are received by McFarlane's (2002) negotiated method, even if people do choose to respond immediately. This confirms that email interruptions are 'controllable'. Following the alert, participants report that they then consider the relative priority of goals before deciding whether to deal with the email. This indicates another stage to Trafton et al.'s (2003) timeline, a stage where strategy selection and stages one to four of ART's cycle may be engaged. This stage might be appropriately termed the 'negotiation lag', to recognise McFarlane's (2002) identification of the negotiated mode of receipt (see Figure Four below). This sets email interruptions out as different from telephone or face-to-face interruptions that might also be negotiated. Email interruptions are asynchronous, whereas telephone or face-to-face interruptions are synchronous. Once a telephone alert or person presence has been acknowledged a person must respond in some way, if only to request that the interrupter waits. With asynchronous email interruptions recipients always have full control over their response, after acknowledging an alert. If appraisal within the negotiation lag reveals that the interruption is not desired or sufficiently important to capture full attention the recipient can simply exit the email with no additional work required. They can then return to the email any number of times subsequently, as is convenient.
CHAPTER THREE

Figure Four: Email interruption timeline including negotiation lag

Begin Primary Task  Email Alert  Check Email  Begin Email Task  End Email Task  Resume Primary Task

Prepare to resume primary task  Decide whether to attend to email task  Re-orient back to primary task

Interruption Lag  Negotiation Lag  Resumption Lag

(After Trafton et al., 2003)

Participants' answers emphasise how important efficiency is to people at work. This fits with the work of the Action Regulation Theorists, who state that at work people are continuously attempting to optimise efficiency and reduce the number of transformational steps required to get a task done (see Chapter Four for a discussion). At its best, email is a tool that optimises efficiency; it allows people to clear their desk of tasks; it eliminates the need to engage in polite, pre-emptive conversation before work elements must be discussed; it is immediate and convenient. At its worst however, email can make working very inefficient, usually because of the lack of knowledge about how to use the system, or because of overuse of the system. For example, interviewees mention how email can lead to chaining (seemingly endless exchanges on a subject, which can cause confusion and take up more time than necessary to resolve an issue), difficulties in understanding when to use email, or how to write an email appropriately according to recipient preferences.

In ART terms this translates into a lack of understanding of the laws of transformation about how to act with an object or social partner in order to achieve one's goals. People also report disliking being interrupted by an email when it is irrelevant, a circular, long and unsummarised, and when non-agreed workload is passed on (such as making the recipient print out a bulky...
attachment, or allocating a work task without the recipient formally accepting this).

The preference for email because it can help optimise efficiency, and the annoyance with email when it causes increase in workload or confusion in communication, indicates that people at work do desire to work efficiently - key to Hacker's (1985; 1994) work. Individuals reported that in most circumstances they will check an email interruption on receipt. Studies in Chapter One (Altmann & Trafton, 2002; Einstein et al., 2003; Trafton et al., 2003) demonstrate how remembering an intention can be demanding to cognitive resources, and so by checking the email immediately, one does not have to remember there is something to do. Immediate checking may be considered efficient therefore.

Social/personal email was one of the most widely reported type to be received and sent. It was also the most likeable type of incoming email. This demonstrates that people do not always spend their work time trying to fulfil their work tasks as efficiently as possible. The very fact that they will attend to personal/social goals at work indicates that other issues are involved. Perhaps attending to personal/social email bolsters wellbeing, thus fitting with the work of Hockey (1997, 2000, 2002) who suggests that efficiency balance is more than just an appraisal of goal versus energy/effort, but something that also includes an assessment of wellbeing, and the need to take cognitive breaks to prevent stress build up. If personal emailing aids wellbeing (an important consideration in the efficiency conundrum, as explained by Hockey, 1997, and Zijlstra, 1993) then tolerance of this activity at work may mean that employees subsequently attend to their work tasks with greater focus, energy and commitment. An exploration of the positive benefits of personal emailing and the prioritisation of wellbeing goals could be examined further to understand how it impacts on efficiency and satisfaction at work.

People reported that they are most pleased to receive email when they are in need of a break, and most annoyed to receive email when they are engaged in demanding work. For example, one participant illustrated succinctly how difficult he found it when email kept building up when he was otherwise engaged in a meeting. The demands of a task would appear to affect how
distracting and how useful email is when one is attempting to achieve their work tasks then.

Answers in this section also support previous work revealing that task demands can affect response to interruptions. When engaging a low level of regulation (if one assumes this happens when bored) people said that they were glad to be interrupted. When engaging a high level of regulation (if one assumes this happens when people are concentrating) then people were annoyed to be interrupted.

In conclusion, this section of questions reveals support for the notion that:

- Email is a controllable, asynchronous interruption – and another stage in Trafton et al.'s (2003) timeline is now noted to distinguish email from synchronous negotiated interruptions (such as telephone calls) or uncontrolled interruptions. This further justifies the need to study email interruptions as a special form of interruptions that the empirical literature has overlooked to date.
- People attempt to work efficiently towards their goals, by attempting to reduce workload, reduce the number of transformational steps required, engage an ‘optimum’ level of stimulation/demands, etc. Email sometimes helps people to work efficiently, but when it doesn’t this is usually due to a lack of knowledge about how best to use the system, and a lack of consensus between social partners about the form emailing should take.
- In light of the attention given to social/personal email, it appears that it would be sensible to acknowledge the importance of non-work goals in the efficiency equation, perhaps because of the impact this has on wellbeing (Hockey, 1997, 2000, 2002).

**Strategies for dealing with email**
The next set of results looks at the strategies that participants report to use in dealing with the email they send and receive at work. Participants were then asked about the strategies they use to deal with email interruptions when parameters of their task or situation changed. Questions 12 to 17 represent the results from these interview questions.
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Question 12 represents the categories people report to use to deal with their email, in general. Thirty-eight strategy categories were reported by participants, with a mean of 6 strategy categories allocated to each participant (standard deviation: 2.3). This indicates that people may be quite idiosyncratic in the strategies they have devised for their general email use. With the exception of 4 or 5 categories, most categories of strategies were reported by less than 30% of participants. Again, this would support the idea that people have quite an individual relationship with email, and as yet, guiding strategies do not seem to have come into general use.

The most popular strategy reported by participants was to store email into folders and sub-folders within their system (as 86% purported to do):

...I've got folders set up on my system, for my email, to make it easier to file them away... I've got folders by category type. (Participant 4, Organisation Z).

50% of participants reported that on reading or actioning an email they would clear it out from the generic inbox into the 'deleted items' folder, or to another sub-folder:

I have very strong strategies, having dealt with too much email over the years. The first thing is – if it is something I can action immediately – action it, and then more importantly, to delete it. So if it's done it goes. I don't save it, I don't store it anywhere, it's been dealt with. (Participant 13, Organisation X).

These two most popular categories reveal how participants try to manage their incoming email by methods of filing, storing or deleting. Other popular strategies reported by participants include:

- Using a prioritisation system to deal with email (code 12.26 reported by 36% of participants):

  I will read my email and decide what I need to action – what's the priority and what's not, and there are-, I can read it and then mark it as unread so I know I have to go back to it. (Participant 21, Organisation X).

- Previewing email on alert/immediately but responding according to task or email demands (code 12.1 reported by 36% of participants).
• Conducting periodic 'housekeeping' on the system — e.g. storage/deletion/tidying up the system — (code 12.31 reported by 32% of participants):

What I tend to do is, every three months, I tend to archive off the last three months worth of work. So I've always got two or three months active on my email and then I archive the previous three months off onto saved areas. (Participant B, Organisation Y).

You can tell when I'm doing too much work because they pile up. And if they pile up and I haven't read them after a week, I figure that they're probably not worth reading and I delete them anyway [laughter] — very harsh! (Participant 13, Organisation X).

Question 12a further summarises all of the strategies mentioned by participants into a more manageable (but less informative) four categories. According to these categories, 10% of strategies mentioned were for 'receiving' email, 15% of strategies mentioned were for 'sending' email, 73% of strategies mentioned were for 'managing' the email system, and 1% of reports were for 'no strategies'. As noted in the figures above, it is in the management of email therefore that people have devised the most strategies.

Participants were then asked to think about how their strategies for dealing with email interruptions may differ when new/different demands were placed on them in their work. This was really to examine whether and how action programs may change or differ when different situational parameters are imposed (as Hacker, 1985, suggests they should do).

Strategies under a deadline
When asked whether the strategies differed when working under a deadline (Question 13), strategies did seem to differ, as highlighted by the following participant:

I definitely manage email much more efficiently when I'm under a deadline: deleting much more ruthlessly, not responding to things I might normally respond to, um, not opening attachments and things that are just there for information unless I really think I am going to find them useful. And using 'Out-of-office' assistant, because I just don't have time, to send out a message telling people not to expect a response this week. (Participant 5, Organisation X).
43% of participants reported that whilst they may check the inbox they may not ‘deal’ with it as new email comes in. 32% of participants reported that they would check how their email priorities compare with their task priorities and respond accordingly (e.g., if the email had a higher degree of urgency than the task then that would have precedence). In both cases Hacker (1985) is supported; as unexpected information comes in during the actioning of a task, the new information is appraised, and as answer code 13.5 reveals, the priority of the new information is compared against current demands, in order to decide on the best course of action (e.g., comparison of goal outcome). However, 32% reported that when working under a deadline they would ignore email interruptions completely, sometimes by actually shutting down their email system or working in another room:

...I would just ignore it, I wouldn’t even-. if I’m in Word or Excel, I wouldn’t even open it up, because there isn’t time. And if I haven’t opened it, I haven’t seen it, so I can’t worry about it. (Participant 24, Organisation Zb).

This contradicts the previous finding, as it suggests that unexpected or new information is ignored (i.e., the environment is not being constantly scanned). This suggests that for some people, working under a deadline may require more of their cognitive resources. This would involve operating at a high level of regulation such that they simply do not have the cognitive space to take in any new information, and the additional demands this may afford (attentional narrowing as a form of performance protection – Hockey, 1997).

**Strategies when working on important or difficult tasks**

Interestingly, this response was most popular reported strategy for dealing with email interruptions when working on an important or difficult task, as 56% of participants reported that they would ignore their email in this situation (see Question 14/16):

I would prefer to work away from my desk and not have access to the email, because one of the things it does is distract you at times, so if I have something new to my line of work then I prefer not to be at my desk. (Participant 21, Organisation X).

This further supports the idea that those who ignore novel or unexpected environmental cues may do so because of the demands placed on their
cognitive resource. Working under a deadline does not necessarily mean the work is mentally taxing, but working on a difficult or important task is. Those who report that they would still attend to email interruptions (33% of participants reported that when working on an important or difficult task they would still check their inbox) also stated that they probably wouldn’t deal with it. 22% of participants meanwhile would not change their strategy for dealing with email in this situation at all (often this was because they felt their normal strategies were flexible enough to deal with this scenario). This also indicates that under mentally demanding situations, adapting one’s existing strategies (or action programs) may be too costly in cognitive terms.

Strategies when tasks are boring
Questions 13 and 14/16 dealt with situations that may place demands on an individual working on a task. Question 15 however, looks at how people may deal with email interruptions in undemanding situations, or when they are under-stimulated. Participants were asked what strategies they would use for dealing with email interruptions when working on a boring task and 46% of participants reported that they would be likely to read and respond to email on cue, immediately or more readily:

...I check the email every time it beeps.... Something like data entry, you are almost looking for something to distract you away from it. So, as soon as it beeps I’ll check, because it’s the one thing you do when you are not busy, when you have time for it, yeah. (Participant 21, Organisation X).

...if I’m in a boring task, when it flashes up new email, then I’m straight into it like a shot. And I’ll probably spend longer reading it because I want to get away from the boring task. (Participant 24, Organisation Zb).

29% of participants believed that they checked their inbox more frequently, and 29% believed that they did more system ‘housekeeping’ when bored:

...I probably do look through my inbox and email a bit more and have a bit more of a sort out and maybe delete a few, move a few over, answer the ones that haven’t been answered.... (Participant 1, Organisation Z).

An equal proportion - 29% - reported that they would not change their strategies when working on a boring task. In 3 of the top 4 categories, people reported that they would be especially attuned to the email interruption and
happy to be distracted away from their existing task to deal with it. This suggests that when working at a lower level of regulation, individuals are actively seeking more cognitive stimulation or variety. It isn’t known whether a comparison of goal outcomes is made (i.e. the task may be boring but important, the email interesting but unimportant), but as the comments suggest, for many people the added variety and stimulation offered by email is welcome, perhaps regardless of how it fits into general work plans.

**Strategies when email is central to the task**

Finally, when email is central to the completion of an important work task, (for example, the communication is part of the task, or the email is being used to transmit important task documents, meeting arrangements etc.) a range of strategies were reported. On such occasions, 54% of participants reported that they would check their email immediately or more readily and compare this against the task to respond accordingly:

> ...I look at the subject. And I have to say, at times, there are email I don’t read, when I know they send everyone email and it is probably not important. (Participant 21, Organisation X).

18% reported that there would be no change in their dealing of email (again, often because they felt their normal strategies were flexible enough to deal with this scenario). 14% of participants reported that they would encourage a timely response from the email partner. Here then, people are more attuned to environmental stimuli (e.g., the incoming email) as it is important to the completion of the task. Their action program therefore probably ensures that regularly checking email is an important strategy, but irrelevant email is not allowed to divert the individual from the task in hand (as the participant’s quote illustrates). Category 17.10 also shows that some people may adapt their action program in an attempt to exercise some control over their social partners – consciously alerting them to the need to respond in a timely manner, in order that the task goals can be met more efficiently.

**Section discussion**

This section indicates that people have many different strategies that they use to deal with email, with most strategies reported by less than 30% of participants in each case. 73% of the strategies mentioned related to how
email was managed, in terms of filing, storing, deleting and housekeeping. It
seems that people attempt to keep on top of the volume of email they receive
by adopting management strategies that sort and sift their messages,
perhaps to prevent the information from overwhelming them.

How incoming email is dealt with is the area of especial interest to this thesis,
and it appears that the demands of the current task strongly influence how
such incoming information is dealt with (Russell, Millward Purvis & Banks,
2005). This supports the findings of information researchers such as Cutrell et
Gillie & Broadbent (1989), Speier et al. (2003) and Zijlstra et al. (1999) who
all found that when tasks are demanding interruptions are more disruptive,
but when tasks are less demanding interruptions can actually improve
performance and efficiency. For example, participants reported that the most
common method for dealing with email when working on important and
difficult tasks was to ignore the email completely, often by switching the
system off or taking themselves away from their computer terminals to work.
When working on boring tasks however, participants report they are most
likely to go straight into their system and deal with an email as soon as it
arrives.

Paradoxically, this finding is opposite to what one might predict from ART, as
Hacker (1985, 1994) states that people are more aware of environmental
cues (such as interruptions) at the intellectual level of regulation, and less
aware at the senso-motoric level of regulation. However, Hockey (2000)
considers it to be an adaptive behaviour to be aware of signals from
competing goals, with attention narrowing to partial these out when demands
are too high. Participants report that the goals of different tasks are often
compared to the goals afforded by email interruptions, which would fit with
Hockey's premise. Those who are able to make these checks even in
pressured circumstances may well be demonstrating expert behaviours - the
ability to work with two goals in mind at once (Hacker, 1994). Indeed, an
awareness of one's environment becomes particularly pertinent when the
checking of email is important for the completion of a task.

These findings also support the work by Hancock & Warm (1989) who indicate
that when people are under-stimulated or working on tasks with low demands
(underloaded) they may seek out opportunities to heighten their effort and energy levels, whereas, when engaged in demanding work (overloaded) they adapt by attempting to reduce or limit the demands placed upon them. Support for Hancock & Warm indicates that Hockey and ART's levels of regulation hypotheses could benefit from amendments to illustrate that people may decide to increase demands to engage a higher level of regulation if they are bored or under-stimulated.

When working towards a deadline one participant reported that they are much more efficient at such times, deleting more ruthlessly and spending less time on unnecessary activities. This would support Zijlstra et al.'s (1999) findings, and also Seshadri & Shapira's (2001) conclusions that adding an element of time pressure to people's tasks can encourage them to work more optimally in terms of performance output. This increase in efficiency was also found in reports about how participants deal with email when waiting for an email is part of their current task's action plan. On such occasions they check their email as soon as an alert sounds, but will also attempt to work better and more proactively with social partners, perhaps by sending them reminders and encouraging their expeditiousness.

It is important to note how many people reported response strategies that differ from the most popular. For example, whilst some people under a deadline find they work more efficiently, others prefer to ignore email at such times (presumably to reduce demands placed upon them). Equally, although some people may respond more readily to an email alert when engaged in boring work, others do not change their response strategy at such times. This appears to support Hockey's conclusions that people adapt to different workload demands according to how they prioritise wellbeing against performance goals, their individual capacity for increased workload, and their personal characteristics. Combined with the individualised development of strategies (illustrated in Question 12), it seems that internal factors such as wellbeing and personality characteristics need more attention to understand why people adapt their strategies to deal with email interruptions. As mentioned in Chapters One and Two, internal factors have received scant empirical attention in the interruptions research domain. This thesis asserts that such internal factors should no longer be overlooked.
Email and overload

Participants were next asked about the relationship between email and work overload (Questions 18 - 23a), as reports detailed in Chapter One indicate that the email explosion has created overload and intrusion in our working lives that we don’t have the cognitive capacity to cope with (Kraut & Attewell, 1997; McFarlane & Latorella, 2002). Hancock & Warm (1989) report that people are strategic in their response to workload changes – acting to overcome over or under load when external demands are incongruent with internal capacity. In this section, participants were asked whether they were overloaded by email, and how they accordingly dealt with the load. 68% of participants in this study reported that they had felt overloaded by the amount of email they had in their inbox, with just 32% saying that they had not felt overloaded by this. Of those who had reported feeling overloaded (n=19) 68% stated that this occurred when a backlog of email had built up in their absence (e.g., when on holiday or away on business):

At busy times...I’m out of the office a lot, come back to mountains of email and it is very overwhelming. ...you can feel overwhelmed with it and you can get to the stage where it gets on top of you, but you have to learn how to manage that so that you can do your job, because it’s here to stay. (Participant 4, Organisation Z).

The above participant acknowledged her email learning need, understanding that management strategies were required. This follows with Action Regulation Theory’s premise that people endeavour to enhance their learning at work by devising strategies that will lower the level of regulation required to deal with a task or goal. Interestingly, from a workload perspective, the above interviewee also sees email as something to deal with in addition to the job, i.e. the email correspondence must be handled before the real work of getting on with their job can begin. This may explain why people feel overloaded. Rather than seeing ‘dealing with email’ as a part of their daily work tasks it is seen as additional to them, and therefore places more pressure on the time available to achieve one’s task goals. When one does return to work after an absence and sees an unusually high number of email awaiting attention, time pressure becomes even more acute, and people may feel they are losing control over their email.
Thirty-seven percent of overloaded participants reported that the actual physical presence of email in the inbox caused them to feel overloaded:

I try to keep my inbox under a certain number of email, I mean when it's above 20 in my inbox - which means 20 actionable items - then that becomes an issue.... And I have this thing that if it gets to 50 I have to work on it, even if it means staying in one evening and working. (Participant 13, Organisation X).

Sixteen percent of overloaded participants stated that email caused them to feel overloaded when they were busy or pressured and new email kept interrupting them (answer code 19.4) and/or equally because they felt their colleagues expected them to respond quickly to an email interruption (answer code 19.5). If email is seen as a fast communication medium, communication partners may well expect a fast response, regardless of the recipient's own priorities. For some people this can cause them to feel overloaded. These responses indicate that the volume of email alone does not cause pressure; the demand that the email affords is the important consideration.

Overloaded participants were asked what strategies they attempt to use to deal with their experience of overload. 58% of these participants report that they create a prioritisation system, based on factors like importance...

...when I come back and I've got lots of email to read...I will not read them in the sequence they've been coming in. I will be reading them in, you know, red dot importance of topic and prioritise it that way. (Participant 16, Organisation Y).

... or factors such as receipt order,

...I have this very old-fashioned policy whereby everybody who comes to me is a customer of mine. Uh, if they've been waiting two hours and [my boss] wants something and he's only been waiting five minutes, he has to wait.... (Participant 22, Organisation Y).

Forty-two percent of overloaded participants stated that they delete general or irrelevant email at such times (often without having read it), for example:

If there's any rubbish in there that I can see immediately, just delete it.... Because then visually it doesn't look so bad. (Participant 15, Organisation Z).
I'll delete things that don't-, just by the subject, without even opening them.  
(Participant 24, Organisation Zb).

Thirty-seven percent of overloaded participants stated that they review or scan their inbox to get a flavour of the email they have to deal with, to help relieve the sensation of overload. One participant reported how the strategy for dealing with email over the years had changed so that now overload is less of a problem:

...I used to get all the-, everyone's email used to come through, straight to my inbox. Now I put them straight to my deleted box I don't get any of them...Outlook has an organise button, so you can organise where things are actually sent, so...it doesn't go straight into your inbox, it goes to your deleted items. (Participant 2, Organisation X).

These strategies offer a fascinating insight into how people are learning to deal with email by attempting to exert more control over the medium. Comparisons of goal outcomes appears to be important here, with people adopting prioritisation systems and consciously appraising which email need attention, and which can be ignored or deleted. The strategies also show evidence of expert behaviour. The experienced email user, quoted in the last citation has found the presence of irrelevant email to be so annoying that she/he has devised a way of moving all unwanted email interruptions straight to the deleted file without ever having to consciously process them (by using a technique like 'blocked sender' on Outlook). This contrasts strongly with the participant quoted earlier who deals with each email in turn regardless of its importance. Despite the difference in strategy, both participants believed their technique helps them to reduce sensations of load.

Nine people reported that they have not felt overloaded by email, and this could be due to the absence contingencies they set up when out of the office, such as automated replies or forwarding functions (reported by 33% of non-overloaded participants), and/or because they feel they are able to control and prioritise their email (reported by 33% of non-overloaded participants), and/or because they feel that email has improved their life and thus is a welcome tool (reported by 33% of non-overloaded participants). Setting up strategies to deal with the build-up of email when absent shows foresight and prior knowledge. Again, this is indicative of expert behaviour, and supports
ART's notion that people develop strategies to achieve their work goals as efficiently as possible.

Those who didn't feel overloaded by email were asked how they felt about the volume of email they have to deal with at work. 78% of them said that they felt they currently had an acceptable level of email volume, 22% reported that they would prefer to have more email to deal with (suggesting they may even feel underloaded at work). This supports Scerbo (2001) and Fisher (1998) who indicate that interruptions and other demands are welcomed by under-stimulated workers. 22% of participants said that email volume was irrelevant, it is the subsequent actions and tasks afforded by the email that matters:

...the email system doesn't ever contain any nasty surprises, and I think that's fairly key. I think if I came into work every morning and the in-tray was full of sort of depressing actions and events then I would feel overloaded. But I feel I've got a lot of volume, but to be honest I'm sort of aware of generally what it's referring to. (Participant 11, Organisation Y).

...sometimes it can be a one-liner and it's two-hours work. (Participant 22, Organisation Y).

Both overloaded and non-overloaded participants were then asked about their competence and strategies for dealing with their workload generally (not specifically relating to email). Question 23 reveals that 29% of participants felt they were better at dealing with their workload compared to colleagues, with 25% claiming to be the same as colleagues, or neither better nor worse, and 21% stating that they couldn't compare themselves to their colleagues, or they didn't know:

I don't know, because, we work very closely together but I've no idea, perhaps this is something we could talk about - how other people cope with their workloads... I often get the system's over-size limit, which is a fault of mine. So I know...where my faults are and where I could do things better.... But I haven't talked to people about how they cope with that. (Participant 20, Organisation X).

Nobody reported that they were worse than their colleagues at dealing with their workload. Presumably, those who feel overloaded at work at least believe that their colleagues are equally overloaded. In asking participants
what strategies they use to deal with their workload (Question 23a - attributing reasons for their level of competence), a range of answers was presented. The highest reported strategy, stated by 36% of participants was for time management and planning. Prioritisation skills were also reported to be a good strategy, by 32% of participants, whilst 18% of participants reported that their strategy for letting go of things and not hoarding was effective. Again, these categories are indicative of the fact that people do try to implement efficient strategies and action programs in achieving their goals.

Section discussion
It seems that, in this instance, Hancock & Warm's (1989) statements are valid. They say that people are purposeful and adaptive and that they actively attempt to respond to changing workload demands in order to limit the disruptive effects of both underload and overload on wellbeing. The participants in the exploratory study have clearly attempted to develop strategies to reduce their perception of overload, in the face of email interruptions. Such strategies range from staying late to deal with the backlog, putting prioritisation systems in place, actively deleting unwanted messages and using system tools such as 'block senders' to automatically delete unwanted messages before they can even infiltrate consciousness.

These active attempts to adapt to email provide support for the Action Regulation Theorists comments that people try to learn and develop their skills by honing their strategies for dealing with work more efficiently. Additionally, this section demonstrates how the volume of email received is not linearly related to how overloaded one feels, as one's perception of load appears to be the moderator in this association (Parasuraman & Hancock, 2001). For those who do perceive themselves to be overloaded employing skills for time management, prioritisation of messages and work, and resisting the temptation to hoard messages are reported to make a difference to the impact this has on stress and wellbeing. Those who do not feel overloaded by email clearly exercise active management of their email, and therefore are less likely to feel it is beyond their control.

Again, this section emphasises the importance of considering wellbeing at work, to appreciate people's choice of strategies. It also emphasises that people are faced with multiple demands and conflicting goals at work, and
that people need to weigh up such demands constantly. ART has been criticised for taking a view of action that focuses on single activity cycles (Frese & Zapf, 1994; Zijlstra, 1993). However, this section highlights that in dealing with email interruptions, people adopt strategies to preserve the task, wellbeing, and cope with the demands of the email. Hence multiple action strands exist together. Applying a focus on multiple activities and how people weigh up and choose between the goals and strategies relating to these appears to be necessary now.

**Overall impressions**

This final section of questions sought to summarise how participants generally felt about their personal response to email at work, and how they usually deal with interruptions. They were then asked for their overall impressions about email.

*Personal response perceptions*

Participants reported whether they felt they were better or worse at dealing with their email compared to colleagues. 43% of participants stated that they did not know, and could not compare. This answer often provoked dialogue about how they wish they did know how others used email, as it might help them to improve their own strategies:

...to be perfectly honest, I don't know how anyone else deals with email, we just do not discuss it. ...You just develop your own style and if you hang yourself, you hang yourself, and if you don’t – you survive on it really. (*Participant 24, Organisation Zb*).

As can be seen in the section on policy (in the summary later), people appear to want to know how others use email, and are often frustrated by the lack of guidance they have received. This supports Hacker (1985, 1994) and Miller et al. (1960) who say that knowledge is one of the key elements required to devise and utilise effective strategies and plans. Without knowledge, people may find they are being left unsupported, as the participant's quote above indicates.

Nevertheless, 32% of people reported that they thought they were better at dealing with email compared to colleagues, 7% thought they were worse, and 25% reported that however they compared, they felt their strategies for
dealing with email worked for them. Again, a range of strategies was reported that did or did not aid efficacy in dealing with email. The most popular reported strategies (each reported by 21% of participants) were for managing the email system itself and for responding conscientiously to email. Both of these strategies were felt to be efficacious by participants. The next most popular reported strategies (each reported by 18% of participants) were for keeping the inbox volume to a minimum, and for showing awareness of how the volume of email dictates one's competence at handling it. Keeping the inbox volume to a minimum was considered to be an efficacious strategy.

Moving on to look at how people feel about being interrupted in their work (Question 26), 54% of participants reported that they were more likely than colleagues to welcome interruptions. 32% simply reported that interruptions were to be expected, they were part of the job requirement:

...there's four of us that do exactly the same role in my team, we're so used to interruptions that that's part of the role. So really, if we weren't open to it, I don't think we'd be very good in the role. (Participant 20, Organisation X).

This supports Seshadri & Shapira (2001) who argue that competent managers are those who can predict and allow for interruptions to their work, and who therefore have strategies and time available to deal with these.

Twenty-nine percent stated that they enjoyed being interrupted because of the social contact it afforded. However, for some, not all interruptions are the same:

Um, from an email perspective I'm happy with email because it's not sort of 'in your face'. But telephones I do get frustrated with, the sort of telephone-interrupting/disturbing type of approach.... I think it's the fact that you can't prioritise a telephone call. You can't look at it and say, "is this important, what can I do?" (Participant 8, Organisation Y).

The above participant appears to be someone who is happier receiving interruptions via the negotiated, as opposed to the immediate method (McFarlane, 2002). It is interesting here that email (as an asynchronous medium) is seen as a different, more acceptable, form of interruption -
because one’s response can be controlled. This supports the findings reported in the *Characteristics of Use* section.

**Final thoughts**

Question 32 demonstrates that however overloaded, annoyed or pleased people felt about email an overwhelming majority of these participants believe that email ultimately benefits their work:

> Overall, given what we are trying to do as an organisation, and what my role involves, I would really struggle without it. No doubt about it, in terms of just basic functional effectiveness. *(Participant 6, Organisation X).*

Indeed 27 out of 28 participants would rather be with email (96% of the sample), with just 1 person preferring to be without it, explaining:

> If we didn’t have that form of communication, I am trying to think what the alternatives would be…. I guess some of the communications I receive I wouldn’t receive because it would just be too difficult for people, so that would be good. But then I’d get them in paper form, or orally, so they’d sit in my in-tray and be a lot easier to read than reading a screen. So yeah, probably happier without [email]. *(Participant 5, Organisation X).*

Participants were then asked to summarise what they thought were the positives and negatives about having email at work (as reported in Questions 33 and 34). The five most popular reasons given for the positive benefits of email were as follows:

- **57%** felt it made communication easier:

  > It’s a good way of keeping contacts going…particularly if you’ve got a mix between sort of business and social contacts. It’s quite a handy way of keeping in touch without being as formal as a letter. *(Participant 11, Organisation Y).*

  > Being able to communicate internationally fairly easily. Being able to think about your response, think about the content and not react like that, so you can give some thought to it. *(Participant 20, Organisation X).*

- **43%** liked the real-time speed of email.
- **43%** liked the way email could disseminate documents and information to multiple end users in one action.
• 39% felt it was advantageous to be able to track and record correspondence through the email system and functions of the system (perhaps because it gives control over rules for transformation in activity partners):

The fact that you can track things. So if you send someone an email and don't get an answer, well you can ask, "did you read that email?" and they say, "No I didn't". Well you've got it tracked that it has been read, so it's kind of like, Hmmm [knowingly]! (Participant 2, Organisation X).

• 32% stated that it was the efficiency (e.g. speed/effort/outcome relationship) of email that made it advantageous.

You can communicate with people quickly and effectively without it rudely interrupting what you're doing.... Because you can kind of do it, you don't have to talk, you can get back to what you're doing, it's silent, you know... (Participant 23, Organisation Y).

These comments indicate that email is a medium that has made strategies for monitoring, communicating and managing work much easier. This suggests people may use email to assist them in working at a lower level of regulation. From Hockey's perspective, as email strategies evolve to become more and more automatic, email becomes less demanding and thus unlikely to exceed effort stores allocated to tasks. As the last category demonstrates, email enables people to optimise efficiency at work - something that Hacker (1985) suggests we are continuously attempting to do.

The five most negative aspects of email were reported to be:

1. The lack of personal and cultural cues in email
2. The information overload and overuse of email
3. Unwanted or unsolicited email
4. Excessive communication
5. Its isolating effect

• The lack of personal and cultural cues in email, which 50% of participants reported to be a problem in terms of establishing the correct tone, style, subtext, trust relationship and rapport intended:
...what people write and what they feel are two different things, and sometimes clarity of written communication is something that - it looks fine on email - but when you go and talk to someone and challenge them on a few issues, you find that that's not at all what they believe. They are towing the party line or are conscious of the permanence, the relative permanence of email, and therefore it has an authority that a conversation doesn't. (Participant 13, Organisation X).

As the following participant stated, the lack of personal cues in email has implications for the time spent on constructing email:

...I do feel that you have to be so careful with email. It's the way you read them. Sometimes if you're not in a very good mood or something like that, you read them in a different way to people writing them. I have to always re-read several times before I'm happy with what I send. So really my time is taken up with making sure I haven't put anything that might be misconstrued or anything like that. (Participant 3, Organisation Y).

The potential for miscommunication in using email to achieve one's goals seems to relate then to a lack of knowledge about the laws of transformation of the activity partners, and the absence of a style genre to shape the common consensus of how to use email. Not knowing what someone may find offensive, or not thinking about whether the correct tone or accurate information has been presented can have detrimental effects. Participant 13's astute comment about the authority that email has compared to a spoken conversation also indicates that for some purposes email can distort reality and lead to a misreading of environmental cues. It is likely that this can result in the adoption of action programs that are thus inappropriate and a potential failure of goal achievement.

- Moving on, 43% disliked the information overload and overuse element of email, stating that too many email were being sent and received, often unnecessarily, and as indicated by the following participant this can then create a self-perpetuating situation:

I often work long hours, trying to keep up, and then my colleagues complain that me working long hours actually creates more work for them, because I've been responding to email and stuff, and if I worked fewer hours I'd probably be sending fewer email, and everyone would be sending fewer email, and we could all manage our workload. (Participant 5, Organisation X).
As mentioned earlier, email still seems to be something that people interpret as being tagged onto their normal day's tasks, rather than something to be dealt with within the working day as a task in itself. If it doesn't fit into the day then it is dealt with beyond working hours and can lead to information overload and extra workload.

- Unwanted or unsolicited email (such as SPAM, unnecessary cc’s, etc.) were reported to be problematic by 36% of participants:

  ...it's a fact of email that people do tend to blow their own trumpet a bit and copy it to everyone in the company who's got the same colour eyes, just to let everyone know that they still exist. (Participant 11, Organisation Y).

  All sort of huge mailings should be approved. I worked somewhere you could get up to three whole-company email a day, advertising theatre tickets, animals for sale, you know. They used it as a kind of advertising board, which was really irritating. The odd one or two, you know, sort of one a month I wouldn't mind at all, you might even be quite interested in some of them. But when you are trying to do a job, and you go, "Oh God, not another one!". (Participant 12, Organisation Z).

  ...because email is so easy you can waste a lot of time with-, you know, the example of people just sending in saying, “where's my mug?” or "so and so's left their lights on in the car park". And whilst this might be useful in certain circumstances, it's just a waste of everyone's time if you consider that a thousand people in our office probably open that email about someone's mug. (Participant 24, Organisation Zb).

In the Characteristics of Use section, it was noted that people dislike receiving unsolicited email, but don’t seem to consider that they themselves actually send such things. The above comments indicate that sending company-wide email is efficient for the sender in the first instance (they can address multiple people simultaneously) but for recipients this email is annoying and distracting. In the long term, provoking such a reaction may mean a company-wide email strategy can become inefficient for the sender. People may come to see that email from 'X' are a waste of time and as such when 'X' communicates important information by email he/she may find that this is ignored, making it more difficult for 'X' to achieve their own task goals. Recipients’ action programs in such cases may well be amended to filter out
known annoyances (as Participant 2 stated on page 93) by using techniques such as ‘Block Sender’.

- 21% of participants felt that email created excessive communication (e.g., as chains are set up, or questions are sent out, rather than the sender taking time to find out for themselves, etc.):

> I know certainly from employee questions, they’ll find it a lot easier to type...[an] email rather than look on the intranet...and rather than actually actively looking up the information themselves. (Participant 7, Organisation Z).

Again this shows how a sender is optimising his or her own work by taking the easiest route, without long-term appreciation of how this may affect future correspondence with their annoyed activity partner.

- Email was also felt to have an isolating effect, with 21% of people reporting this to be a problem, often because email has cut down on face-to-face and telephone communications that traditionally brought people into contact with each other:

> I think the best option is to have a mixture of communication means. And I think that nowadays, and myself as well, and because of time constraints, you tend to rely more heavily on email. And the move has gone for email first as the primary form of communication, phone next and then actually face-to-face. Whereas really it could do with being a bit more balanced with email and phone still. But that is largely to do with time pressure I think. (Participant 20, Organisation X).

However, not all people feel that email prevents social development. It seems again that individual differences in personality matters. The following participant reveals how email communication actually helped to form bonds and friendships that hadn’t previously been fostered:

> I think one thing I have found is that it has helped me to make some friendships, in the sense that if you are included in certain groups for certain jokes then you sort of tend to feel comfortable with that person... (Participant 21, Organisation X).

In addition, others, rather than complaining about the lack of personal contact, find that email makes them too contactable:
CHAPTER THREE

It's not a bad thing for the company, because I'm sure they think it's more efficient. But for the individual it means you're never really able to get away to-, and I feel I do my day job better when I'm fresh and can get my tasks done. And I don't particularly want to, you know, feel I have to be accountable on every level. You know, at people's beck and call effectively. (Participant 24, Organisation Zb).

Section discussion

The positive qualities of email, reported by participants in the exploratory interviews, mainly relate to the opportunity to work more efficiently. This was reported in the Characteristics of Use section and is replicated here. Participants see that email has made their working lives easier and quicker, with work being carried out in fewer transformational steps (in Action Regulation Theory speak). This is especially so for some people who feel that email helps them overcome social barriers. This indicates (as in the Characteristics of Use section) that personality may affect one's relationship with email.

The negative qualities of email relate mainly to issues of time wasting and confusion. Email is seen to be detrimental to efficiency and performance because there is no common consensus in how to style a message, the lack of personal cues afforded by text-based communications, information overload and email overuse, the problem of receiving unwanted email which interrupt work tasks regardless, the feeling of being monitored, and problems of receiving additional workload without prior agreement. Effectively each of these negatives relate either to knowledge ambiguity or a lack of control, both of which are issues that need to be overcome in work design if people are to have decision latitude and expertise and thus to feel satisfied at work (Hacker, 1985, 1994).

Other issues

Throughout the interviews, and on closing, participants were encouraged to discuss relevant issues and topics - relating to email - that may affect their work. These additional comments were quite enlightening, flagging up potential danger areas and contradictions in the use/understanding of email between participants. For example, the following participant flagged up a potential danger area in email use, that he/she would like to be addressed:
...there is a danger with email that people don’t print them off and file them as they do a letter, particularly, sort of, in the military environment everything should be, sort of, printed off, filed, in an electronic system and uh, quite often email are forgotten and they are quite important. You know there may be two paragraphs within an email but they have a fundamental impact on the contract of the thing that you are working on. And of course, it all gets forgotten. And as people move on, what tends to happen is that their email gets ditched and there is no written record of what’s happening. (Participant 8, Organisation Y).

As seen earlier, several participants report enthusiastically how they delete an email as soon as it has been actioned, without storing or preserving it, indicating how some participants see email purely as a device for transmitting communications and actions, and others see it as integral to the work that they do:

But certainly we’ve noticed from a [candidate’s work area] point of view that everything stops when email goes down. Because its not just email now, everything is interlinked with calendar and task lists. And to be honest, if I lost my email, my calendar and my task lists, I wouldn’t be able to do my job. (Participant 8, Organisation Y).

Another participant notes the ‘levelling’ nature of email and how this can cause confusion in creating work strategies:

...in the conventional business model where you had meetings and chains of command and hierarchies that’s very clear as to why somebody’s been asked to do something, what part it plays in what business process. With email there’s an awful lot of requests flying around to an awful lot of people, no clarity as to why and sometimes no clarity as to who. (Participant 11, Organisation Y).

This lack of clarity and standardisation is repeatedly highlighted as a problem with email, with participants reporting that they have very much had to ‘feel their way’ with email, deciding how best to use it, how best to write it, and how best to store it, according to their own discretion rather than any established guidelines or templates (i.e., a lack of ‘knowledge’). The following statements indicate how people really struggle to understand what is expected of them:

I mean I know there doesn’t have to be an email etiquette, but at the same time, every email you get, do you say “yes, thank you for that”? Do you just wait or not say, “I’ve received it” It’s sort of that thing, and that’s, that’s, with me, that’s an issue I never quite know. (Participant 20, Organisation X).
Like when you are writing a letter or a proposal or some sort of document, you need to think about the message. And I think because email's there and it's quick, there's a tendency just to type something in, send it off, and not even think about it. (Participant 7, Organisation Z).

I hate people who write all in capitals, because they just don't realise that it's rude. (Participant 8, Organisation Y).

I think what does frustrate me is people who don't read their email. I've got a couple of members of staff who just write what comes into their head and never double-check it. And you look at it and you think, "I haven't got a clue what you are trying to say here". So I suppose it's the fact that people use email as a relaxed medium, which is good, but then they forget that it's still a formal method of communication, so they just don't double check it or they don't spell check. (Participant 8, Organisation Y).

In light of this struggle, contradictions in the use of email become very apparent. The participant quoted above clearly feels that email should be given a similar status to a letter, in terms of writing standards. The following participant, meanwhile, is in disagreement – seeing a benefit of email in the informality and flexibility in writing style that it affords (the contrast in opinion clearly shows how confusion and miscommunication between activity partners can ensue):

It's easier to send an email because you can be a lot looser in your style, and you don't really have to worry about whether it contains lots of spelling mistakes - that kind of thing - because no-one really cares... (Participant 24, Organisation Zb).

As individuals are developing their own standards and strategies for dealing with email, there is no consensus about how to organise email usage. As such, people also have to learn about the strategies, styles and standards of each of their email colleagues (or activity partners), in order to ensure communication is effective and appropriate. This may make it difficult for email strategies ever to be regulated at the lowest level - a problem in Job Design, from Action Regulation Theory's perspective. The following statements highlight how participants have learned how best to deal with certain colleagues with whom they have an email relationship:
...there's one woman who always sends out, not nightmare email, but it's always processes and procedures and, "now you've got to do this, because it's changed" and I think, "Oh God". And I find it quite difficult to read that sort of thing on email. And I'll always leave her email, because I just know what's going to be in it. (Participant 15, Organisation Z).

I mean, we have one or two managers and they say, "I want this to be done now" and they mean now. Whereas you have others who say, "Could you do this for me?" and you could have the whole afternoon or the whole week or something and still be happy with the result at the end of it. (Participant 1, Organisation Z).

I think one thing about email...is the recipient is more in control with email than they are with a phone call. They can choose when to open it, whereas the phone call, you know, is ringing in their ear and you kind of feel compelled to answer it really.... I mean I use email with my boss, because my boss is someone with a high level of concentration and if I interrupt the pattern, in order to talk to her about something, um... I don't necessarily get a very positive response...so often I'd say, perhaps email and say, "I want to talk to you about this", or "I think we should be doing that" or something, and then she'll come back to me in her own time. (Participant 18, Organisation X)

Despite the apparent need for improved knowledge about how to use email, because people have developed their own standards and strategies for handling their email communications, several participants commented that to introduce standardised principles and issue of consensus would be very difficult, and perhaps even undesirable:

If you wanted to have some sort of simple rules that I would put in place I think that's difficult because everyone works in their own way. I know that the way I work would not suit somebody else, and that's one of the great things about IT these days. (Participant 11, Organisation Y).

...it's so ingrained now it would be very difficult to retrain people's way of thinking I think. So even if we tried to introduce a way of doing things it would be very difficult to undo that, because it's part of the culture now. (Participant 15, Organisation Z).

However, the following contradictions in email use between participants and organisations clearly highlights how some guiding principles or the sharing of strategy knowledge could prevent misunderstanding, and even (in the case of the virus issue below) system malfunctions:
Contradictions in opinion over using email in delicate situations:

...if I've got individuals at risk of redundancy and I need to get certain amounts of information over to them, back and forth to them, whilst they are at risk from redundancy, and yet you don’t really want to get into a long and drawn out conversation with them about why they are being made redundant...you look to the facts rather than bringing in any kind of emotion. (Participant 17, Organisation Z).

...if it was a delicate matter I would want to speak to someone personally. So if there was a difficult message to deliver, on many occasions it would be better to do it by telephone. (Participant 19, Organisation X).

Whether to use typeface or punctuation principles to highlight email tone:

I have had experience of being sent something ironic and not realising the person didn’t mean it... I’ve responded in all seriousness. I didn’t read it that way at all. So that certainly is a disadvantage of email, that you almost need a different typeface for a joke or something don’t you? (Participant 18, Organisation X).

I have to confess I’m one of those people who overuses the exclamation mark for everything, but it does recognise humour in an email, rather than just bland, boring text. (Participant 8, Organisation Y).

How differences in previewing email affects strategy and potential virus problems:

I’ve actually got it set up so that it displays the first three lines of an email as well, so you can normally get a good gist from that first paragraph. (Participant 8, Organisation Y).

...we were told not to have the preview screen up because of viruses, so I do tend to open all my email immediately just about... (Participant 9, Organisation X).

Discussion

This exploratory study aimed to provide a context for studying email interruptions in the remainder of this research programme. It was deemed desirable therefore to firstly gather data about how email is actually being used in the workplace at present, and what people feel and think about it. Within such a context it was important then to ascertain what strategies
people might use for dealing with email in general, and then in relation to email interruptions received in different situations and task modes, and when overloaded. Whilst previous research into interruptions has focused on the forced nature of the intrusion to a cognitive task, some of this work has yielded findings suggesting that whether the outcome is disruptive or not may in part depend on how much control one has over the impact of the interruption.

The idea that email is a different type of interruption to that previously discussed in the literature is borne out from the interviews. Indeed, email interruptions are 'controllable'. They do not force people's attention away from a main task, and do not obligate the recipient to deal with the interruption, even when their attention has been captured. For although most people will check an email immediately on hearing an alert, participants also report that they then engage in some kind of decision-making process before they will actually process the email. This adds support for the fact that email is a negotiated interruption (McFarlane, 2002) and, because it is asynchronous, it affords a 'negotiation lag', a temporal window for choosing an appropriate response (a stage not previously acknowledged in Trafton et al.'s 2003 interruption time sequence).

Thus, understanding what people choose to do with email interruptions facilitates understanding of what variables may be involved in goal-directed decision making. The key findings from this exploratory study are that:

- People use a wide range of different strategies for dealing with email.
- People's strategies for dealing with email interruptions will change according to the situational parameters afforded by the task or email, in particular:
  - when people are faced with demanding situations (e.g., if their task is important, difficult or time pressured) they engage in strategies for ignoring email interruptions
  - when people are faced with 'boring' tasks they are more likely to respond to an email interruption immediately and spend more time dealing with it
  - when people are expecting an email that is important to their main task they engage in strategies to ensure that the email is received as
expeditiously as possible (extra checking, encouraging activity partners to respond quickly, etc.)

- when people are overloaded by email interruptions they apply strategies to reduce perception of load (such as deleting 'unread' email, using prioritisation systems, etc.).

- There are individual differences in the use of strategies in any given situation. For example, even though 32% of participants would ignore email completely when working under a deadline, 43% of participants continue to check email at such times.

- People try to work efficiently and develop their knowledge about how best to use email. Participants stated their interest in learning about email etiquette. Some also try to take account of their activity partners' preferences through their strategic responding, by attempting to communicate with them in the most effective manner.

- There are individual differences in preference for email. Some participants believe email is overused at the expense of personal contact, others feel it has enhanced their opportunities to communicate with people.

- There is a lack of standardisation in email use. The lack of strategy consensus, and the need to understand the requirements of each activity partner consequently means that strategy development is not as automated as it could be.

- Feeling in control of email appears to relieve problems of overload.

The strategic responses reported by participants in the exploratory study show support for ART's premise that people who can control their response to work will attempt to use efficient action programs (Hacker, 1985, 1994). For example, participants reported that they tend to deal with an email 'immediately', even though they have the choice to delay it (Jackson et al., 2003; van Solingen et al., 1998). van Solingen et al. (1998) found that postponed interruptions were three times more difficult to process. Thus, dealing with email immediately, under normal circumstances, appears to be a strategy that may be linked with efficient performance (Altmann & Trafton, 2002; Einstein et al., 2003; Trafton et al., 2003).

From the point of view of Action Regulation Theory, it does seem to be the case that people attempt to optimise efficiency and enhance their learning and development at work, as stated by Hacker (1985, 1994). People use
email partly because it is a more efficient means for communicating and disseminating work. When it is used incorrectly, or when there is ambiguity over how best to use it, this is frustrating to participants as more time and energy needs to be spent on dealing with email than is necessary. The fact that people have developed so many strategies for dealing with email supports the ART view that people attempt to move down a level of regulation wherever possible, as strategy development is indicative of expertise and learning.

Again, in support of ART, this study also demonstrated how strategy choice is affected by both situational differences and the level of regulation one engages (Russell et al., 2005). For example, when a task is difficult (and therefore requires a high level of regulation) people may be more likely to ignore an incoming email interruption. When a task is boring (and involves operating at a low level of regulation) people may speedily respond to an incoming email interruption. It seems feasible that the goal parameters (such as goal difficulty and valence) provided by Frese & Zapf (see their 1994 paper) warrant research attention now, to identify which characteristics of both the current goal and the new goal (the email) appear to influence both the level of regulation and the differential application of strategy choice, for dealing with email interruptions.

Also, situational parameters and levels of regulation alone do not appear to explain the dynamic and adaptive choice of strategy that individuals are engaged in. As noted earlier, people deviate from their main work tasks - even when these are pressing, important or difficult - to deal with email interruptions. They also engage in personal and social emailing at work. According to the ART framework this would be considered inefficient behaviour. However, if one extends the definition of efficiency to also include an awareness of wellbeing goals, and overall effectiveness, beyond a single action program, such behaviour can be theoretically understood.

Hockey's (1997, 2000, 2002) cognitive-energetical framework accounts for the fact that people are differentially interested in pursuing wellbeing and performance goals at work. He also acknowledges that people respond to multiple goals at work, and their strategic behaviour has to change and adapt to competing priorities from different goals. In line with Hockey's theory, the
attention to email interruptions, even when undertaking another action program, might be considered adaptive and efficient - a way of appraising the relative priority of other goals. Such awareness could be associated with overall effectiveness at work, even if current action programs are disrupted.

This highlights an important distinction between ART and Hockey. Whereas ART define success in goal achievement as relating to the efficient attainment of a single work goal, Hockey argues that success in goal achievement also involves considering wellbeing goals (working in a manner that means wellbeing doesn’t suffer) and other work goals besides that afforded by the current task. Although attending to an email interruption may be detrimental to a current work task (and thus inefficient behaviour in ART terms) it might involve working on activity that heightens wellbeing (i.e., relieves boredom or strain) or assists in the achievement of other work goals (i.e., that afforded by the email).

An acknowledgement of both wellbeing and multi-goal considerations in efficiency equations sets Hockey’s theory apart from ART, which, according to these exploratory results, may be missing some key points in its understanding of strategic action in goal-directed behaviour. Yes, people may wish to optimise their efficiency at work - indeed this study demonstrates how email is a tool that helps them do this - but optimising efficiency needs to take account of wellbeing and multiple goals if we are to appreciate reasons behind such behaviours as dealing with personal email, and checking email even when engaged in difficult or important tasks.

This study highlighted the need to establish what part internal factors play in strategy response to email interruptions. Individuals adopted different strategic responses for dealing with the same situation. Some people are email ‘ignorers’ and others are very quick to respond to email. This may indicate dispositional differences in personality or motivational style. In ART, Frese et al. (1987) have validated the presence of ‘Goal Orientation’ or ‘Planfulness’ action styles, but despite having acknowledged the importance of these (Frese et al., 1987; Frese & Zapf, 1994; Miller et al., 1960) ART has yet to use a structured, taxonomical measure of personality to identify whether and how it is linked to strategy choice and efficiency. In Hockey’s framework he acknowledges that individual differences may moderate or mediate...
strategic action, but apart from his discussion of coping style he does not pursue this area. The results of this study indicate a need to pursue an understanding of individual differences in strategic behaviour now.

In essence this exploratory study has highlighted some of the conflicts between ART and Hockey's approaches to understanding goal-directed activity.

In support of ART it seems that people:
- do change their strategies for dealing with email interruptions according to parameters of the current task or the email (external influences)
- do appear to want to work efficiently, (they try to reduce the level of regulation needed to apply a strategy and are annoyed by the misuse of email).

In support of Hockey it seems that:
- people also consider personal wellbeing in deciding how to respond to an email interruption (internal influences)
- respond to email interruptions even when tasks are demanding, perhaps to take a cognitive break, or to engage in other task goals (multiple goal consideration).

The study also highlighted that both theories could benefit from enhancing understanding of the role individual differences plays in goal-directed activity, as people appeared to adopt idiosyncratic approaches to email, and were differentially impressed with it as a communications tool.

**Conclusion**

With email clearly impacting on modern organisational life in a powerful and extensive way, this exploratory study has highlighted the importance of researching email interruptions in the context of people's real work experiences. As a controllable, asynchronous form of interruption, how incoming email affects strategy development and efficiency now warrants structured research attention. In particular, definitions of efficiency may need to be extended beyond that given by ART, to include the notion that working
to heighten wellbeing may be considered efficient, and working towards multiple, as opposed to single, goals may be more efficient in the long-run. In addition, an appreciation of the role that individual differences, such as personality, plays in moderating or mediating goal-directed activity warrants clarification, on the basis of these results.

Chapter Four will now pitch the findings of these exploratory interviews into context, using the interruptions literature reviewed in Chapter One and the theories of goal-directed activity summarised in Chapter Two. Chapter Four will outline the key areas of research interest that make up the focus of this thesis. As such, Chapter Four will now build a case for testing how email interruptions affect people's strategy choices, and how this clarifies or adds to both Action Regulation Theory and Hockey's compensatory control cognitive-energetical model. In particular the focus will be on understanding:

- The relationship between internal factors such as wellbeing and personality and strategies used to deal with email interruptions.
- How wellbeing is balanced against performance goals when responding to email interruptions.
- Whether controllable email interruptions have a positive or negative affect on overall effectiveness at work.
- What strategies are associated with improved wellbeing at work, and what strategies are associated with improved goal achievement at work - at the single and multi-task level.

Hypotheses for testing, (i) wellbeing, (ii) multiple-goal prioritisation, and (iii) individual differences considerations, in subsequent studies, will then be presented.
Chapter Four:
The Theoretical Direction of the Thesis

This chapter integrates the discussion on interruptions from Chapter One, with the findings from the exploratory study in Chapter Three, into the theoretical framework presented in Chapter Two. This will synthesise the aims and the focus of the main empirical studies of this thesis.

Thesis overview thus far

In Chapter One the discussion about email interruptions in mental information work presented a review of the literature pertaining to the psychological effects of interruptions. Interruptions tangibly affect memory and attention, and have implications for the deployment of cognitive resources. However, Chapter One also concluded that email interruptions are a different type of interruption, because they can be controlled. Thus studying email interruptions is warranted, (a) because controlled interruptions have not been sufficiently examined in the traditional, experimental, enforced interruptions domain, and (b) because, as noted in Chapter One, email interruptions are now prevalent in working life.

Studying controllable interruptions also provides a natural opportunity for examining strategic behaviour in goal-directed activity. In Chapter Two, Hockey's compensatory control cognitive-energetical framework (1997) provided an account of how individuals consciously and decisively adopt strategies for dealing with changing workload demands, depending on one's preference for preserving wellbeing or performance goals in different situations. Action Regulation Theory (Hacker, 1985, 1994; Frese & Zapf, 1994) was then introduced as a second organising theory to this thesis. Action Regulation Theory is especially useful as a theoretical framework for discussing the strategies people use for dealing with email interruptions because of its particular focus on the development of action programs ("strategies") for dealing with different situations and how these are
regulated. These two theories provided the platform for developing the key research question of this thesis:

*How do strategies for dealing with email interruptions affect wellbeing and goal achievement in goal directed work?*

Given that there is no precedent in the literature for evolving precise predictions in pursuit of this research interest, an exploratory study was conducted and presented in Chapter Three. This study explored how email is currently being used within organisations today, and logged the strategies that people described for dealing with email interruptions. Providing a detailed description of natural responding in human behaviour is essential to the scientific study of psychology (Lazarus, 2000). Conducting fieldwork within actual organisations, where staff are faced with the real problem of email interruptions on a day-to-day basis, provides an important first step to understanding how people naturally respond to email interruptions in reality. The results from Study One suggested that:

- Wellbeing may influence the strategy chosen by people to deal with an email interruption.
- The strategy chosen by people to deal with an email interruption may affect wellbeing.
- There are individual differences in the way people deal with email, and how this makes them feel.
- People are not just concerned about optimising efficiency on current work tasks. The way people deal with email interruptions suggests people may also be concerned to satisfy personal/wellbeing goals and other work tasks.

In this chapter these central themes relating to wellbeing, multiple goals, and individual differences will be discussed in the context of a more in-depth theoretical discussion, as central elements requiring further study. An empirical assessment of such issues will clarify the relative positions of Hockey (1997, 2000, 2002), and Action Regulation Theory (ART), as theories that frame subsequent studies of this thesis. A theoretical case for studying the strategies individuals use to deal with email interruptions efficiently (and what efficiency means in this context) is presented. In particular the inclusion
of wellbeing and multi-goal effectiveness concepts are highlighted to test both academic and practical issues relating to controllable email interruptions and goal-attainment. In addition, the importance of including an appraisal of individual differences in this equation will be argued, specifically as this is a research area that the goal-directed theorists universally consider to be significant to the development of strategic action, and yet has almost universally been overlooked by them in their applied studies.

Figure Five, below, illustrates the points at which people appear to have control over how to deal with their email interruptions (based on findings from Study One). These points are represented by Times 1, 2, and 3. By testing what appears to influence strategic action at each point in an email interruptions timeline (Boxes A, B and C) and relating this back to how strategic action then influences wellbeing and goal achievement (Box D), Figure Five provides a coherent hypothetical framework for conducting the remaining empirical studies of this thesis. The remainder of this chapter will outline how each theory has influenced the predictions made within this framework.

By the end of the chapter a series of research questions will be generated as the basis for further work (see Chapters Six and Seven). Each research question addresses a particular theoretical conundrum.
**Figure Five:** Antecedents and consequences to strategic action in a controllable email interruptions timeline

*Interruption timeline*

<table>
<thead>
<tr>
<th>Begin Primary Task</th>
<th>Email Alert</th>
<th>Check Email</th>
<th>Begin Email Task</th>
<th>End Email Task</th>
<th>Resume Primary Task</th>
</tr>
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**Interruption Lag**
- Prepare to resume primary task

**Negotiation Lag**
- Decide whether to attend to email task

**Resumption Lag**
- Re-orient back to primary task

**Time 1**
- Strategic Control: can decide on length of pause between alert and checking

**Time 2**
- Strategic Control: can decide on length of delay between checking and dealing with email

**Time 3**
- Strategic Control: can decide on length of time spent in email system, dealing with email

**Strategic actions at time 1, 2 or 3 influences:**
- Wellbeing
- Current task achievement
- Overall work task achievement
- Wellbeing goal achievement

**Box D**

**Box A**
- Current wellbeing
- Personality
- Activation of current task goal
- Demands of current task

**Box C**
- Current wellbeing
- Personality
- Relative importance of task versus email to one's goals
- Relative demands of current task versus email

**Box B**

**Defining efficiency at work**

Hockey (1997) defines effectiveness in terms of how well specific targets are achieved (i.e., goal outcome), and efficiency as the achievement of specific...
 targets divided by costs to performance or the person. However, the variables involved in weighing up the costs and benefits of action differ according to different theories. Optimising efficiency in Hacker's (1985, 1994) terms is referred to as behavioural economy - minimising psychological costs (effort expenditure) by executing action at the lowest level of regulation possible without compromising the successful achievement of a goal (Lazarus, 1985). According to ART, through learning, appraisal and correction we attempt to simplify our action programs (Zijlstra, 1993) so that a shift to operating at lower levels can be applied:

No matter what kind of information is available in the beginning, representations of the results will develop that minimise the number of transformational cognitive steps needed to regulate activity. (Hacker, 1985, p.278).

In other words, we try to work efficiently, to make life as simple as possible for ourselves and to keep working memory relatively clear. Hacker (1994) reports that in behavioural economy approaches, the resources ’consumed’ - such as energy - are seen as the costs in action, with the resources ’gained’ - such as goal achievement - seen as the benefits in action. If there is a discrepancy between the actual state of goal achievement and the desirable state of goal achievement then extra effort will usually be exerted, but only if the rewards associated with the goal outweigh the costs associated with engaging in extra effort (Hacker, 1994). From Hacker's (1985) perspective, attempting to work efficiently is rewarding in that it reduces memory load and gains mental capacity and allows for the production and storage of general task-related representations (in the Operative Image System - OIS) to be called upon and tweaked as and when conditions change.

Any discussion of behavioural economy should necessarily include an appraisal of Schönpflug's work (1983, 1985, 1986, 1992). Considered to be an action theorist by some (Frese & Sabinl, 1985), Schönpflug nevertheless provides a different emphasis in his discussion of efficiency, when compared with the other Action Regulation Theorists. In particular, this relates to his appreciation of demand-capacity relationships, the long term effects of acting, and the relationship between action and strain. Schönpflug looks at the regulation of effort in stressful situations and how people balance demands with capacity. Based on work by Schulz & Schönpflug (1982) stress is deemed
to be most acute if capacities just match demands or if demands marginally exceed capacities: when people feel that demands are only just beyond their remit, or when they actually match their capacity, they will try harder for longer, perhaps because the chance of success seems more likely. Thus, according to Schönpflug, lower efficiency will be maintained over a longer time period. Whereas, when capacity clearly exceeds demands and if demands clearly exceed capacity, efficiency will be higher as ineffective performance will be terminated earlier. The appearance of the occasional email interruption to one's work (especially at the lower level reported above) may mean that for many people email interruptions place just marginally more demands on them than capacity might allow. Hence, rather than ignoring email completely, people may struggle to deal with it, potentially operating less efficiently for longer.

Schönpflug (1983) says that increasing effort in response to demands may enhance capacity but downward shifts in one's effort regulation will probably occur if: (a) efficiency is suffering and so effort is reduced to adjust activity in relation to achievement, and (b) effort is psychologically costly and thus reduced. Psychological costs are, according to Schönpflug, a "...potent principle in human life" (p.314). Hockey (2000) agrees, saying that in goal-directed action, performance tends to be protected in the face of normal increases in demands as effort stores are employed. This means that as demands increase one might not immediately notice a decline in performance because people will automatically and moderately increase effort as a compensatory measure. This serves to protect work goals but can come at a cost to energy states, affective states, emotional stability, autonomic/endocrine activation, low-priority behavioural activity (e.g., secondary tasks), etc. In normal circumstances health is not affected, but over time or in extreme circumstances, such strategies might reveal greater side-effects such as the experience of stress or strain, or even organic damage. Hockey (2000) notes that a desire to protect one's goals is more noticeable in real-life situations where people's goals have meaning and there are real side effects or costs to contend with. In laboratory studies performance decrement or changes are difficult to observe or cross-validate in an ecologically valid setting.
Zijlstra (1993) reviews the work of Hacker, Frese and colleagues, and claims that it may be unrealistic to state that people continually try to optimise action efficiency by always striving to use the best strategy for achieving goals at work. Zijlstra suggests that a combination of economic principles and personal considerations are more applicable, with people attempting to use the best strategy at the minimum cost to wellbeing and psychological health. Although ART mentions costs in terms of energy or effort expense, it does not explicitly refer to wellbeing and psychological health, indicating that efficiency is rated on work performance dimensions only. In contrast, Zijlstra (1993) defines psychological efficiency as:

...[relating] to the individual's perception and/or experience of what is the most efficient way to carry out the task or, to be more specific, which strategy (or action alternative) is required to obtain the goal (i.e., 'benefits' of work behaviour) that involves the lowest 'costs'. (p.15).

Here, 'costs' include a consideration of effects on wellbeing and health. Such statements fit with Schönpflug's approach. Schönpflug discusses how this balancing act involves corresponding internal demands with external pressures so that the costs and benefits of regulating both are balanced to the optimal state. For example, attempting to control threatening or challenging conditions (external) can invoke worry and anxiety or even strain in a person (internal) and so it may be decided that rather than actively attempt to control an external threat, some other coping strategy must be employed to reduce strain upon the person. He discusses the need for research, looking at which coping strategy is most likely to 'pay off' and be 'profitable', and says of efficiency:

Efficiency is not to be equated with absolute achievement but rather with the relation between activity (regarded as psychological costs) and achievement (i.e., gains). (Schönpflug, 1983, p.303).

Indeed, the notion that acting in itself may be considered to evoke stress is a unique perspective (Lazarus, 1985).

ART does not consider how internal concerns or consequences of action affect efficiency, but both Zijlstra and Schönpflug's perspectives note that psychological wellbeing and strain may well be considerations in the balancing
acts that people employ when attempting to work efficiently. In Hockey's (1997, 2000, 2002) model it is assumed that people will actively choose whether to work at an upper level or lower level of cognitive processing according to both task and wellbeing demands. Activating extra reserves of cognitive energy to deal with high demand situations has a potential psychological and physiological cost. On the other hand, reducing effort and energy as pressures increase, by dropping down to a lower level of processing (at least periodically) can provide cognitive respite and prevent stress or exhaustion. Operating at a high level for a prolonged period of time can be draining and stressful (Scerbo, 2001), so although it may result in better work outcome, such a mode of operation can also reduce wellbeing. Just switching to a lower level of operation intermittently may help reduce wellbeing deficits, as this provides some cognitive relief, even though this may make achieving one's work tasks more effortful and slow in the long run. This is a cost-benefit equation that individuals may implicitly have to consider.

It is noted here that ART and Schönpflug have been criticised because in discussing behavioural economy the assumption is that people have the time and resource to process these cognitive considerations before engaging each action program. In reality, people are likely to respond far more automatically and immediately (Emmons, 1997; Lazarus, 1985). ART acknowledges that as action programs become well-practised they are applied automatically. Hockey argues that people only tend to 'think' about strategies when moving into Loop B, as action in Loop A is fairly automated. Nevertheless, it is important to remember these criticisms within this context.

Efficiency at work then appears to involve weighing up the human input - increased effort and expenditure of cognitive energy and resource, against the actual outcome - swifter and better quality goal-achievement, plus reduced psychological wellbeing. With practice it is likely that such balancing acts have become fairly automatic and non-conscious. Changing task demands will encourage individuals to consider this balancing act however, and it may continue until goal achievement is attained, as environmental and human conditions continue to change. The interdependent relationship between the situation and the individual actor is constant and synergistic, and efficiency involves being able to read this relationship accurately, if implicitly. However, although Zijlstra (1993), and Hockey (1997, 2000, 2002) all acknowledge that
this is how individuals make decisions about how to adapt to changing work demands, the Action Regulation Theorists (not including Schönpfug) are more narrow in their definition of how efficiency is optimised. Their focus is more on how people learn to operate at the lowest level of regulation possible so that fewer transformational steps are required to reach an end goal. Learning how to shortcut action is a long-term consideration in acting and is supposedly at the heart of efficient behaviour (Hacker, 1985, 1994) according to ART.

Efficiency and wellbeing
By focusing on the level of regulation as a key unit in appraising efficiency in behaviour, the Action Regulation Theorists do not consider that an individual would choose to operate at a different level of regulation than that required by the situation as part of a wellbeing consideration. For example, if a situation is novel and challenging ART suggests that efficient workers operate at an intellectual level initially (i.e., in order to learn the task), because operating at a lower level is more likely to result in error and the non-attainment of a goal (Frese & Zapf, 1994). However, as discussed above, operating at a lower level of regulation may be actively chosen by an individual if they wish to reduce the demands being placed upon them (and hence increase wellbeing), even if goal-achievement and learning suffers somewhat. In short, what Action Regulation Theory does not appear to acknowledge explicitly is that people make active choices about how to act that are based on considerations for wellbeing and not just an assessment of external situation demands.

In the context of how people deal with email interruptions with consequences for efficiency, findings from Study One suggest that people weigh up the extent to which an email interruption will help or hinder goal achievement, and how it might also affect wellbeing, before they 'decide' whether to act on it. If people are engaged in demanding work then an email interruption may affect them in one of two ways. It may prove to be a welcome distracter, especially if it is low in demands, perhaps encouraging people to take a cognitive break (and thus recharge in the lower loop for a short period – Hockey, 1997, 2000, 2002). Or it may add to the demands being placed upon a person and thus increase their level of personal stress. In attempting to minimise costs in achieving one's goal, Zijlstra (1993), Hockey (1997, 2000, 2002), and Schönpfug (1983) all comment that people may choose a course
of action to reduce personal stress or enhance personal wellbeing. In such circumstances, people may not always want to operate at low levels of regulation (even if it is more efficient) because they may find this boring, undemanding and therefore may actively elect to work at a higher level to reduce the potential for feeling stressed (Scerbo, 2001). Equally, people may choose to operate at a lower level of regulation than is necessary to achieve a goal effectively, because they are finding it difficult to sustain vigilance and concentration and want to spend some time on lower level, perhaps even unimportant, activity.

The strategy that people choose to deal with an email interruption therefore needs to be appraised according to both task and personal demands. For what may seem inefficient at first glance (e.g., attending to a light-hearted email whilst engaged in a demanding task) may in fact be a means of improving likely outcomes (e.g., by enhancing wellbeing, which has longer term benefits), and thereby optimising performance.

Wellbeing as an antecedent to action
Wellbeing need not only be considered in terms of a consequence of action, however. Hockey’s approach indicates that wellbeing may also be an antecedent of behaviour (potentially influencing Time 1, 2, and 3 in Figure Five). Study One revealed that when individuals have been working in the automatic loop (on undemanding tasks) for any period of time, email interruptions were very welcome (see also Trafton et al., 2003). The majority of participants in the exploratory study stated that, when bored, they went straight into their email without hesitation.

Although Hockey (1997, 2000, 2002) does not discuss underload, Scerbo (2001) states that under-stimulation at work can reduce levels of comfort and performance. Hancock & Warm (1989) report that underload stimulates one’s adaptive resource, prompting people to seek stimulation and improve wellbeing and energy. Indeed, Fisher (1998) states that boredom and mind wandering tends to occur when tasks are not demanding enough. She also comments that mind wandering (termed cognitive interference) could make a task seem more boring than it is, as people attribute the fact that they are distracted to the notion that the task must be dull if they can’t concentrate on it. In such a state, the presence of an email may prove to be a welcome and
enticing distraction to relieve ennui. Participants 21 and 24 (quoted on page 87 of Chapter Three) from the exploratory study summarise this strategy well.

These findings support the notion of wellbeing as an antecedent to action. When people are bored or understimulated they may adopt strategies to boost wellbeing, perhaps by responding quickly to the interrupting stimulus and spending more time dealing with it. In Study One, the most common reason for being glad to receive email is when one is understimulated at work (reported by 32% of participants).

Such conclusions could explain why so many people reported the sending and receiving of personal/social email in the Study One exploratory interviews. Here, personal and social email was the most frequently reported form of email that was sent (by 68% of participants) and the second most popular reported email that was received (by 64% of participants). Although the frequency results cannot tell us whether personal and social emailing makes up the greatest proportion of email traffic, it does indicate that this is a form of email that is widely used. From Hockey’s perspective, in the course of demanding work people may need to break into a less demanding mode of working occasionally (i.e., low-level email exchange) to recharge, or they may need to move focus away from performance protection to enhance wellbeing (i.e., by spending some time on personal emailing). However, in light of these findings it is recommended that Hockey now also considers that wellbeing influences activity when underloaded too; people may wish to seek out opportunities to boost energy if demands are too low. Moreover, if responding to an email interruption boosts wellbeing, then this suggests clarification needs to be made to the principles of behavioural economy and the optimising of action efficiency as discussed by Hacker (1985, 1994).

The first set of research questions focuses on the concept of wellbeing as an integral part of the efficiency equation, and attempts to explore the part that wellbeing plays as people make strategic choices about how to respond to email interruptions. These questions investigate wellbeing as both a consequence and antecedent of action, and ask:

1. Does wellbeing affect strategies chosen to deal with email interruptions at work? (antecedent hypothesis)
2. Do strategies chosen to deal with email interruptions at work affect wellbeing? (consequence hypothesis)

Figure Five graphically outlines at which points in the interruptions timeline wellbeing will influence (Boxes A, B, and C) and be influenced by (Box D) strategic action.

**Summary**
Efficiency appears to be defined in different ways by different theorists. Action Regulation Theory suggest that people try to work efficiently by operating at the lowest level of regulation and adopting the fewest transformational steps to achieve their action program as well as possible. Hockey (2002) examines energy expenditure, with particular reference to wellbeing. For example, he notes that a strategy that may protect the performance of a task can be bad for wellbeing (can cause strain or fatigue). Schönpflug also considers the role of internal factors in balancing efficiency equations. He focuses particularly on how action can reduce stress, and how demands and capacity are balanced in efficient situations, to reduce the impact of strain.

Whilst it is clear that these theories all stipulate that people appear to consider efficiency as something to be optimised in carrying out goal-directed work, the concept of efficient behaviour is different according to each theory.

**What do efficient workers do?**
Given the contrasts in how efficiency is characterised by the different models, understanding what efficient workers do also differs theoretically. Focusing on how ART and Hockey respectively conceptualise efficient workers helps to clarify the issues involved.

**ART and efficient workers**
According to Action Regulation Theory efficient workers tend to have better representations about their activity - a more accurate representation of the anticipated result, the transformational relations required to reach this, and the input conditions (the tools, materials, appreciation of own skills and
knowledge) available (Hacker, 1985). The Action Regulation Theorists suggest that level of expertise affects people's ability to weigh up principles of behavioural economy effectively. Frese & Zapf (1994) state that experts (or 'superworkers' in their terms) aren't motivated to work harder than other people, but because they have a better represented Operative Image System (OIS or knowledge base) and better work strategies (action programs) available they achieve a higher yield (goal outcome) for less effort exerted. People who are less effective at working efficiently may have poorer mental representations or poorer plans available, even if they are motivated to work harder. So, (according to Action Regulation Theorists) motivation doesn't improve performance and increase effort (Frese & Zapf, 1994; Hacker, 1992); what improves performance is expertise and a better OIS:

Superworkers in real life situations show a better understanding of work processes and potential strategies, and also use more active strategies to control the work situation, rather than have it govern them. (Frese & Zapf, 1994, p.299).

These individuals tend to be capable of dealing with unexpected events. When undertaking their action programs, they are continually reading environmental conditions to see how successful their strategy is proving to be, and whether they need to change course. Applying the issue of email interruptions to this process, workers who are able to achieve their goals and tasks, even when bombarded with email interruptions, are likely to be more effective at:

- planning strategies for undertaking work
- monitoring the extent of interruptions and the demands this places on their resources
- changing strategies to cope with this as necessary (perhaps by adopting an alternative action sequence).

Effectively, for 'superworkers' email interruptions are something to be controlled, not something that controls them. Practice at dealing with interruptions is perhaps therefore responsible for improving strategic performance, and ultimately efficiency (Hess & Detweiler, 1994).

In Koole & van't Spijker's (2000) study on expectations and interruptions, 80 university students were given an essay writing task to do and were asked to outline when they expected to do this, and how they intended to allocate their
time to it. They then tracked progress on the essay-writing task from allocation until completion. Interestingly, those who formed implementation intentions\textsuperscript{10} were better at visualising the action program, were more committed to their goal, and were focused. They were consequently less likely to engage in optimistic bias (so their goals were achieved in a way congruent with expectation), but this was mediated by a reduction in interruptions. Goal interruptions constitute an important source of optimistic bias because inexpert people fail to incorporate such distractions into their goal-directed plan expectations (Buehler, Griffin & Ross, 1995). Koole & van't Spijker (2000) demonstrated that if people expect to receive interruptions to their goal-directed plans then they are also more likely to attempt to reduce them and thus will achieve their goal more efficiently, perhaps, as Schönpflug (1983) or Hockey (2000) might say, through adopting an attentional narrowing strategy.

In light of this, one would assume that superworkers in new technology environments have better implementation intentions and so anticipate email interruptions to their work plans, are better able to weigh up how such interruptions affect their current work, and may actively attempt to reduce interruptions – perhaps by ignoring them. Certainly, participants in the exploratory study who claimed to have email under control comment that this is because they have learned how best to deal with email, after having suffered from poor strategising in the past. In particular, participant 13 (quoted on page 84 of Chapter Three) highlights this.

Hacker (1986) (translated by Frese & Zapf, 1994) says that experts (or superworkers) are characterised by performing fewer activities and producing more output because they show:

- bursts of activation/intensity of working (periods of energy followed by respite)
- a more active approach overall (less effort expended for higher yield)
- increased sensitivity to the environment because of a better developed

\textsuperscript{10} Planning fallacy (Kahneman & Tversky, 1979) or optimistic bias involves predicting that a goal will be achieved with greater ease, speed or proficiency than it is in practice. Those who fall foul of optimistic bias fail to create implementation intentions about their work goals (Koole & van't Spijker, 2000). Implementation Intentions are conceptualised as similar to anticipations and expectations in Action Regulation Theory, as they require an individual to mentally represent how their goals will be achieved; what the likely outcome is and where obstacles may lie en-route.
- psychological automisation (whereby movements are smoother through practice – although over-automisation can result in rigidity or inappropriate application)
- verbalisation (whether expressed or not, this aids orientation and focus)
- intellectual penetration (a deep understanding of the task and its implications)

Frese & Zapf (1994) summarise that superworkers have more precise goals, a more foresighted prioritisation system, more hypotheses, spend more time planning, orient to the goal more completely, take more decisions, are more self-reflective and are less neurotic than average workers. Essentially they argue that superworkers are particularly effective because they have a better, more complete understanding of their work and the situation within which they work, and are better disposed therefore to control their tasks and goal-achievement, rather than succumbing to being controlled by work.

However, from Schönpflug's (1983) perspective, Hacker's (1986) 'experts' are not engaged in efficient behaviour. In Schönpflug's theory of behavioural economics (1983) efficiency involves considering a balance between capacity and effort. The most efficient behaviour involves exerting effort that uses all of the available capacity to an individual. Extending capacity further can result in future inefficiency, as fatigue and strain can result. Yet, in the first point given by Hacker (1986) above, he says that experts work more intensively for a short period (probably a highly efficient form of working as capacity is pushed to the limit and maximum outcome is expected), but that this period is followed by a non-defined time of rest (which could be considered inefficient as the previous good work is then balanced against a period of non-activity due to fatigue).

As a second example, in Hacker's next point (above) lower levels of effort employed may mean (according to Schönpflug, 1983) that an individual's full capacity availability is not harnessed, which is wasteful and thus non-economic. Thus, contrary to the Action Regulation Theorists postulation that effort is not involved in expert behaviour, Schönpflug argues that it is not the amount of effort that results in the most efficient behaviour, but the
relationship between effort and capacity. If effort and capacity are perfectly correlated then the behaviour is perfectly efficient.

Hockey and efficient workers
Hockey's (2000) definition of an efficient worker, depends on the coping style adopted, and one's definition of efficiency. He notes how different people will adopt different coping strategies for dealing with the regulation of work activity in the face of increasing load or demands. For example, people who adopt direct coping strategies will:

- protect performance goals
- appear more effective overall
- prevent major work problems
- maintain high quality output
- neglect minor work activities
- cut corners
- suffer more physiological and psychological strain
- have minor health complaints
- have problems relaxing
- experience reduced wellbeing.

On the other hand, people who adopt indirect coping strategies will:

- maintain a relaxed approach to work
- fail to complete tasks on time
- possibly experience reduced self-esteem and a sense of failure.

Direct copers may be more effective at their work tasks but not necessarily more efficient overall because of the impact of such a strategy on physiological and psychological health. Indirect copers however, may appear to be less efficient at attaining work tasks, but may be more efficient in their life as a whole. Clearly, what is considered efficient then not only involves differences in understanding the cost-benefits involved in work (and the variables considered in such a relationship), but also involves differences in the focus of activity and whether it is simply related to work goals, or to personal and wellbeing goals too.
The third research question attempts to decipher how wellbeing might be balanced against performance goals as people make choices about how to respond to email interruptions:

3. How do different strategies for dealing with email interruptions differentially affect wellbeing and task goal achievement outcomes?

Box D in Figure Five suggests that strategic action at times 1-3 will relate to wellbeing and current task achievement. Having checked the email interruption, Box B indicates that people are likely to choose strategic action based on how important the task versus the email is in terms of one's goals. One's goals relate back, differentially, to task and wellbeing.

**Summary – amalgamating the approaches: a third way**

In discussing efficiency then, it seems that Action Regulation Theorists are primarily discussing costs and benefits involved in working towards work goals, with a focus on variables of performance outcome, levels of regulation employed and the number of transformational steps required. An efficient worker is more likely to have accurate knowledge and representations about achieving their work goals and as such can reduce the amount of effort and energy they employ in executing action programs towards achieving a successful end goal. Schönpflug (1983) however, in his principles of behavioural economy, suggests that executing lower effort is not necessarily indicative of efficient behaviour as it insinuates that effort or capacity is wasted. According to Schönpflug, efficient working involves balancing capacity with effort without stretching or wasting either. This is because Schönpflug also considers personal or emotional goals as being part of the equation in behavioural economics. Over or under extending one's effort or capacity can result in strain or fatigue, and this has negative implications for wellbeing.

ART looks at task and situational parameters that influence strategy choice, and explains that these are stored alongside action programs in the OIS, to influence future behaviour. ART does not consider that wellbeing is a parameter that also influences strategy choice. Nor does ART consider that one's consequent wellbeing as a result of applying a strategy may be linked in with the storage of action programs and the likelihood of them being used.
again (i.e., applying an action program because of how it makes one feel) (Daniels, Harris & Briner, 2004).

Picking up on the wellbeing theme then is Hockey's (1997, 2000, 2002) compensatory control cognitive-energetic model. Hockey agrees with Schönpflug that personal goals are also considered as people attempt to cope with an increase in demands. Hockey states that strategic behaviour involves wellbeing, in that people act to either protect task performance or to protect wellbeing, and that either strategy is necessarily detrimental to the other unless the balance is right. However, he does not refer to underload, and the fact that people may adopt a strategy to promote wellbeing when demands are too low (Hancock & Warm, 1989; Parasuraman & Hancock, 2001). By neglecting to attend to underload, Hockey also neglects to consider that people may adopt strategies that allow fulfilment of both wellbeing and work goals - *at the same time*. Participants in Study One indicate that when bored, dealing with email both boosts their wellbeing, but also the vigour with which they apply themselves to their tasks.

So, the decision taken to respond to any situation is not driven purely by situational or task demands, (as claimed by the Action Regulation Theorists), but is actively controlled by an individual appraising both personal/wellbeing and work goals (as claimed by Hockey). Efficiency thus needs to be considered in terms of how work and wellbeing goals are satisfied. Hockey and Schönpflug consider this, and ART does not. However, Hockey does not appreciate that both work and wellbeing goals might equally be attained in applying strategic behaviour, possibly because his model does not include a consideration of underload.

The approach taken in this thesis recognises that current wellbeing may influence strategy choice, and that strategy choice can be rated as efficient according to consequences at both the task level and in terms of subsequent wellbeing. This integrates the perspectives offered by ART, Schönpflug, Hancock & Warm and Hockey. Although controllable email interruptions are used as a tool for studying wellbeing and strategic behaviour, a range of other situations at work may be explained by this amalgamated approach.
For example, if someone is feeling bored or tired at work (underloaded), opting to take a 'coffee break' may mean that energy is boosted and one returns to one's work tasks with renewed vigour. Taking a coffee break may appear to be inefficient behaviour, if one only considers how the current task's action program is progressing (as in ART). However, when wellbeing is considered it is clear that such a break can improve performance on the task, and in satisfying wellbeing goals. Indeed, even short-term absenteeism may be a strategic consideration, with workers using absence from work as part of a strategy to prevent burnout and stress and to make sure that they can reconvene their work responsibilities refreshed. The introduction of 'duvet days' by some companies is recognition of the fact that sometimes people just need to take a break from work to recoup their energy levels (Can duvet days combat sickies?, 2003).

Indeed, numerous scenarios might be applied. When a long, arduous meeting is interjected by a humorous aside from a colleague, the atmosphere is broken and people return to the meeting agenda with renewed enthusiasm. Taking time to phone home to find out how a loved one has done at school/work takes time out from work tasks, but may mean that one's mind is put at rest, and concentration on work tasks improves. From ART's perspective taking time to drink coffee, being absent from work, telling jokes in meetings, or making personal calls at work, might all be considered inefficient to the satisfaction of work tasks (which they indicate people with control over work are keen to optimise). However, such activities are likely to boost wellbeing, and as such, this may well satisfy both task and wellbeing goals, a feature that neither ART nor Hockey predict.

**Acting in multi-goal environments**

Hockey suggests that efficient behaviour should also include a consideration of one's work goals, one's life goals and one's personal/wellbeing goals. What is efficient action in the work domain may be considered highly inefficient in another domain (Lazarus, 1985). People engaged in mental information work usually do deal with multiple goals, and in many cases, an interruption may relate to another, equally important goal that the worker must achieve. For
example, Burmistrov & Leonova (1996) found that participants in their study actively adopted strategies to work on interruptions at the same time as their main task. Walji et al. (2004) report that interruptions have frequently been construed as negative within the research literature. However, they argue that this is because of the focus on measuring single task output. Yet, if one extends the measure of effectiveness to include performance in work as a whole, attending to an interruption can increase one's effectiveness.

Walji et al. (2004) focus on which 'types' of interruptions might be construed as positive (e.g., warning bells in hospitals) and say that, "...when looking at the individual performing various tasks, the interruption may not have a detrimental impact upon the whole. Most research has focused on the task level, which may be an inappropriate level of analysis in some cases" (p.2), and, "...it is important to clarify the perspective from which effectiveness is judged" (p.4). For example, imagine a worker who has to get a report in to his manager. He has two hours to complete this document, and he is working away on his computer trying to get this done. Shortly he is interrupted by an email; someone is asking for details about how many chairs he needs for a meeting he is holding tomorrow. This worker has two goals requiring achievement – i) the goal to get the report in on time; ii) the goal to contribute effectively at the meeting tomorrow. How the worker deals with the interruption will surely differ in this scenario if compared to a scenario where the interrupting email is unsolicited and from an on-line holiday company telling him about their latest deals. In this latter condition the interruption does not afford a personally relevant goal and so is unlikely to be a priority for the worker. When an interruption presents a goal that is at least equal to the importance of the goal being worked on (the former example) the individual faces a dilemma about how best to act without compromising efficiency (see Box B in Figure Five).

**Multiple goals in ART**

In ART, the parameters for acting on a goal (see Frese & Zapf, 1994, in Chapter Two) are considered before a worker decides whether to act and whether to orient towards a single goal. However, working in multiple goal environments can cause problems when other goal opportunities conflict with the goal of the current action program (Frese & Zapf, 1994), as in the example above. When goals do conflict it is important to understand what is
involved in the decision making process that means that one goal is chosen to be pursued above another. In the context of email interruptions, this involves ascertaining what aspects of the email would cause someone to stop working on a task and attend to the interruption and the extent to which this decision is made with principles of efficiency and goal success in mind. In other words, what is it that makes a person act on an interruption, such as an incoming email, when engaged in other goal-directed behaviour?

Frese et al. (1987) comment that action is pursued according to the hierarchical arrangement of goals, sub-goals, plans and sub-plans. They note that high-level goals necessitate the creation of more manageable sub-goals and related actions and that action programs are pursued according to the priority of sub-goals. Their discussion is nonetheless limited to an understanding of hierarchy and priority within a single activity cycle (however broad its superordinate goal may be). What they don't discuss is how sub-plans and goals from other activity cycles may compete for resources in multi-goal environments. In multi-goal environments, attending to an email interruption takes temporary priority over an existing action program. Yet, as discussed above, shifting one's attention could be considered efficient working if, for example, it allows for another goal to be pursued in a timely manner, or it ensures that a problem (which has been pressing on somebody's mind) can be attended to and eliminated, thus ensuring a more clear-headed return to the original action program.

Hacker (1994) also says that actions are controlled by hierarchically arranged goals. Therefore, when working on concurrent action programs, the assignment of attention to any goal at any one time depends on the differential value attributed to them. In other words, if a new goal has a higher value than the current goal then that goal will be pursued, and presumably the current goal's action program may be temporarily halted so that a new action program can be pursued. If people are prompted to halt an existing plan in order to pursue another plan (related to another goal), Hacker (1994) and Frese & Zapf (1994) stipulate that this is due to the other goal offering variety in action and having a higher value to the individual (in Figure Five, Box B deals with the idea that people weigh up the importance of the email and the task in deciding how to act).
Hacker (1985) says that high performing people may need to work on multiple action programs in order to feel satisfied. He says that autonomous goal setting and variety in task demands are most important for enhancing performance, wellbeing and motivation. By this reckoning, if one has been engaged in executing the same action program for a long time an email interruption may appeal simply because it offers variety and the freedom to pursue a different course of action. As one participant in the exploratory study commented, when they are bored at work and an email arrives, they are, "...straight into it like a shot". Indeed, the novelty and challenge of a conflicting goal are key characteristics that will encourage an individual to suspend existing action and deviate action to the goal that affords this (Robertson, 2003).

Fischbach et al. (2003) found in their study on temptations that distracters with lower goal values can still divert people away from their existing goal pursuit. Jackson et al. (2001) concur that resisting the temptation to open an email when it has just arrived is very difficult as it, "...is like being sent an interesting parcel through the post and having to resist the temptation not to open it until the current job has been finished" (page number omitted). Interestingly such temptations do not always result in deviant behaviour, as Fischbach et al. (2003) and Altmann & Trafton (2002) have found that interruptions to goal pursuit often remind people of their existing goal, reactivate and strengthen it and thus encourage people to ignore distracters. Additionally, research by Whittaker & Sidner (1997) found that people will only deal with email interruptions when working on important tasks, if the email is unambiguous, quick and easy to process. If it requires more attention than is available then it will be temporarily halted.

Levels of regulation

Although Hacker (1985, 1994) does not consider whether multiple activity cycles are worked on concurrently, he does acknowledge that working on multiple action programs can take place. Yet this is only really possible when dealing with familiar situations and more automated processes, at sensoromotoric levels of regulation (Zijlstra, 1993). In the five stages of an activity cycle, the sequencing of activity is hierarchically interwoven, with different stages returned to and re-appraised as the activity progresses (Hacker, 1985). When dealing with multiple tasks (such as dealing with an important
email interruption, and getting a report finished by a deadline) the five stages may operate in parallel, or simultaneously as additional tasks are anticipated. Clearly this requires use of a cognitive resource that may only be available at a low, automated level of regulation.

In particular, Hacker states that when operating at a high level of regulation people are more inclined to check the environment for cues that will impact on their progress of the action program and likely goal achievement. However, it is when operating at a low level of regulation that Hacker claims people could engage in multiple action programs, as this is when there may be cognitive resource available. When working at a higher level of mental regulation, there may be fewer cognitive resources available to compare parallel goals and operate in concurrent activity cycles (Zijlstra, 1993).

When email interruptions occur in the course of one’s goal activity, one might expect then that they would be ignored if people are operating at too high a level of regulation on their current task to afford the cognitive resources to check (see Box A in Figure Five). Even if people do find the resources to check an email interruption, if the level of regulation required to deal with the email uses up more cognitive resource than is available, the question is, which will suffer – the processing of the task, the processing of the email, or the processing of both?

Reports from the exploratory interviews indicate that people consider the demands of their task (29% reported this) and demands of the email (29% reported this) before they process an interruption. Interestingly, while 32% of people commented that they would therefore ignore their email when working on a deadline (i.e., when under time pressure), 56% said this strategy would apply when working on important or difficult tasks (i.e., when cognitive demands are likely to be high). Time pressure may place demands on one’s cognitive capacities but this is not a given, whereas working on important or difficult tasks does require more mental resource, and probably a higher level of regulation. This might explain why more participants indicated that there isn’t available resource to attend to the email interruption at such times.

Frese & Zapf (1994) tried to address the criticism that Action Regulation Theory only looks at singular action programs and singular goals by stating...
that, "...two actions running their course are intertwined with each other; often this is done by some time-sharing process on the intellectual level of regulation" (p.281). If conflicting activities are regulated by the intellectual level they have to be executed at a low level of regulation (i.e., more automated) in order that they can co-exist. Operating on multiple activity cycles that require high levels of regulation means that available cognitive energy and resource is limited and people do not have the mental capacity to maintain efficient modes of working. For example, checking the environment for feedback cues may be reduced, and more automated action programs may be selected inappropriately. In Hacker’s terms then, in multi-goal environments an email may be most noticed (checked) when at a high level of regulation but most likely to be processed (acted upon) when at a low level of regulation, as one will find it easier to switch between different action programs when there is more cognitive resource available to do so. If lower level action programs are preventing the satisfaction of superordinate goals then Frese & Zapf (1994) state that the higher-level goals will be changed.

With such scenarios in mind, it seems that Action Regulation Theory needs to consider multiple goals and how they are prioritised to understand when and why action takes place. The exploratory study indicates that it does appear that some assessment of conflicting goals is made before one decides to process an interruption. To make an assessment one has to acknowledge the character of the conflicting goal in the first instance, and this may be why the exploratory (and other) studies revealed how readily people will attend to an interruption when it first appears. However, people don’t then necessarily follow this up with a decision to act on the interruption. Thus, what appears to be happening is that people will check an email interruption in response to an alert fairly speedily (Time 1 in Figure Five). Then, perhaps in the negotiation lag, having assessed the email content, they will make a decision about whether to act on it (Time 2 in Figure Five). Such a decision appears to involve a comparison between the new goal and the current goal along the lines of goal value, novelty, challenge, and the other action parameters outlined by Frese & Zapf (1994) – see Chapter Two, and Box B in Figure Five. The goal that ‘wins’ in such a comparison will probably be the one that receives renewed attention.
Hockey's perspective on multiple goals

Hockey (2000) says that humans are principally required to satisfy "many different goals at different times" (p.212-213), and thus they are required to keep switching between action programs in order to respond to their multitude of goals. This means that people have to be flexible. However, Hockey also says that to be effective such flexibility must be resisted or goal orientation will suffer. In particular, in order that important goals are maintained as a target state, and so that behaviour can be modified in line with such goals, people must resist the temptation to switch towards other goals. There is a paradox here. Prevention of switching may mean that one target goal is reached more readily, but it also means others will necessarily suffer.

Dealing with multiple goals however doesn't just involve dealing with numerous work goals. Hockey reminds us that preserving or protecting wellbeing is also a goal that needs to be balanced against the other task goals that emerge at work. In fact, Hockey (2000) says that work goals may be more vulnerable to disruption because in the long-run emotional goals are more powerful. Emotional goals involve satisfying basic biological urges for security, warmth, the need to stay calm and have rests. Hockey (2000) says, "The desire for rest or change in the middle of even quite interesting work is a particularly powerful regulating process, and may reflect the operation of an active motivational mechanism which is normally experienced as fatigue" (p.215). Such emotional demands are often very disruptive, and indeed, this may be why people succumb to email interruptions, because they need a break or a rest from the goal they are pursuing, in order to pursue their wellbeing goal. Hockey says that performance goals are disrupted by one of two methods - (i) distraction by other goals (especially emotional and motivational ones, i.e., wellbeing goals), or, (ii) loss of activation. In the first instance the goal is susceptible to distraction from other sources such as the personal need to stay calm or take a break. In the second instance the main goal may reduce its strength in consciousness, perhaps because the task is so routine or because the worker has been involved in the task for too long.

Distraction by other goals

Hockey says that distraction from goals may serve an adaptive function as it means we are ready to respond to emotional needs and even emergency
situations. He says it is also adaptive in that it ensures only the strongest goals maintain priority in one's behavioural efforts. If other goals or opportunities are presented that are more important then it is necessary that we are aware of these and respond to them. He says that this flexibility in behavioural orientation means that novel and alternative agendas can be considered, which is an essential part of creativity and problem-solving. However, if a goal is strong and people wish to avoid distraction they may utilise the function of selective attention to block out interference and remain devoted to the goal in hand.

*The activation of the goal*
In common with Hockey’s explanation, the decision to act isn't controlled by goal value per se, according to the Goal Activation Model (Altmann & Trafton, 2003), but it is dependent on whether a goal is at a high state of activation at the time when other cues emerge. In this explanation it does not matter what level of regulation one is working at. Nor does it matter what the differential goal values of conflicting goals are; when people move from one action program to another they do so because another goal is presented that has a higher level of activation in consciousness. How active a goal is in one’s consciousness in the first place may be dependent on parameters such as goal value, level of regulation required, etc., but unless the goal is maintained at such a level of activation throughout an action program, an interruption may well detract attention away simply because it is novel and different and thus receives a higher activation level. In fact, novelty increases arousal and alertness (Robertson, 2003), and so the appeal of alternative goals (such as afforded by the email interruption) is apparent.

*Summary*
As stated, Hockey (2000) says that people switch attention due to distraction by other goals (work or wellbeing) or loss of activation (see Boxes A and B in Figure Five). Effectively he is bringing together the cognitive decision making perspective of Action Regulation Theory (i.e., other goals distract us if they are more important/difficult/challenging, etc.) and the goal activation perspective of Altmann & Trafton's (2003) Goal Activation Model. Hockey (2002) acknowledges how Action Regulation Theory, and Schönpflug are concerned with efficiency and the cost-benefit assessments involved in acting - e.g., towards which goal should I best employ my efforts to be sure of a
more successful outcome? Hockey also says that such assessments are difficult to carry out in practice, because the decision-making involved in acting is likely to be costly in terms of cognitive resource (as mentioned earlier).

By acknowledging the goal activation issue as well then, Hockey accounts for the times when people may appear to be easily swayed by another goal, even if it is not the most efficient behaviour to engage in. For example, if one is easily swayed by a low level temptation (Fischbach et al., 2003; Jackson et al., 2001) that clearly has lower goal value across Frese & Zapf's (1994) parameters this may be simply due to the current goal having low activation levels in consciousness. Reasons for this may be manifold, and won't be discussed here, but Hockey (2000) suggests that one explanation for low activation might be because the goal has been pursued for a long time and completion is far off. Equally, when an email interruption is ignored and not even checked, this is unlikely to be due to a cognitive decision being made about its lower value (as it hasn't even been appraised) but is more probably due to the current high activation or value of the existing goal, which means attention cannot readily be swayed (as found in the exploratory study, and in studies of attentional narrowing).

Hockey's (2000) explanation of goal switching in multi-activity environments might explain some of the conflicting results about the distractibility of other goals. For example, people may readily check an email, even when working on important or difficult tasks, because the current goal has low activation in consciousness. People may then process that email despite it having low goal valence, again because the current goal is low in activation. Alternatively, they may process the email, because after checking it, they see that the goal is more important/novel, challenging, or beneficial to wellbeing (i.e., they have weighed up the cognitive benefit of the new versus the old goal). On the other hand, when email interruptions are ignored, this could be due to the fact that a current goal is so strongly activated in consciousness that there isn't the cognitive resource available to make a decision about whether to change course (Hockey, 2000). It may otherwise be ignored because it is not considered to be as valuable as the existing goal (in terms of work or wellbeing goal satisfaction). The relative value of goals may be appraised according to the action parameters outlined by Frese & Zapf (1994) – see
Chapter Two. For example, as Whittaker & Sidner (1997) found, an email interruption that is clear, quick and easy to deal with (parameters outlined by Frese & Zapf) probably will be attended to immediately because it is most efficient to get it out of the way there and then, and thus it will 'win' in the goal valence battle with the current task. However, these parameters do not consider an appraisal of wellbeing, even though a desire to protect wellbeing is a goal inextricably linked to activity in multi-goal environments (Hockey, 1997, 2000, 2002).

In order to appreciate how and why an email interruption may win people's attention in goal-directed work, the following research question was therefore generated:

4. Are people distracted by email interruptions in multi-goal environments because of the email characteristics, the status of the current task, and/or the relative value or activation of the task goal versus the email goal?

When answered, this question should lend weight to Hockey (2000), Action Regulation Theory and/or the Goal Activation Model, and indicate whether Boxes A and B in Figure Five are valid.

Summary
Participants in the exploratory study, and according to email research carried out by Jackson et al. (2001) and McFarlane (2002), clearly indicate that email interruptions are highly distracting, with the majority of people preferring to attend to them as soon as they are notified to their presence. Attending to an email interruption often means that people are deviating from a current action program, which on first glance would appear to be inefficient behaviour, as it involves expending energy on a task that may not relate to the timely satisfaction of the current goal. Yet, attending to interruptions can also bolster performance, as the work by Fisher (1998), Speler et al. (2003) and Zijlstra et al. (1999) has found. O'Conaill & Frohlich (1995) found that 64% of interruptions received by their study participants were rated to have some benefit for the recipient.
When interviewing participants in Study One, the majority of people stated that they went straight into their email when they were interrupted at work. This tendency is supported by Jackson et al. (2001) who found that 70% of their participants attended to an email interruption immediately. In the exploratory study, many participants said that their strategy for checking the content of email interruptions (regardless of current task priorities and regardless of email type) on alert was an effective mode of working. It may not be optimal to the efficiency of the current action program to be distracted, but in the context of their work as a whole it was considered important that email was checked so that other pressing issues could be appraised and attended to if necessary (see quotes by Participants 1 and 15 on page 78 of Chapter Three).

Such reports do not necessarily conflict with ART, as Hacker (1985, 1994) fully expects effective workers to be engaged in a continuous assessment of environmental cues and shifting goal priorities. However, what it does highlight is the lack of clarity in Hacker’s discussion of efficient working, and how this relates to working on multiple action programs. In other words, optimising efficiency may not apply to the pursuit of each individual action program, but to the way people sort and shift between all of their goals and plans. Indeed, checking an interruption may bolster working on a current goal if it serves to remind people of the importance of staying focused on existing work:

Successful resistance of such temptations may require that one’s goal be kept firmly in focus, exerting its guiding influence on actual behavior. (Fischbach et al., 2003, p.305).

On the other hand, Czerwinski et al. (2000b), Einstein et al. (2003), and Eyrolle & Cellier (2000), all discussed in Chapter One, found that switching between tasks is effortful and disruptive (although disruption was usually measured only in terms of how much the interrupted task was disrupted, following enforced interruption). The question here then is whether efficient or effective workers attempt to reduce their interruptions and thus achieve a single action program more efficiently, or whether they are more alert to interruptions in order to be fully informed about incoming goal conflict and attention demands from other activity cycles. Hacker (1986), as discussed in
the section earlier on 'What do efficient workers do?', states that superworkers are more sensitive to the environment, but this requires clarification in terms of likely behaviour. Does sensitivity mean that although interruptions are more accurately expected they are then ignored (as found by Koole & van't Spijker, 2001) or more likely to be attended to so that overall goal priority can continually be assessed? The definition of expertise and efficiency in a multi-goal environment requires further elucidation if the phenomenon of email interruptions is to be accounted for. As such, the next research question asks whether strategies for attending to email interruptions differ, if one wants to achieve their work goals:

5. Are some strategies for dealing with email interruptions associated with current task goal achievement, and other strategies associated with overall work goal achievement?

The answer to question 5 should indicate whether working on one action program at a time, and reducing the extent to which one pursues multiple goals concurrently is efficient in terms of current task satisfaction. Alternatively, if attending to multiple action programs, this may be more efficient in terms of overall goals. It is difficult to anticipate the direction of results because of contrasts in the research and theories. On the one hand, the Action Regulation Theorists, Fischbach et al. (2003), and Fisher (1998) indicate that 'experts' are more attuned to incoming information or are more likely to work efficiently when interrupted. On the other hand work by (again) the Action Regulation Theorists, Czerwinski et al. (2000b), Einstein et al. (2003), Eyrolle & Cellier (2000), Frei, Racio & Travagline (1999), Hockey (2000), and Koole & van't Spijker (2000) say that the most effective workers are those who limit interruptions and attentional switching at work. Appreciating which strategies are related to goal achievement at a single and multiple task level in multi-goal environments will provide an opportunity to systematically test predictions arising from these different theoretical frameworks.
Individual differences

In the exploratory study it was clear that people applied idiosyncratic strategies for dealing with email. People also commented that their speed of response to an incoming email, and preference for the medium, may also be influenced by their personality. Personality has received many varying definitions by psychologists over the years, but perhaps the most all-encompassing definition concludes that personality is, "...the complex set of unique psychological qualities that influence an individual's characteristic patterns of behaviour across different situations and over time" (Zimbardo, 1992).

Kirmeyer (1988) calls for attention to be paid to the relationship between personality characteristics and interruptions behaviour, and how this impacts on long-term health and wellbeing. Indeed, McFarlane & Latorella (2002) suggest that there are individual differences in people's ability to accommodate interruptions to work, and to handle them effectively. These differences may include anxiety levels, arousal, motivation and multi-tasking capabilities.

Since at least the 1960's researchers into activity regulation and goal-directed behaviour have argued that attending to individual differences is a very important and necessary focus to apply, if we are to fully appreciate how and why people adopt and execute the strategies that they do at work (Frese & Zapf, 1994; Hacker, 1985, 1994; Hockey, 1997, 2000, 2002; Miller et al., 1960; Schönpflug, 1983, 1986, 1992; Zijlstra, 1993). However, perhaps because of the primarily cognitive concentration of such theorists, personality and individual differences have not been explored in any kind of coherent or structured manner, and thus this is an area of study that is still outstanding in terms of its conclusions within the domain.

ART and individual differences

The Action Regulation Theorists repeatedly comment that individual differences are likely to be linked to the effectiveness of performance at work. They discuss differences such as expertise (or superworking), action styles, personality, cognitive resources, and educational level as being potential
moderators of behaviours, both influencing and being influenced by activity proficiency (Frese et al., 1987; Frese & Zapf, 1994; Miller et al., 1960). However, the discussion on individual differences is somewhat disjointed and appears to require clarification. In particular, the Action Regulation Theorists' discussion of personality reveals much confusion about how it should be operationalised and how it relates to activity.

According to Action Regulation Theory, an individual's 'personality' can be altered as the worker learns and develops abilities (and conversely as the worker may become deskilled or involved in more automated actions) (Hacker, 1985). Action Regulation Theorists suggest that personality need not always be the manipulated variable (the IV). Personality can also be the DV - shaped and affected by action and behavioural strategies. Frese & Zapf (1994) present a series of studies to demonstrate how personality may be shaped by action, but unfortunately (like Hacker, 1985) never clearly define what they mean by the concept of 'personality'. The studies that they cite involve variables that are clearly positioned in personality theory (such as the Type A personality) but they also discuss constructs such as grade point average and cognitive heuristics. Indeed, ART's discussion of personality seems most closely aligned to Miller et al.'s (1960) definition of 'image' - a knowledge base personal to each individual.

Despite this, Frese & Zapf's (1994) suggestion is interesting - they believe that personality influences action style as much as an action style influences personality. This is an important take on the role of personality as it may well be that a mutual relationship exists between the action style of individuals and the behavioural strategies they use to deal with interruptions, and their personality.

Some individuals take all of their goals very seriously, do everything they set out to do, do not do anything that does not lead toward their goals, and start immediately to act when they have decided what they want to accomplish. Others are not so goal oriented. They do things that they did not really intend, do not take their goals particularly seriously, and are sometimes sidetracked by incidental happenings. (Frese et al., 1987, p.1182).

Indeed, it is the action style ("... a person-specific approach to action" - Frese et al., 1987, p.1182) that appears to be the unit of individual difference most
often referred to by Action Regulation Theorists. The action style of an individual is deemed to influence individual differences in the way acting is approached, at all stages of the cycle.

Action styles
An action style is conceptualised as being reasonably consistent, stable, bi-directional and applicable across contexts. (Frese et al., 1987). This definition would appear to have much in common with definitions of personality and personality constructs, yet Frese et al. (1987) firmly state that, "Action styles are neither traits nor aspects of temperament nor abilities..." (p.1183). By their definition, an action style is:

(i) a propensity to act, represented cognitively as general learned heuristics/metacognitions that offer a guideline or policy on how to approach something
(ii) trainable (to a degree), as better ways of executing a plan, or defining a goal, can be taken on board and used to shape the heuristic
(iii) bi-directional (but dependent on the situation). i.e., in different situations, different action styles may be required – so if one is planful about one’s career normally, one may be less so when the labour market is shaky as this is less psychologically costly. This seems to go against the earlier statement that action styles are consistent and stable. However, they qualify this slightly when they say that action styles "... cannot be called good or bad irrespective of the situation in which they are used. If the situation strongly determines the action, the propensity to use a certain action style will be over-ruled" (p.1183). So it seems that whilst Frese et al. (1987) are saying that action styles are stable and consistent and will determine how we approach most situations, in some cases an action style will be overruled and an alternative approach taken.

There certainly seems to be some confusion and overlap in how an action style is defined, and it may be unwise for Frese et al. to strongly denounce the role of personality traits or temperaments as influential in the way we approach our goals and plans. For example, the heuristics that we develop are probably influenced by our personality. If one of our guidelines is to always define the plan before acting, this is probably influenced by characteristics such as conscientiousness. While personality is not considered to be trainable
(unlike an action style), personality will influence to what extent a new approach can be taught (e.g., is one open or closed to new experiences?). Again, when looking at the ability to change action style or over-rule action styles according to the situation, this is likely to be influenced by personality characteristics for flexibility and openness. Using the concept of personality as a framework for understanding how we approach planning and goal-orientation, the theoretical picture becomes clearer.

Frese et al. (1987) successfully correlate two action styles (borne from factor analysing people's responses to a questionnaire) of goal orientation and planfulness with various personality constructs and yet assert that an action style is distinct from personality, because personality constructs are inherited, stable during childhood, retained in adulthood, have adaptive value and appear as traits in animal forebears. This is a rather dated view of what personality is, as the discussion on the Five Factor Model, later, will outline.

Cognitive style
Hodgkinson & Sadler-Smith (2003), in discussing 'cognitive styles' (apparently akin to action styles) accept that nomenclature in this area is inconsistent, conceptualisation is weak, and consequent psychometric tools attempting to measure cognitive style are poor. It is unclear whether these problems exist because of a lack of consensus amongst academics, or because of the fact that cognitive or action styles are in reality weak concepts, best superseded by studies of personality. Perhaps to further illustrate the difficulties in identifying cognitive/action styles as separate from personality, Hodgkinson & Sadler-Smith (2003) discuss the Myers-Briggs Type Indicator (MBTI) as a tool of cognitive style, used in a variety of contexts, such as in workplace selection. Yet, whilst the MBTI may indicate people's preferences, it firmly considered a personality measure, based on Jungian type theory (OPP, 2006). In addition it is not recommended for use in selection contexts (even though it is invariably misused in such a way) because it uses quasi-ipsative scaling to score the instrument, which does not allow for comparisons between people, and so it is not advisable to use this in competitive situations. Hodgkinson & Sadler-Smith go on to argue that people can switch their cognitive style to fit the dictates of the situation. If this is part of the nature of cognitive styles (that they are changeable according to situation) it is unclear why such researchers refer to construct validity studies with stable personality
measures (such as the 16PF and MBTI) as evidence of the construct of a cognitive style (Hodgkinson & Sadler-Smith, 2003; Allinson & Hayes, 1996). Indeed, this is precisely what the Action Regulation Theorists have done (Frese et al., 1987).

It is thought that measuring cognitive styles can bridge the gap between information processing and personality (Hodgkinson & Sadler-Smith, 2003; Allinson & Hayes, 1996), but in reality this may not be achieved because effective measurement relies on constructs having been conceptualised clearly. By suggesting cognitive styles fall, "...somewhere between ability and personality domains" (Allinson & Hayes, 1996, p.131) and by failing to indicate whether cognitive style questionnaires add incremental validity to the study of workplace behaviour above and beyond personality and ability measures, it is difficult to appreciate the worth in continuing to study such 'concepts'.

**Hockey and individual differences**

Hockey (2002) is especially interested in testing the extent to which individual differences in disposition and coping style affect control and effort regulation. A Problem Focused (PF) or Emotion Focused (EF) style may be more to do with the person than the situation in many cases\(^\text{11}\). Although the choice of coping strategy is usually put down to situational influences, individual differences (such as disposition and coping style) and energetical states are also involved. Lazarus (1990) reminds that a 'coping style' is not a stable personality feature, because of its changeability and diversity in response to situations. So, for example, a PF coping strategy might be adopted if people evaluate the situation as necessitating it, but it may also be more likely to be chosen by, for example, a Type A personality who is more achievement focused. Individual differences in the response to strain are, according to Hockey (2002) likely to be partly responsible for people's choices about the mode of control that they adopt in response to demands.

\(^{11}\) Hockey (2002) cites the work of Lazarus and Folkman (1984) who differentiate between Problem Focused (PF) and Emotion Focused (EF) goals in coping acts:
- PF coping (e.g., redoubling efforts to overcome a problem) is aimed at external cognitive goals such as the task and other work demands.
- EF coping (e.g., trying not to let it upset you) is concerned with the preservation of personal stability and wellbeing.
Hockey, Maule, Clough & Bdzola (2000) comment that decisions to act and their relationship with mood or wellbeing are highly likely to be moderated or mediated by such personality factors as extraversion, neuroticism or stable positive or negative affectivity. However, despite the implications for theories of goal-directed behaviour, they complain that little formal, empirical work exists to test this.

Applying a structure for studying personality in goal-directed work

Hockey (1997, 2000, 2002; Hockey et al., 2000), Miller et al. (1960), Schönpflug (1983, 1992), and even the Action Regulation Theorists acknowledge that personality is likely to have a strong mediating or moderating affect on goal-directed behaviour, efficiency and strategy choice at work. This thesis therefore attempts to examine which personality (as opposed to action, cognitive, or coping style) constructs are involved, using the organising framework of the Five Factor Model, and later by introducing a motivational measure.

The Five Factor Model (FFM) is now the dominant paradigm in work psychology and is based on how people come across in social situations. The FFM presents personality not as a style or a trait but in terms of how people seem to be consistently described. Indeed, of the FFM, Hogan (1998) says that for the first time there is an adequate taxonomy available to delineate and conceptualise human behaviour. He says that the FFM has given us a commonly agreed language for talking about people. However, he does warn that FFM is a theory about variables and not about people. As FFM only describes how personality is delineated we need another way of understanding what it is that makes people act more or less in line with each dimension. He says that personality has been dismissed as a unit of study in social psychology because of the abiding claim that situations are more powerful determinant of behaviour than personality, i.e., “what people do depends on where, not who, they are” (p.1). With action styles being dependent on the situation, such a criticism might easily be levied at Action Regulation Theory.

The Five Factor Model (McCrae & Costa, 1987; Digman, 1990; Goldberg, 1992) describes personality along the dimensions of Extraversion, Neuroticism (or Anxiety), Conscientiousness (or Self-control), Agreeableness, and
Openness to Experience. A review of the exploratory study and the interruptions literature indicates that some of these concepts are involved in moderating people’s response to interruptions in goal-directed work. For example, Study One indicated that differences in responding to email may be linked to personality characteristics such as extraversion. In other words, people who are easily bored (such as people high on extraversion scales) may be more likely to welcome email interruptions. In other studies of interruptions at work those who are high in self-control are better disposed to reduce the impact of interruptions on their work (Connor & Abraham, 2001; Fischbach et al., 2003; Frei et al., 1999), with anxiety (Connor & Abraham 2001; M. Eysenck, 1983; Schönpflug, 1992) and extraversion (Fisher, 1998) also related to ability to perform effectively when interrupted.

Arguably then, measures of individual differences (especially measures of personality) should be included in a study on email interruptions as potential moderators of strategy choice (see Boxes A, B and C in Figure Five). In line with Hogan’s (1998) statements, the discussion of personality below will focus on the FFM as an all-encompassing, widely accepted framework for talking about which personality dimensions are relevant to the study of managing email interruptions at work.

Although it will be beneficial to measure each of the five factors in the next tranche of research studies, it is the first three constructs (Extraversion-Introversion, Neuroticism/Anxiety, and Conscientiousness/Self-control) that have been most discussed (though admittedly studies are rare) in the literature on interruptions and goal-directed work to date, and thus it is the first three constructs that are given specific attention below.

Extraversion-Introversion

In her work on boredom and interruptions, Fisher (1998) hypothesised that extraverts, who are more susceptible to boredom and under-stimulation, may especially demonstrate improved satisfaction when distracted and interrupted. Equally, van den Berg et al. (1996) found that people with a high need for excitation (as extraverts have, according to Eysenck, 1990) found interruptions to be less disruptive than those with a low need for excitation. In Study One several self-reported ‘introverts’ mentioned that they liked communicating by email because they could get a message across without
having to speak to someone and engage in highly 'personal' exchanges (i.e.,
to them email was rich enough to provide a friendly, clear exchange, without
impacting on their personal need for quiet, privacy, etc.). However,
theoretically, it is unlikely that people low on extraversion scales are more
welcoming of email interruptions than those who are high on extraversion
scales, who need more external stimulation.

Neuroticism/Anxiety
Frese & Zapf (1994) claim that superworkers are less neurotic - i.e., they
have lower levels of anxiety than those who use poorer strategies for
achieving their goals. M. Eysenck (1983) noted how worriers and non-worriers
perform at roughly the same level in demanding situations because, although
some of the cognitive space of worriers is used up with worrying their work
does not suffer as they expend more effort to compensate. Alternatively,
Connor & Abraham (2001) say worriers are more motivated to act because
they are worried. Schönpfug (1992) found that high Anxiety people were
actually more accurate in task performance as a result of increased effort and
thus out-performed low Anxiety participants.

Conscientiousness/Self-control
On the basis of the exploratory results it appears that those who attempt to
control their email interruptions may be less prone to overload and disruption.
Connor & Abraham (2001) found that conscientious people form better plans
and intentions to act and are consequently more likely to achieve their goals.
Fischbach et al. (2003) note that individuals exerting high levels of self-
control will avoid 'temptation', stick to their main goals and achieve them. Frei
et al. (1999) have found that people who limit their interruptions tend to
produce more work.\textsuperscript{12}

Summary
Even though the above three constructs are the ones that have been most
discussed, there is still a real brevity of actual empirical research available
that looks at the role personality plays in the cognitive regulation of work
activity and interruption demands. As such, the discussion above is clearly
limited, as solid findings are difficult to apply. According to Hogan (1998), the

\textsuperscript{12} Although they also find that such behaviour is linked to higher levels of stress compared to
those who are open to interruptions.
lack of a theoretical basis for studying a domain should not deter research. He says that it is perfectly acceptable for science to proceed with an empirical study phase followed by a theoretical phase. In the first phase researchers may notice that there is a phenomenon worthy of study; that there is an association or outcome of relevance, and then they seek to find out why or how this might be. He says, "In this model, theory building comes after the fact; it is the tail on the empirical dog" (p.4). Clearly this is a contentious position, but nevertheless it is argued that personality needs to be explored as an issue, because if one discovers that certain personality characteristics are related to different responses in dealing with email interruptions and that these differences have varying outcomes in terms of success or efficiency, then this has implications for offering support to people operating in multi-goal environments.

So, with various goal-directed theorists hypothesising that personality matters, and with so little sound theory or background research to back-up why this might be so, an empirical exploration is necessitated. Using a structured framework – the FFM – for integrating personality, this thesis aims to establish:

6. Are strategies employed for dealing with email interruptions associated with individual differences in personality?

Should the answer to this question be 'yes', this would indicate support for the presence of 'personality' in Boxes A, B and C in Figure Five.

**Chapter summary**

When considering results from the interruptions literature, alongside feedback from the exploratory interviews, within the theoretical context outlined here, it appears that definitions of efficiency in work behaviour need to be clarified and extended. From examining the perspectives of Hockey (1997, 2000, 2002), and Action Regulation Theory (Hacker, 1985, 1994; Frese & Zapf, 1994) (with reference to Schönpflug's theory of behaviour economics, 1983) the impact that email interruptions have on efficient behaviour in goal
directed work appears to depend upon how efficiency is conceptualised. Including some consideration of how costs and benefits are appraised in the trade-off between performance and wellbeing, and between singular and multiple goals, may go some way to understanding why people apply different strategies for dealing with controllable email interruptions, and what the consequences of such strategies might be. In addition, to more fully understand whether, how and why interruptions will be disruptive in the pursuit of goals at work, individual differences such as personality are worth exploring as potential moderators or mediators in the action-outcome relationship.

Attending to email interruptions in the face of cognitive demands appears to either push the cognitive resources to extend their capacity (with implications for wellbeing), or pull the cognitive resources away from the current task (with implications for task performance). Incorporating an appreciation of underload (Hancock & Warm, 1989), an amalgamated approach of Hockey and ART's positions suggests however, that a strategy to enhance wellbeing need not always be to the detriment of the task. When the task goal is not sensitised within conscious awareness (because it has lower goal valence, is not highly activated, is being acted on at a low level of regulation, etc.) then interruptions may be attended to more readily (Robertson, 2003). This may boost both wellbeing and task performance as energy levels are heightened (Hancock & Warm, 1989; Parasuraman & Hancock, 2001). This explanation manages to take account of many of the conflicting and multiple accounts of how interruptions affect task performance.

It seems then that the interaction between task goals, personal goals, work demands, effort, and individual differences affect how an interruption will be handled as people attempt to achieve their work tasks effectively, within the context of their personal priorities. In this context it is easy to see that email interruptions need not simply be seen as disruptive or negative to the achievement of work goals. On the contrary, by extending efficiency definitions to include an appreciation of multiple goal achievement and wellbeing, it is apparent that email interruptions may well have a positive effect on goal-directed work behaviour (Walji et al., 2004).
The research questions generated in this chapter were borne from a discussion of theoretical issues, empirical findings (both from the exploratory study, and published research findings) and practical concerns (e.g., about the role personality plays). They focus on the three key research aims of this thesis, to understand how, (i) wellbeing, (ii) multi-goal achievement, and (iii) individual differences are involved in strategic action when dealing with email interruptions. These questions ask:

1. Does wellbeing affect strategies chosen to deal with email interruptions at work?
2. Do strategies chosen to deal with email interruptions at work affect wellbeing?
3. How do different strategies for dealing with email interruptions differentially affect wellbeing and task goal achievement outcomes?
4. Are people distracted by email interruptions in multi-goal environments because of the email characteristics, the status of the current task, and/or the relative value or activation of the task goal versus the email goal?
5. Are some strategies for dealing with email interruptions associated with current task goal achievement, and other strategies associated with overall work goal achievement?
6. Are strategies employed for dealing with email interruptions associated with individual differences in personality?

Answering these questions should afford the opportunity to systematically test various contradictory propositions arising from the main theories discussed. Subsequent studies will therefore look at:

- Ways of defining and measuring wellbeing in studies of email interruptions (Study Two in Chapter Five)
- The role of wellbeing in the strategic response to email interruptions, as both an antecedent and consequence (Study Four)
- The role of personality in people's strategic response to email interruptions (Studies Four and Six)
- How characteristics of the task and email, and their comparative value and activation, relate to the action program chosen (Studies Four and Six)
• Which strategies are related to the achievement of wellbeing goals, and which to task effectiveness at a single and multi-goal level at work (Study Six)

Study Three is a validation of the approach used to measure strategic responding to email interruptions (see Chapter Five) and Study Five is a post-hoc analysis of the ecological validity of Study Four (see Chapter Six).

From an applied perspective, and as the driving force behind this research, understanding how email interruptions are dealt with within the context of the complete activity cycle and goal-directed behaviour should allow for the eventual production of guidelines for email use that will hopefully inform workers how best to deal with email interruptions (according to their personality profile) if they want to achieve their goals and secure a sense of wellbeing at work. On a wider level, with a greater understanding of the role that wellbeing, individual differences and multiple goal prioritisation plays in goal-directed activity, this should enable extension of practical application and understanding to other domains of workplace behaviour. This will be discussed in Chapter Eight.
Chapter Five: Methodology

Introduction

As a thesis firmly rooted in the domain of Applied Occupational Psychology, it is deemed vital that any research into email interruptions is conducted with real email users, working in their real occupational context, on their real goals and work tasks. Any conclusions made from the analyses conducted in this research programme can therefore be directly disseminated back into industry, to inform people about how to optimise their use of email (having qualified this in a theoretically and empirically robust manner).

In this chapter then, the principles behind the methodological approach to studying email interruptions in goal-directed work within this thesis will be outlined. This will begin with a discussion of how interruptions and new technology phenomena have traditionally been studied, and compared against the guidance that Hockey and the Action Regulation Theorists make, about conducting research in real-world work environments. The diary method event-sampling approach will then be introduced as a useful and ecologically appropriate tool of research within this domain. A short introduction to multilevel random coefficient modelling (MRCM) statistical analysis will then be presented, as this is the key analytical procedure adopted to analyse the diary method data in the remaining key studies. Finally, two validity studies are presented in this chapter, conducted to confirm the use of a wellbeing scale and a subjective method of estimating timings in email activity, in the final two research phases.
Studying email interruptions in mental information work

There are several issues surrounding the ecological validity of the study of interruptions and new technology in mental information work. Much of this research stems from the cognitive or human-computer interaction schools of thought. These schools champion the experimental method, almost at the cost of the social implications and context. Consequently experiments may present statistically sound results, achieved via controlled methodologies, yet fail to account for variables that are clearly influential in reality. Too often, participants are given arbitrary tasks that have no history or consequence (George & Jessup, 1997). Recent criticism (Hockey, 1997; Majchrzak & Borys, 1998; Sonnetag, 2000; Symon, 2000a, 2000b; Zijlstra & Krediet, 1999) of such approaches is now alerting researchers to the need to engage in studies of both social and environmental contingencies alongside technical and cognitive variables in order to appreciate how mental information work is conducted in the ‘real’ world.

Symon’s (2000a) critique of the current research available into network and networked organisations is a seminal paper, exploring how studies of new technology can be improved. She is critical of experimental or contingency approaches, preferring to use more qualitative and ecologically valid means of study. Using the example of email ‘flaming’ ("the open expression of conflict and abuse" p.398), Symon (2000a) indicates that, "...stripping a situation down to its bare essentials in order to test specific variables may only serve to destroy the very social processes in which we are interested" (p.399). She reports on a study by Lea, O' Shea, Fung & Spears (1992) where flaming was found to have been over-exaggerated in email messages because of experimental artefacts. Essentially, participants became curter and more unpleasant in message tone because of the experimental pressure they were under. Symon argues that in studying new communication technologies researchers should avoid the preoccupation with finding a grand theory and concentrate on finding approaches that are "tailored to their own contexts" (p.420, 2000b). Symon (2000b) further states that:
I am not convinced that we can pin down the essential nature of either the 'new' communication technologies or the 'new' tasks being performed...in order to discover facts or make absolute predictions (p.421).

Symon (2000b) argues that contingency approaches are both too simple and too complex. They are too simple in that they suggest the world of work is comprised of fragmented variables that can be isolated, measured and manipulated. They are too complex because the process of splitting the world into an infinite number of discrete variables only to 'match' them up again into interdependent relationships is complicated and subject to error, as the following study demonstrates.

In Gillie & Broadbent’s (1989) study, the authors discovered some unusual results, which may well have been due to a number of uncontrolled, non-IV variables that changed between four conditions (e.g., the main task, the subject pool, the interruptive stimuli). For example, in experiment three, interruptions were manipulated to be similar to the main task and were found to be very disruptive. However, interruptions in experiment four were manipulated to be dissimilar to the main task and yet were also disruptive. This could have occurred as a feature of the uncontrolled design as it wasn’t just the similarity variable that differed between experiment 3 and 4. The length of the interruption and the control participants had over the length of the interruption also changed (in experiment 4 the enforced switching from task to interruption and back, via automatic screen clearance, was scrapped). The unusual results may also have been due to the small (N=10) and changing sample, despite the within-subjects design. Due to the fact that variables were not clearly controlled, and because the experiment consisted of short-term, transient, partialised tasks, devoid of real goals, any conclusions made have weak applicability and validity to the real world. Yet this study is frequently cited by other interruptions researchers, and has become an influential paper.

However, not everyone would agree that contingency approaches and the experimental method is flawed. In common with Fang (1998), Majchrzak & Borys (1998) and Symon (2000a), Damodaran & Olphert (2000) recommend that research into the impact of new technology methods should always have a socio-technical (not just technical) focus. Sonnetag (2000), in direct
response to Symon's critique, says that contingency or experimental approaches should not be shelved completely, as they can isolate the components that relate new communication technologies to new organisational forms of working. Whilst agreeing with Symon (2000a) that lab-based studies often lack external validity, Sonnetag (2000) argues (further to Majchrzak & Borys, 1998, and Rousseau, 1979) that contingency and qualitative approaches should be merged. Isolated case studies are not good enough... quantitative coding of qualitative research is necessary to really understand how new technologies affect individuals' real work experience (a technique applied in Study One of this thesis).

**Principles for studying work activity according to the goal-directed theorists**

The Action Regulation Theorists and Hockey are in agreement, that in order to understand work activity research needs to be conducted in real-world environments, within the context of proper time frames and work tasks (Hacker, 1985; Hockey, 2000; Hockey et al., 2000).

From the point of view of ART, exploration of the complete activity is key to understanding how people formulate and regulate action programs in goal pursuit. Identifying one sequence of actions without appreciating the social, personal or organisational context, the long term goals and the various conflicts and decisions the individual has had to face, does not suffice, as far as the Action Regulation Theorists are concerned (Hacker, 1994; Frese & Sabini, 1985; Frese & Zapf, 1994). Indeed, their awareness of context and their study of the complete activity helps us to appraise some of the unusual findings from other studies of mental information work that have only examined partialised activity or failed to appreciate the social and normative influences on goals and action.

According to their methodological paradigm, research into ART is best focused in the real-world, rather than laboratory or experimental situations (Frese & Sabini, 1985; Hacker, 1985). If an experiment is to be run, the Action Regulation Theorists suggest it is best that this is a simulation, looking at ecologically valid work tasks (Frese & Sabini, 1985) and complete activity, rather than concentrating on partialised action via simplistic experiments that
only highlight individual components of the cognitive experience. However, where possible, field studies are desirable.

If an experimental task is 'goal-less', or has goals for the participant that are not congruent with the experimenter's understanding, subordinate action choice cannot properly be understood. Zijlstra (1993), in his review of Action Regulation Theory, says that there is a difference between objective and subjective reality in the way we orient ourselves towards a task or goal. Effectively, the instructions that are given to workers are classed as the 'objective task', and the individual interpretation and internalisation of these instructions by the worker is known as the 'subjective task'. It is the subjective task that determines what action or strategy the individual will adopt to complete the task, and explains why individuals are differentially successful at work. In very few experimental settings is this difference measured or even acknowledged. Esteemed researchers have set up short experiments involving arbitrary tasks, where the real goal for the participant is to receive course credit or payment for their involvement in the experiment (see Gillie & Broadbent, 1989; Schellekens et al., 2000; and Strickland & Galimba, 2001, for example) and as such the goal for the individual is deviant from that set out by the experimenter.

Hockey (1997) says that it is rare for people to simply carry out tasks in isolation from a context or goal. A failure from researchers to appreciate this may result in the observation of behaviours that simply lack ecological validity. Hockey (2000) remarks that in experimental studies people tend to work flat-out towards task goals at the expense of wellbeing goals because of the transient, trivial and impersonal nature of the experimental situation (such as what appears to have occurred in Zijlstra et al., 1999, for example). Yet, in the real world, Hockey argues that work goals rarely take precedence over psychological and physiological health considerations, as it is not adaptive to protect performance to the extent that one may experience strain or burnout. Thus, responses to tasks observed in such lab-based environments may be invalid. In the real world, people adopt different strategies to deal with changing demands.

Ignoring the complete cycle of activity does not assist our understanding of how new technology interruptions affect mental information work in the real
world. This PhD thesis attempts to fulfil the recommendations made by ART and Hockey, and attempts to ensure that each study is conducted within real-world organisations, over real and suitable time periods, and with reference to individual goals and priorities. For reasons of validity then, and in order to capture elements of the working experience over a longer time frame, the key empirical studies adopted in Phase Two and Three of this research programme will utilise a 'diary' methodology.

The diary-study approach

The diary-study method (also called event-sampling or experience sampling method) adopts the technique of asking participants to record their real experiences across specific phenomena, periodically across a particular time frame. In the main, participants are encouraged to operate as they normally would, so that natural responses and behaviours may be captured. The diary-study method has increased in popularity over recent years, even within traditionally experimental or cognitive research traditions. For example, Czerwinski et al. (2004), working in the domain of human-computer interaction conducted a diary-study of prospective memory failure, saying:

Diary studies have high ecological value as they are carried out in situ, in the users' real environments (p.176).

This is a very real advantage when one is attempting to understand how work is executed within the context of participants' own goals and priorities. A laboratory setting can never replicate the real concerns and values that a worker holds about their tasks, with all their associated history and consequences. Yet, in order to gather data that can be directly linked to variables of interest, the experimental method has previously shown superiority. Diary studies however, "...can capture events close to when they happen, and certainly within the same day... [by permitting] access to ongoing everyday behavior in a relatively unobtrusive manner by gathering reports of events, experiences and feelings close to when they happen" (Conway & Briner, 2002, p.289). As such, it appears that the diary method can both measure 'realistic' behaviour in a natural environment, thus preserving ecological validity, whilst also ensuring that associations between
variables can be tightly linked and acknowledged, and problems in retrospective recall overcome (Harris, Daniels & Briner, 2003). When measures of wellbeing are needed, this is a very real benefit, because of the fact that emotions are so tied in with the context and history of a situation, and yet are often fleeting or transient and thus need to be noted within a short time-frame of their occurrence (van Eerde, Holman & Totterdell, 2005). Participants also appear to appreciate that this type of methodology can capture, "... their work lives much better than static methods." (Miner, Glomb & Hulin, 2005, p.190).

In summary:

Daily diary studies are ideal for tracking variable psychological phenomena over a number of occasions and therefore allow such inter- and intra-individual differences to be studied. ...Diary studies can capture the data closer to changes in [phenomena]... and are therefore less likely to suffer from such distortion. ...The diary method can also enable inferences about the causal direction of relationships between the variables to be made with greater confidence... (Harris et al., 2003, p.403).

In the final two phases of this thesis then, diary methodology will be utilised by asking people to complete a short survey following attendance to each email interruption received across an appropriate working time period. This means that people can be studied within their normal working environment, dealing with their typical, context-laden work tasks and interruptions. Their usual reactions and experiences can also be recorded within a tight time frame of occurrence.

**Multilevel random coefficient modelling (MRCM)**

Analysing data from diary studies often needs to take into account the fact that participants may record information about particular variables on numerous occasions. In Phases Two and Three of this research programme, this is exactly how the diary method has been used, as participants were asked to complete diary record forms each time they finished dealing with an email interruption. In order to establish relationships between the variables, traditional statistical techniques such as multiple regression or correlation
could not be used however. This is because the data from these diary studies
is nested hierarchically and thus disobeys principles of independence in data
needed to run regression techniques. For example, at one level, all of the data
about each email interruption is gathered. Yet, this data is dependent upon
the person who generated it, and thus is nested within a second level – a
person level. In some studies, the person may also be nested within a third
level (say a team) and then even a fourth level (say an organisation). The
hierarchical arrangement of data could, in principle, progress to several more
levels again, depending on what and how much data is collected. However, in
this thesis, only two levels of data were captured: level-one – the data
relating to individual email interruptions; and, level-two – the data relating to
the participant. Higher levels are not of interest theoretically.

Multilevel random coefficient modelling (MRCM) allows one to regress
predictors against outcome variables at level-one, to establish whether there
is a relationship between variables. Coefficients at level-one are then made
random at level-two where further regression is performed. Effectively, a
multilevel model aims to establish whether there is a relationship between
variables, and whether this relationship is affected (e.g., made stronger or
weaker) by the presence of level-two variables. MRCM enables one to assess
to what extent the slope and intercept for each set of level-one data (grouped
by level-two) differs from the overall level-one slope and intercept, by plotting
the average variation either side of the regression line. The smaller the
variation the less likely it is that level-two variables influence the relationship
fit at level-one.

A number of random and fixed effects statistics are generated when running
multilevel models. The random error statistic represents the degree to which
level-one coefficient slopes and intercepts deviate from the overall solution.
The fixed effects statistics are the parameters of the overall solution and
indicates the degree and level of the relationship between variables, having
separated out the error.

MRCM is also advantageous in that it can, "...easily deal with repeated
measurement data, including unbalanced cases with missing data" (Kreft & de
Leeuw, 1998, p.6). Although the majority of participants in these studies
completed all questions on all diary record forms, some participants did miss
out the occasional question or set of questions. MRCM is able to deal with this missing data (because it does not assume it is random, and can acknowledge that certain persons – i.e., level-two variables – may be more responsible for this than others).

In all of these analyses, ML-Win version 2.02 (Rasbash, J., Steele, F., Browne, W. & Prosser, B., 2005. Multilevel Models Project: Institute of Education) was used.

**Analytical procedure**

In the Phase Two and Three studies, a particular analytical procedure was taken, and this is outlined below. It is advisable to refer back to this process when perusing the models in Chapters Six and Seven. The choice of predictors used in each model was driven by theoretical plausibility, or based on previous empirical findings. The exception to this is when the personality or motivational factors were added at level-two. Due to the lack of research available to drive theoretical predictions in these domains, a 'data-driven' approach was used to explore the role that such factors might play.

In running each model, the single level null model for each outcome variable was first created, followed by a two level model for the outcome, with no explanatory variables and a random intercept. If the $2\times$ log likelihood demonstrated a significant increase in fit, then explanatory variables were added to the two level model.

A forward-stepping procedure was adopted here (Tschan, Rochat & Zapf, 2005; Nezlek, 2003) following a series of steps, as outcome variables (DVs) were tested by more than one predictor overall, according to the differential requirements of the study hypotheses. Explanatory variables were entered individually in the first instance, initially estimated as fixed coefficients (random intercepts only), and then with a random error term allowed (random intercept and random slope). If the parameter value for the explanatory variable (fixed or with random error term) was more than 1.96 times its standard error, then it was considered to be significant. The difference in model fit between a random intercept only and a random intercept and slope model was then calculated, along with an analysis of the variation around the slope in the latter model. For each explanatory variable,
if the random slopes and intercepts model was a better fit, and variance around the slope was significant, then the explanatory variable was entered into the grand model (later) with its slope allowed to vary. If any individual explanatory variable demonstrated significance either in its slope or variation around the slope, it was then entered into a grand model with other such explanatory variables (its slope fixed or variable according to preceding analysis).

The model was run and if the slope or variation ceased to become significant when other explanatory variables were allowed, the explanatory variable was removed. Note that a random slope value may not be significant on occasion, but the random slope is kept if it means that without it the parameter value loses significance.

A final model was then run. The final model for each outcome therefore included all explanatory variables that provide a significant explanation, either in terms of their overall slope, and/or in terms of the variation around the slope.

\textit{Phase Two: Study Four stepping procedure}

Study Four was concerned with assessing the relationship between wellbeing and strategy choice (measured using timing estimates of speed to check, respond and deal with an email interruptions), with personality entered as having a direct or moderating impact upon relationships at level-two. Email characteristics were explanatory variables entered as ‘controls’ at level-one. Please see Chapter Six for more details.

In Study Four, the above forward stepping process was followed for each step of creating models for each outcome. Specifically, the following steps were taken:

The steps followed were:

\footnotesize{13 An exception to this rule can be found in the moderator models. Here a single variable might be included, even if it is non-significant, because it is a factor in a significant interaction term.}
1. Adding email category type and email characteristics as controls for each outcome.

1 + interaction terms. Adding interaction terms for email characteristics controls with 'before' wellbeing ratings, in wellbeing as outcome models only.

2. Adding level-one predictor variables (wellbeing or timing strategy, depending on outcome).

2 + interaction terms. Adding interaction terms for predictors with 'before' wellbeing ratings, in wellbeing as outcome models only.

3. Adding level-two personality predictor variables.

4. Adding cross-level interaction terms for level-one predictors (wellbeing or timing strategy, depending on outcome) and level-two personality predictors.

From Step 3, the adding of explanatory variables built upon the 'final' model of the preceding step. After creating the Step 2 final model, each personality variable was entered individually, to explore whether it could provide additional explanation for the outcome variable. All personality variables that demonstrated significance either in its fixed coefficient or its random error term were then entered en masse after Step 2 for each outcome. All variables that retained significance either in their fixed coefficient or random error term were then entered in the Step 3 final model.

Each of the Step 2 models created in the main analysis section was recreated with the interaction terms between wellbeing or timing estimates and each personality variable, entered in separate models. Personality variables were entered with level-one predictors as a possible interaction term, even if the personality variable alone had not shown significance in Step 3 (see p.96 of Snijders & Bosker, 2002, for a review). If the interaction term demonstrated a significant coefficient and/or significant random error term, it was recalled and entered in a final model (with slopes made random or not, depending on earlier significance) with the other significant interaction terms after Step 3. The final Step 4 model for each outcome variable consists of the relevant email control characteristics and interaction terms, the relevant level-one-predictors and interaction terms, and then the relevant level-two predictors.
and significant cross-level interaction terms. Cross-level interaction terms were not created with email control characteristics, only with level-one predictors (e.g., BefPA or LOG1), or in the wellbeing models, with the 'before' ratings. In Step 4, where more than one cross-level interaction term reached significance individually, these were then entered en masse, to avoid potential masking effects or order bias (Snijders & Bosker, 2002). Again, only significant cross-level interactions were then retained for entry into the final Step 4 model.

Models for each step are only reported in the results section of Study Four if they include significant explanatory variables. Outcomes that appear to 'miss out' steps (reported below) only do so if the addition of explanatory variables in that step showed no significance (parameter values must be 1.96 times the standard error) in fixed effect or slope.

Phase Three: Study Six stepping procedure

In this study, the relationship between wellbeing, strategy choice and goal achievement perceptions from a multi and single task perspective was examined. Measures of comparative assessments between task and email priorities were also made, and the stage one was at in the task when interrupted, was also recorded. This data was all taken at level-one. At level-two, personality and motivational style variables were taken. The same stepping procedure was adopted as for Study Four, but because of the number of variables of interest in Study Six, occasional 'thematic grouping' techniques were adopted, as below.

Initially, single models were run, looking at which individual predictors were significant predictors of each DV when entered individually. Having established this, significant level-one predictors (either at random intercept or random intercept and slopes models) were then grouped thematically and entered into a new model, using the same DV each time, to establish which ones retained significance. Thematic groups included, for example, all task characteristics predictors, or all strategy help/hinder/neither predictors. The remaining significant predictors from each thematic group were then extracted and entered into a new grand level-one model. At the thematic testing stage, interaction terms were tested. Where a task stage was found to be a significant predictor of strategy timing estimates (LOG 1, 2, or 3), it was
tested in an interaction with task characteristics, using all task characteristics, one at a time in separate interaction models, even if the task characteristics had not displayed individual significance. The model was run, and again, any predictors that consequently lost significance were removed. The model was run again – afresh – until a final, ‘grand’ level-one model was obtained, comprising significant predictors of the DV at either random intercept only or random slopes and intercept.

Snijders & Bosker (2004) say that explanatory variables should be added to a model based on knowledge, theory, problem formulation and common sense. However, where, “...there is no strong prior knowledge about which variables to include in random part, one may follow a data-driven approach to select the variables for the random-part” (p.92). They also argue that a data-driven, forward-stepping approach can be justified in models with multiple possible predictors. Entering multiple predictors to a model can reduce power and will run the risk of the model failing to converge, or alternatively, overfitting the data. Hence, because of the number of possible variables involved in Study Six, and the two-tailed nature of most of the hypotheses, this data-driven, staged approach to entering en masse predictors was adopted, and deemed appropriate.

At the next stage, level-two predictors were dealt with in the same manner as for Study Four. To clarify the thematic grouping process at level-one, results in Study Six are presented according to final level-one and final level-two outcomes for each DV.

Establishing the validity of measures used in Phases Two and Three

As mentioned in the section on MRCM above, Studies Four and Six were concerned with measuring wellbeing, and strategy choice (conceptualised as timing estimates for checking, responding to and dealing with email interruptions) in relation to each email interruption dealt with at work. Therefore, it was important to establish that the measure of wellbeing adopted was suitable to use in a diary-study, and that it captured the
constructs of wellbeing mentioned by Hockey, Schönpflug and others. It was also considered important to establish that people’s subjective estimates of time were an accurate enough measure to be considered valid for use in these studies. The next two studies therefore aim to establish, firstly that the wellbeing measure chosen is a valid and appropriate scale to use in this research (Study Two), and secondly, that the use of subjective timing estimates is a valid method for recording time taken to check, respond and deal with email interruptions (Study Three).

Study 2: An assessment of the validity and reliability of Daniels’ 10-item measure of affective wellbeing

Introduction
To assess the impact of momentary wellbeing as an antecedent and consequence of strategies used to deal with email interruptions, an appropriate measure of wellbeing needed to be sourced. Affective wellbeing is considered to be the most important component of psychological wellbeing (van Horn, Taris, Schaufeli & Schreurs, 2004), and focuses on measuring current mood within any domain (Daniels, 2000). Affective wellbeing relates to the frequent occurrence of positive affect, and the infrequent occurrence of negative affect (Daniels, 2000). The structure and measurement of affective wellbeing has enjoyed healthy debate and research attention in recent years. Whilst some theorists believe that wellbeing is best represented by two independent scales, such as positive and negative affect (Tellegen, Watson & Clarke, 1999; Watson & Clarke, 1997), others believe that affect is best represented in a circumplex model, whereby concepts such as positive and negative affect are bipolar ends of one scale, but orthogonal to such concepts as activation (Feldman Barrett & Russell, 1998; Larsen & Diener, 1992; Russell & Carroll, 1999).

Effectively it seems that the structure of affect and wellbeing is primarily determined by how one chooses to measure it. If a wellbeing measure contains terms that mainly represent hedonic tone (such as pleasure and positive/negative affect) then a factor analysis of such a questionnaire will inevitably reveal that affect is structured accordingly (Larsen & Diener, 1992). In addition, if wellbeing is measured momentarily – when it is difficult for people to experience two conflicting emotions concurrently - then bipolar scales are more likely to emerge from an analysis than if people are asked to
rate which wellbeing terms were experienced by them over the course of a set time period (Russell & Carroll, 1999). To represent affect in a circumplex model (where emotion terms are displayed along the circumference of the model in each octant) Larsen & Diener (1992) comment that this necessarily suggests that terms, (a) have bipolar opposites, (b) that they have more in common with some terms (i.e., those placed next to them in the circumplex), than with others, and that, (c) emotions are spread evenly with equal space between them.

In order to represent emotion in a circumplex a questionnaire needs to sample the full range of emotional terms, and it has to ensure that terms used are balanced by terms of exact opposite meaning (Feldman Barrett & Russell, 1999). In any event, this does not mean that the full spectrum of mood, wellbeing and emotion will have been captured, and evidence indicates that whilst the demonstration of emotion in the physical world may consist of seven universal factors (e.g., Ekman & Friesen, 1986) this isn’t necessarily reflected in models of mood and emotion generated from self-report questionnaires (Larsen & Diener, 1992).

So the measurement of wellbeing, mood and emotion is inextricably bound into the debate about the structure of wellbeing, mood and emotion. If one wishes to select a measure of wellbeing that will sample the real structure of emotion one needs to acknowledge that any choice will be partisan to a particular viewpoint and not necessarily to reality.

The Positive and Negative Affect Schedule (PANAS) is perhaps the most widely used measure of affective wellbeing in Psychology (Kashdan, Julian, Merritt & Uswatte, 2006). The PANAS was developed by Watson, Clark & Tellegen (1988) and comprises two independent scales – positive affect and negative affect. Positive Affect (PA) includes measures of enthusiasm, activity and energy for life goals. Negative Affect (NA) measures active distress, anxiety and anger (Watson et al., 1988). However, some researchers believe that these labels are misleading as the low end of positive affect is conceptualised by Watson & Tellegen (1985) as comprising terms such as dull or sluggish, which are not particularly ‘positive’ (Larsen & Diener, 1992). Larsen & Diener (1992) argue that PA and NA are conceptualised as bipolar independent dimensions with unipolar labels, which can be misleading.
There is also concern that PANAS does not adequately sample the range of emotions involved in wellbeing (Daniels, 2000; Larsen & Diener, 1992) and that its terms only contain adjectives that are high, or neutral, in activation (Daniels, 2000; Feldman Barrett & Russell, 1999; Larsen & Diener, 1992). Feldman Barrett & Russell (1999) suggest that PANAS should change the labels of its terms PA and NA to Positive Activated Affect and Negative Activated Affect to represent this. Appropriate labelling should highlight to researchers using the PANAS precisely which elements of wellbeing are being sampled. Indeed, in Tellegen et al.'s (1999) paper they concede that Positive Activation and Negative Activation are the better terms to use for the PA and NA dimensions.

The debate about how to label emotion may appear to be a navel-gazing obsession of affect researchers, but it does have relevance to this study. In order to best represent the concepts of wellbeing discussed by Hockey (1997, 2000, 2002; Hockey et al., 2000), along with Schönpflug (1983, 1986, 1992), and Hancock & Warm (1989), it is important to ensure that the wellbeing scale used contains adjectives and terms that tap into these. Boredom, fatigue and a lack of energy are low-end constructs of Positive Affect, and anxiety is a high-end construct of Negative Affect. Thus it would seem that a measure of PA and NA might be suitable to use in these studies. However, PANAS has been criticised for failing to contain low activation terms in its questionnaire proper (i.e., boredom and fatigue are not actually measured), and so it seems that a measure comprising terms with positive and negative affectivity and terms with high and low activation would be more suitable for use in this research programme.

Daniels (2000) five-factor model of affective wellbeing represents an alternative structure for measuring wellbeing and demonstrates good reliability and validity in occupational contexts. He measures wellbeing on dimensions for: Anxiety-Comfort, and Angry-Placid (akin to a higher order Negative Affect factor), plus Bored-Enthusiastic, and Tired-Vigour (akin to a higher order Positive Affect factor), along with Depression-Pleasure. In Daniels' own factor analysis he demonstrates that Depression-Pleasure can load onto either the NA or PA dimension. In Daniels' ten-item scale five of the terms are positive and five are negative; five of the terms have high activation and five have low activation. As such his scales appear to be bipolar.
and balanced, sampling both hedonic tone and activation, and appropriately representing a broad spectrum of emotion. Indeed Daniels (2000) argues that PANAS has an imbalance towards anxiety over anger in measuring NA, and it has not weighted items equally in terms of favourableness (encouraging response bias). Perhaps most importantly for this study however, is the fact that adjectives in Daniels’ measure represent the terms used by Hockey, Schönpflug, and Hancock & Warm. Thus, Daniels’ measure will ensure that the measurement of wellbeing can be directly linked back into the theoretical position and hypotheses of this thesis.

Daniels’ (2000) five-factor measure of affective wellbeing is considered appropriate to use in these studies of wellbeing and strategies for dealing with email interruptions because:

- It is multi-dimensional and can capture subtleties in differences in wellbeing (i.e., differences between boredom and fatigue for example).
- It is domain specific (i.e., can be applied to relate to whichever domain is specified in the instructions) and can be measured in relation to work domain.
- It comprises bipolar scales, which reduces response bias (although items are not forced choice).
- It balances item content to include positive and negative terms, with high and low activation.
- Using five primary factors is more useful for picking up differences in wellbeing when measured frequently.
- Second order factors of PA and NA can be achieved if desired.
- Adjectives used in Daniels’ checklists are conceptually concordant with those used by Hockey, Schönpflug, and Hancock & Warm in discussing wellbeing.
- It is available in short form and so is suitable for frequent, brief assessments of wellbeing.

However, because Daniels’ measure is still relatively new, and because it has not yet been subject to tests of construct validity against other wellbeing measures, it was decided that a validity study be conducted. In particular, this study aims to establish whether Daniels’ (2000) 10-item wellbeing measure is able to capture PA and NA when assessing momentary affective wellbeing on its five dimensions. The PANAS was chosen as the comparison measure.
because of its focus on positive and negative affect and the fact that it is probably the most widely used measure of affective wellbeing (Kashdan et al., 2006, as above).

As such it was hypothesised that:

**H1:** Daniels' Anxiety-Calm and Angry-Placid scales will show significant construct validity with PANAS NA scale.

**H2:** Daniels' Tired-Vigour and Bored-Enthusiastic scales will show significant construct validity with PANAS PA scale.

**H3:** Daniels' Depression-Pleasure Scale will show significant construct validity with both PANAS PA and NA, but to a lesser degree than the specified main scales above.

**H4:** Daniels' Anxiety-Calm scale will show a stronger relationship than the Angry-Placid scale with PANAS NA.

**Method**

**Sample**

An email was sent out to 86 Foundation Graduate employees working for a large, multi-national, IT manufacturing and design organisation in Hampshire. The email asked for volunteers to take part in a study of wellbeing at work. Forty-six employees agreed to participate, and 39 responses were finally received. This gave a response rate of 45.3% from the original email request. Twenty-six participants (67%) were male, the average age was 25.87 years (Range from 22 to 35 years; $\sigma = 3.06$), and the average length of time with the company was 2.83 years (Range from 3 months to 6 years; $\sigma = 2.09$).

**Materials**

All participants were given a study pack containing 15 individual wellbeing forms (see Appendix Three). Each wellbeing form contained the PANAS, and Daniels' ten-item measure (Happy, At ease, Anxious, Annoyed, Motivated, Calm, Tired, Bored, Gloomy, Active). Both measures contained the rubric, "Indicate to what extent you feel this way *right now, that is, at the present moment*" (Watson et al., 1988). Participants were requested to fill out the wellbeing forms using a pen or pencil at designated periods.
CHAPTER FIVE

Procedure
Having been sent out individual study packs in the internal post, participants were asked to complete the PANAS and Daniels' 10-item wellbeing measure three times a day for five consecutive work days. They were asked to complete the measures on arrival at work, during the lunch-break, and at the end of their working day. Once all measures across the five days had been taken, completed forms were returned to an internal contact at the organisation, via the internal post system. On receipt of the questionnaires, acknowledgement emails were sent out. Participants were warmly thanked for their contribution to the study and debriefed.

Results
Scoring
For each of the five dimensions on Daniels' questionnaire, the two scores making up that dimension were added (with one item reversed each time) and then divided by two to provide the overall dimension score, as follows:

- Anxiety-Comfort (A-C) = Anxious plus At ease (reversed)
- Angry-Placid (A-P) = Annoyed plus Calm (reversed)
- Tiredness-Vigour (T-V) = Active plus Tired (reversed)
- Bored-Enthusiastic (B-E) = Motivated plus Bored (reversed)
- Depression-Pleasure (D-P) = Happy plus Gloomy (reversed)

Although these dimensions can be scored by reversing all negative items and adding to positive items (so that on each scale a high score is indicative of positive wellbeing – Daniels, 2000) the above scoring method was used to ensure interpretation of results was clear in the multilevel analysis, as NA scales (A-C and A-P) would then be scored in the same direction as the PANAS NA. The PANAS was scored for PA by adding all positive adjectives and dividing by 10 (items within PA). NA was scored by adding all negative adjectives and dividing by 10 (items per NA), as in Watson et al. (1988).

Descriptive statistics
PANAS PA and NA are scored on 1-5 response rating scales, where 1=very slightly and 5=extremely, (the extent to which the given adjective describes how they feel at the present moment). Daniels' D-P, A-C, A-P, B-E and T-V are scored on 1-6 response rating scales, where 1=not at all and 6=very
much (the extent that the given adjective describes how they feel at the present moment).

A graphical presentation of the distribution of the wellbeing scales can be found in Appendix Four.

**Table One:** Descriptive statistics for the 580 wellbeing raw scores collected on PANAS and Daniels’ scales

<table>
<thead>
<tr>
<th></th>
<th>PA</th>
<th>NA</th>
<th>D-P</th>
<th>A-C</th>
<th>A-P</th>
<th>B-E</th>
<th>T-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>2.94</td>
<td>1.29</td>
<td>4.75</td>
<td>2.64</td>
<td>2.56</td>
<td>4.31</td>
<td>3.79</td>
</tr>
<tr>
<td>SD</td>
<td>0.83</td>
<td>0.40</td>
<td>0.97</td>
<td>1.09</td>
<td>0.97</td>
<td>0.97</td>
<td>1.06</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>5.00</td>
<td>3.30</td>
<td>6.00</td>
<td>6.00</td>
<td>5.50</td>
<td>6.00</td>
<td>6.00</td>
</tr>
<tr>
<td>N</td>
<td>580</td>
<td>580</td>
<td>572</td>
<td>571</td>
<td>570</td>
<td>572</td>
<td>573</td>
</tr>
</tbody>
</table>

PA = PANAS measure of positive affectivity (interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, active); NA = PANAS measure of negative affectivity (distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, afraid); D-P = Daniels’ measure of Depression-Pleasure (happy, gloomy: reversed); A-C = Daniels’ measure of Anxiety-Comfort (anxious, at ease: reversed); A-P = Daniels’ measure of Angry-Placid (annoyed, calm: reversed); B-E = Daniels’ measure of Bored-Enthusiastic (motivated, bored: reversed); T-V = Daniels’ measure of Tired-Vigour (active, tired: reversed).

**Multilevel random coefficient modelling**

To establish whether the Daniels’ 10-item measure reflects PA and NA, as rated on the PANAS, a multilevel random coefficient modelling (MRCM) analysis was required. This reflects the multilevel arrangement of the data, with 580 data points at level-one (each individual rating of wellbeing by 39 participants across 15 time periods, with 5 periods missing) and 39 datapoints at level-two (the number of participants).

**Construct validity analysis**

All wellbeing scores were converted to z-scores in order to grand-mean centre them for use in MRCM analysis.

Outcome variables were for PANAS scales (NA and PA). Predictor variables were from Daniel’s scales (A-C, A-P, B-E, T-V, and D-P). Predictors of PANAS NA were A-C and A-P, predictors of PANAS PA were B-E and T-V. D-P was entered as a second step predictor in each case (see below).

Using ML-Win, for all models, a single level null model was first created and then a two-level null model was formed. The significantly improved fit of the
two-level model meant that this acted as the null model in each case. Following from this, predictors were added at the same time, first as fixed effects only, and then with their slopes made random. The final step-two model includes only predictors that showed significance in value (at 1.96 times the standard error) in terms of fixed coefficient and/or random error around the slope. After entering the predictors at step two, a final third stage involved the addition of D-P, initially as a fixed coefficient and then (if significant) with a random error term, to establish whether this was a significant predictor of PANAS PA or NA.

The first multilevel model created examined whether Daniels' NA dimensions predicted PANAS NA. It was expected that, because PANAS is biased towards Anxiety-related items that the Anxiety-Calm dimension would be more predictive than Angry-Placid (see Hypothesis Four).

Model One indicates that Daniels' A-C and A-P scales are significant predictors of NA. Of the two scales, A-C has the strongest predictive relationship with NA, as expected (Daniels, 2000). When D-P is added, it shows a significant negative relationship but is less predictive than the other two scales. The strength of the relationship between A-C and NA differs significantly between people, but its covariance with the intercept indicates that the general trend is that as NA increases so too do A-C scores. This supports Daniels' (2000) assertion that PANAS NA adjectives refer most specifically to anxiety-related items with few anger/annoyed themes. It seems then that Daniels' measure provides an acceptable measure of NA, and that it also appears to contain a dimension that PANAS NA has overlooked (that of Angry-Placid).

Moving onto Model Two both B-E and T-V from Daniels' scale are significant predictors of PANAS PA, with Bored-Enthusiastic showing greatest significance. The strength of the relationship between B-E and PANAS PA differs between people. Adding D-P demonstrated it was also a significant predictor (although slightly less so than the other Daniels' scales). Depression-Pleasure is a dimension of affective wellbeing and yet different theoretical positions place it either with positive affect measures (Tellegen, 1985), or with negative affect measures (Russell, 1980). Indeed, Watson & Tellegen (1985) suggest that D-P might be equally suited to either PA or NA dimension. Daniels (2000) addresses this theoretical discussion more fully.
### Model One: NA – Daniels’ NA predictors as related to PANAS NA

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 2 Model</th>
<th>Step 3 Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.022 (0.102)</td>
<td>-0.031 (0.061)</td>
<td>-0.031 (0.059)</td>
<td></td>
</tr>
<tr>
<td>Fixed effects</td>
<td>A-C</td>
<td>0.440 (0.060)**</td>
<td>0.395 (0.060)**</td>
<td>0.146 (0.037)**</td>
</tr>
<tr>
<td></td>
<td>A-P</td>
<td>0.191 (0.035)**</td>
<td></td>
<td>-0.132 (0.036)**</td>
</tr>
<tr>
<td></td>
<td>D-P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR A-C</td>
<td>0.080 (0.026)**</td>
<td>0.079 (0.026)**</td>
<td>0.072 (0.023)**</td>
</tr>
<tr>
<td></td>
<td>COV A-C/Intercept</td>
<td>0.078 (0.025)**</td>
<td>0.072 (0.023)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.354 (0.091)**</td>
<td>0.116 (0.033)**</td>
<td>0.106 (0.030)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.642 (0.039)**</td>
<td>0.282 (0.018)**</td>
<td>0.276 (0.017)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2*Log Likelihood</td>
<td>1473.702 (580 cases)</td>
<td>996.696 (569 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from Null to Step Two: Chi Squared 477.006 (4df) p>0.000
Improvement in model fit from Step Two to Step Three: Chi Squared 12.907 (1df) p>0.000

### Model Two: PA – Daniels’ PA predictors as related to PANAS PA

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 2 Model</th>
<th>Step 3 Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.027 (0.106)</td>
<td>-0.014 (0.067)</td>
<td>-0.016 (0.066)</td>
<td></td>
</tr>
<tr>
<td>Fixed effects</td>
<td>B-E</td>
<td>0.513 (0.042)**</td>
<td>0.448 (0.043)**</td>
<td>0.271 (0.029)**</td>
</tr>
<tr>
<td></td>
<td>T-V</td>
<td>0.304 (0.029)**</td>
<td></td>
<td>0.153 (0.029)**</td>
</tr>
<tr>
<td></td>
<td>D-P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR B-E</td>
<td>0.033 (0.013)**</td>
<td>0.033 (0.013)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV B-E/Intercept</td>
<td>-0.005 (0.016)</td>
<td>-0.003 (0.016)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.386 (0.098)*</td>
<td>0.153 (0.040)**</td>
<td>0.147 (0.038)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.607 (0.037)*</td>
<td>0.195 (0.012)**</td>
<td>0.186 (0.012)**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2*Log Likelihood</td>
<td>1443.668 (579 cases)</td>
<td>816.946 (570 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from Null to Step Two: Chi Squared 626.722 (4df) p>0.000
Improvement in model fit from Step Two to Step Three: Chi Squared 28.514 (1df) p>0.000

Key: * = p>0.05; ** = p>0.01
CHAPTER FIVE

This analysis demonstrates that 'Depression-Pleasure' is predictive of both PA and NA (as Watson & Tellegen, 1985 and Daniels, 2000 found), with slightly higher significance and better fit found when D-P is applied to the PA model (Tellegen, 1985), see Model Three below.

Model Three: Comparing D-P's effects on PANAS PA and NA

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>PA as outcome model</th>
<th>NA as outcome model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>-0.070 (0.080)</td>
<td>-0.044 (0.070)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>D-P</td>
<td>0.574 (0.053)**</td>
<td>-0.451 (0.062)**</td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR D-P</td>
<td>0.063 (0.024)**</td>
<td>0.087 (0.032)**</td>
</tr>
<tr>
<td></td>
<td>COV D-P/Intercept</td>
<td>0.036 (0.027)</td>
<td>-0.104 (0.032)**</td>
</tr>
<tr>
<td></td>
<td>Uoij</td>
<td>0.212 (0.056)**</td>
<td>0.148 (0.043)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.342 (0.022)**</td>
<td>0.426 (0.027)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>1127.877 (570 cases)</td>
<td>1212.725 (570 cases)</td>
</tr>
</tbody>
</table>

PA a better fit by Chi Squared 84.848 (0df) p>0.000
* = p>0.05; ** = p>0.01

Overall, the multilevel modelling demonstrates good construct validity for Daniels' 10-item measure against PANAS. His NA scales (A-C and A-P) are good predictors of PANAS NA, supporting Hypothesis One. In particular the more strongly significant effect of the A-C slope in the model, reveals that anxiety-calm items are dominant in PANAS, supporting Hypothesis Four. Daniels' PA scales (T-V and B-E) are also good predictors of PANAS PA, supporting Hypothesis Two. B-E is slightly more predictive than T-V. In both models, when D-P was added it demonstrated predictive power but to a lesser extent than the other two scales, supporting Hypothesis Three. It was a more significant predictor in the PA model than the NA model.

Reliability analysis
To assess the reliability of Daniels' measure, Cronbach's alpha was employed. As alphas have no standard error or p values, within and between variance does not need to be separated out, despite this being multilevel data. In Cronbach's alpha the unit of observation is the level-one datapoint and so analysis is conducted on the 580 observations. The software programme SPSS for Windows version 12.0.1 (The Apache Software Foundation, 2003) was used for this analysis. Daniels' measure can be scored by second order factors - representing positive and negative affect. Cronbach's alpha was calculated for the items making up total NA (A-C and A-P), then for the items making up total PA (B-E and T-V). Table Two signifies what happens when D-P is added
to either NA or PA. Overall affective wellbeing was also scored with negative items reverse scored (anxious, annoyed, bored, tired and gloomy). In addition, Cronbach's alpha was calculated for each of Daniels' five dimensions. However, as only two items make up each dimension it was not expected that such an analysis would demonstrate strongly consistent scales.

The following table summarises the alpha coefficients achieved.

**Table Two:** Cronbach's alpha statistics for Daniels' 10-item measure of affective wellbeing

<table>
<thead>
<tr>
<th>Scale</th>
<th>Number of cases</th>
<th>Number of Items</th>
<th>Alpha (non-standardised)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall wellbeing</td>
<td>567</td>
<td>10</td>
<td>.83</td>
</tr>
<tr>
<td>Overall NA (no D-P)</td>
<td>568</td>
<td>4</td>
<td>.77</td>
</tr>
<tr>
<td>Overall NA (with D-P)</td>
<td>568</td>
<td>6</td>
<td>.83</td>
</tr>
<tr>
<td>Overall PA (no D-P)</td>
<td>570</td>
<td>4</td>
<td>.63</td>
</tr>
<tr>
<td>Overall PA (with D-P)</td>
<td>569</td>
<td>6</td>
<td>.77</td>
</tr>
<tr>
<td>D-P</td>
<td>570</td>
<td>2</td>
<td>.65</td>
</tr>
<tr>
<td>A-C</td>
<td>570</td>
<td>2</td>
<td>.69</td>
</tr>
<tr>
<td>A-P</td>
<td>569</td>
<td>2</td>
<td>.42</td>
</tr>
<tr>
<td>B-E</td>
<td>570</td>
<td>2</td>
<td>.47</td>
</tr>
<tr>
<td>T-V</td>
<td>571</td>
<td>2</td>
<td>.39</td>
</tr>
</tbody>
</table>

n.b. PANAS NA (N=575, alpha=.81; 10 items) PANAS PA (N=574, alpha=.92; 10 items).

It is important to recognise the low number of items per construct, which inevitably affects alpha values. Nevertheless, the reliability of the NA scale is acceptable at .77, although the PA scale is weaker at .63. Adding D-P improves reliability statistics for both NA and PA. It would be tempting, especially in light of the slightly higher significance of DP in the PA model, to add D-P to B-E and T-V to create a PA scale. This would improve reliability of the scale to .77. However, with D-P only a slightly better fit in a PA model, it is considered conceptually sound to maintain Daniels' scales as he intended (2000). However, it is noted that the reliability of PA in this analysis is somewhat below an acceptable level. Indeed, using D-P as a scale in its own right has slightly better reliability (.65) than the 4-item PA scale (.63). The above results also demonstrate that it is best to use the overall PA and NA scales in the main study, rather than the two-item subscales (even though it is surprising to see how strong Depression-Pleasure and Anxiety-Comfort scales are, when they are only composed of two items). Personal correspondence received from Daniels (2004) states that, "for the 10 and 8
item scales, individual reliabilities for facets don’t work as well, because of the small [number] of items”.

Discussion
All four hypotheses for this study were supported and the null hypotheses rejected. The MRCM analysis demonstrates that A-C and A-P are significant predictors of PANAS NA (support for Hypothesis One) and that T-V and B-E are significant predictors of PANAS PA (support for Hypothesis Two). Depression-Pleasure was significantly predictive of both PANAS PA and NA (support for Hypothesis Three). Finally, A-C was a stronger predictor of PANAS NA than A-P, which supports Hypothesis Four.

This study demonstrates that Daniels’ 10-item measure has strong construct validity with the PANAS and is advantageously half its length, making Daniels’ 10-item measure more suitable for frequent momentary analyses. Descriptive statistics and graphical presentation (see Appendix Four) suggest that Daniels’ measure is more normally distributed than PANAS – especially compared to PANAS NA – indicating that response bias is less of a problem with Daniels’ measure, probably because of the balance of negative and positive items for each dimension and construct. This reflects Daniels’ (2000) own justification for developing an alternative measure of affective wellbeing to the PANAS.

Overall, Daniels’ measure of wellbeing is reliable (.83). The reliability of Daniels’ NA construct is sufficient (.77) although PA shows weaker internal consistency (.63). When D-P is included in the analysis for PA the reliability is acceptable (.77) but MRCM, along with the theoretical stance of Daniels, does not support the presence of D-P in a PA factor only. The D-P scale will not be added to PA or NA in further analysis, but because it has a fairly robust alpha for a two-item scale, it will be used as a third factor – see Warr (1992), and Daniels, Brough, Guppy, Peters-Bean & Weatherstone (1997). Work by these theorists suggests that anxiety-comfort (akin to NA), tiredness-vigour (akin to PA) and depression-pleasure (akin to D-P) may be three superordinate factors. Daniels (2000) supports this structure to an extent in testing his 30-item scale, although he asserts that DP will fit with both PA and NA factors. As several of the models in Studies Four and Six will require using both PA and NA scales as predictors, it is not recommended to include D-P as a scale
within both PA and NA (or it will occur twice in one model and inflate the model fit).

As Daniels' measure appears to tap into constructs that the PANAS has underdeveloped (such as Anger and Depression) it is more appropriate that Daniels measure of affective wellbeing is used in these studies of email interruptions. Additionally, its brevity marks this as superior for the purposes of Studies Four and Six. As mentioned in the Introduction, Daniels' measure contains adjectives used by Hockey (1997, 2000, 2002; Hockey et al., 2000), Schönpflug (1983, 1986, 1992), and Hancock & Warm (1989) in their discussions of wellbeing, thus ensuring conceptual concordance between this work and that conceptualised previously.

**Study 3: A self-report timing validity study**

*Introduction*

Estimating the time taken to complete an activity is a subjective, self-report exercise. The duration judgement literature has highlighted how problematic such methodologies for collecting accurate time estimations can be. For example, when faced with high-demand activities we are prone to underestimate the passage of time when asked retrospectively, or will overestimate a passage of time when asked to estimate specific time intervals (Wickens, 1992). When required to self-regulate one's performance (for example, to suppress or exaggerate emotional responses) our estimation of time is also overestimated (Vohs & Schmeichel, 2003), and it is during self-regulatory activity that our resources become depleted which can make time elapses seem longer, even if in reality they are shorter than controls (Vohs & Schmeichel, 2003). Workload appears to interfere with our internal timing estimation mechanisms (Wickens, 1992), and so in any task where someone is required to provide a subjective estimate of time, one also has to consider whether their work demands may be affecting the accuracy of their response.

It is also important to consider how and when estimates of time are gathered. Block & Zakay (1997) found that when people were asked to estimate time taken to do a task after the task had finished (retrospective estimates) they were more accurate than when they had been told prior to the task that they would be asked to make an estimation of the time taken to complete it (prospective estimates). It appears that prospective estimation attunes people
towards time durations, which can lead to an extended-now state (Vohs & Schmeichel, 2003). Extended-now states apparently occur when people are very aware of their own behaviour, especially self-regulatory behaviour, meaning that they lose sight of the future and become preoccupied with every moment of their present, thus elongating it, in terms of their perceptions (Vohs & Schmeichel, 2003).

The measurement scale used for estimating time has a marked effect on accuracy. Hartley, Brecht, Pagerey, Weeks, Chapanis & Hoecker (1977) found that people asked to estimate time allocation to tasks were less accurate as the measurement scale became more quantifiable. Ratio estimates (i.e., "how much time did you spend today doing xxx in hours and minutes?") were the least accurate, whereas nominal and ordinal estimates led to respectively more accurate estimates. Hartley et al. (1977) conclude that although objective measures of time allocation to tasks are expensive and difficult to achieve, "self-report techniques provide greater quantification only at the expense of accuracy" (p.34).

The literature highlights the caution that should be applied then when attempting to use self-report estimates of time as valid and reliable measures. The measurement technique used (Hartley et al., 1977), recall method (Block & Zakay, 1997), and task demands (Wickens, 1992; Vohs & Schmeichel, 2003) can all affect the degree of accuracy of timing estimates. In Studies Four and Six of this thesis a prospective recall method was used, with timing estimates gathered on a ratio scale, in order to ascertain how quickly people checked an email, responded to an email, or how long they spent dealing with an email. Such methodology would, with reference to the literature, indicate overestimation of time, or at the very least, inaccuracies in time estimation. However, Studies Four and Six differ somewhat from previous studies of time estimation, by virtue of the fact that they use diary-study methodology.

Diary-study methods have been praised because they allow researchers to gather data about work tasks close to the time at which they were actually carried out (Czerwinski et al., 2004; Conway & Briner, 2002; Harris et al., 2003; Miner et al., 2005). In Hartley et al.'s (1977) study, by contrast, participants were asked to make timing estimations about tasks completed.
during a work day, after the work day had finished. This could be more than seven hours after the first work task had been undertaken. So, although research indicates that subjective self-report measures of time may not be reliable or valid, it is likely that when the estimates are made close to the time of activity, such problems could be partially overcome (Miner et al., 2005).

In this timing validity study then (a post-hoc study to Study Four - see Chapter Six), an attempt was made to validate the timing estimates made by study participants. The hypothesis is that:

**Hypothesis:** Prospective self-report estimates of time (by ratio scale) are valid measures of actual time, when gathered using momentary diary methodology.

**Method**

**Sample**

Thirty-six Individual Email Survey forms were received from 24 participants from Organisations A (N=5), C (N=6), D (N=4), E (N=8) and F (N=1), from Study Four (see Chapter Six). Nine participants were male.

**Materials and equipment**

Participants were provided with Individual Email Survey forms (see Appendix Six), as part of Study Four, which could be used in the course of this post-hoc study also. All participants needed direct and personal access to email, obtained in 100% of cases by using either Microsoft Outlook or Lotus Notes. The researcher used Microsoft Outlook 2003, to correspond by email with participants.

**Procedure**

Prior to taking part in Study Four, participants were asked to inform the researcher as to which day they were intending to participate. Prior to the elected day participants received an Instructions and Information document (see Appendix Six) that alerted them to the fact that they needed to record timing information about the email they were interrupted by, after they had finished dealing with the email. Thus, they were asked to make timing estimates retrospectively but using a prospective method (i.e., they knew beforehand that they had to monitor time when dealing with each email).
Figure Six below provides an excerpt from the Instructions and Information document pertaining to this:

**Figure Six:** Excerpt from Instructions and Information document detailing how participants should record timing estimates

The survey forms ask you a series of questions that require you to be alert to the time you take in dealing with email. Firstly you are asked to estimate how long it took you to check the email after you noticed/heard the alert. You are then asked if you decided to deal with the email immediately. If you didn’t, you are asked to note how long you waited before returning to process the email. You are then asked to record how long you spent in the email system dealing with that email, and anything else, before exiting to complete the survey form. Please try to record your answers to these questions as accurately as possible, in minutes and seconds. However, do not feel that you have to use a stopwatch or any other timing device. You are simply making an estimate of time, and recording it should not intrude in any way.

During the Study Four elected day, an email was sent to participants at 11am and again at 3pm (see Figure Seven below) by the researcher. An alert was set on the researcher’s computer, using Microsoft Outlook, to remind the researcher to send the email at 11am and at 3pm. The email was sent with a request for the postmaster to send a read receipt and delivery receipt. Participants were informed that they only needed to respond to the timing validity email (and thus take part in this post-hoc study) if that email had actually interrupted their work.

Once participants had read the email and hit reply to it, they then completed a normal diary record (Individual Email Survey) as per Study Four. The diary record asked participants to note in minutes and seconds how long it took them to, (a) check the email on hearing an alert, (b) respond to the email after checking, and then, (c) deal with the email. They were asked to indicate on the email survey that the email they referred to was in reference to the timing validity study (by denoting ‘Emma’ in a specified box on the form). The Individual Email Survey was then returned to the researcher in a batch with the other Individual Email Surveys used in Study Four, in a freepost envelope, provided by researcher.
Once the record forms were returned, the time allocations were recorded.

Analysis

Subjective time allocations given to ‘checking’ the email (Time 1), ‘responding to the email’ (Time 2) and ‘dealing with the email’ (Time 3) were recorded for each participant from the ratio measure provided on the Individual Email Surveys. The ‘replied email’ received by the researcher via the Microsoft Outlook operating system was then analysed. This allowed the actual (objective) time duration of the email to be recorded - from receipt in the participant’s inbox, to the time it left the participant’s inbox. This information was gathered by accessing the details data from ‘options’ in the window of the associated reply email from the ‘Postmaster’. Details include data on the subject, recipient, sender, plus date and time sent and received from and between the server of the participants’ organisation and the researchers’ organisation\(^\text{14}\). The postmaster delivery time denotes the time when the

\(^{14}\) Data on timings should not be mixed to include records from both servers, as they may use different internal clocks. In fact it is not uncommon for ‘details’ to record that a host server received an email before it had even been sent by the sender’s server.
participant received the email (according to the host server). This is noted as Time A. The postmaster reply time denotes the time when the participant hit reply to the email. This is noted as Time B (according to the host server). The difference between Time A and B in seconds indicates the total actual time that the email spent in the participants' inbox. It is equivalent to the total subjective estimate of time made by participants from Time 1 to Time 3.

Results
It was intended that specific measures of objective time could be compared to the specific measures of subjective time, by gathering data on read and delivery receipts from the postmaster. However, only 7 out of the 36 emails received back in this study provided read or delivery data. Microsoft Outlook now has an option to refuse read or delivery receipts, which many people choose to actualise, in order to prevent others' monitoring their activity. Indeed, it is considered poor etiquette to request email read and delivery receipts, hence why many organisations recommend that people do not enable such replies (Email Etiquette, 2005). Nevertheless, Time 1, 2 and 3 data were gathered, as above, and then added to provide a measure of total subjective time.

Due to the fact that some participants completed two forms (N=12) whilst others only completed one form (N=12) it must be noted that data is not independent. In order to partial out within and between person variance, a multilevel analysis of the data was conducted to establish what percentage of total variance could be attributed to between factors, compared with within factors. This was run using ML-Win version 2.02. According to this initial exploration, 99.999% of the variance in this data is attributed to within-person factors. Therefore, one can conclude that individual differences do not affect the data. As such, it was deemed appropriated to use standard statistics to analyse the data.

Descriptive and inferential statistics were calculated using SPSS version 11.5 for Windows.
Table Three: Descriptive statistics for email timing estimation data

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean (seconds)</th>
<th>Standard Deviation (seconds)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>417.94</td>
<td>775.49</td>
<td>32</td>
</tr>
<tr>
<td>Time 2</td>
<td>48.16</td>
<td>165.55</td>
<td>31</td>
</tr>
<tr>
<td>Time 3</td>
<td>105.13</td>
<td>322.96</td>
<td>30</td>
</tr>
<tr>
<td>Total Subjective Time</td>
<td>578.70</td>
<td>881.87</td>
<td>30</td>
</tr>
<tr>
<td>Total Objective Time</td>
<td>465.25</td>
<td>546.89</td>
<td>26</td>
</tr>
</tbody>
</table>

The subjective time estimate is higher, on average, compared to the objective time estimate mean. This supports the notion that people tend to overestimate time spent working on a task when engaged in prospective estimation.

A Pearson’s Product Movement correlation was calculated to establish the degree of the relationship between Total Subjective Time and Total Objective Time estimations. The correlation was $r=0.874$ ($p>0.000$, $N=36$). This statistic indicates a strong, significant positive correlation between objective time and subjective self-report estimates of time made by participants using momentary diary record methodology.

Discussion

This post-hoc assessment of the validity of timing estimations supports the hypothesis that, prospective self-report estimates of time (by ratio scale) are valid measures of actual time, when gathered using momentary diary methodology. The $r=0.874$ statistic suggests a robust construct validity and reassures that subjective estimates of time are accurate enough to use as measures for actual time, when gathered by momentary diary method. Thus the null hypothesis was rejected and the alternative hypothesis, Prospective self-report estimates of time (by ratio scale) are valid measures of actual time, when gathered using momentary diary methodology, was accepted. This is despite the fact that methodology for time estimation relied on both ratio measurement and prospective recall. Both such methods have been found to lead to overestimation of time and inaccuracy (Block & Zakay, 1997; Hartley et al., 1977) in other studies.
Limitations
The number of usable forms was limited to N=36. This is a lower than desirable number, and is based on 24 participants.

Future directions
The remit of this study was simply to provide some reassurance that timing estimates used in Studies Four and Six are valid. This study provides such reassurance. However, future research on subjective perceptions of time, could attempt to establish whether the task demands of an activity influence ratio measured subjective estimates, even in momentary diary methods. This would be of use to the self-regulation theorists (Vohs & Schmelchel, 2003). Interestingly, self-regulation theorists indicate that when participants are engaged in a 'flow' state they underestimate time (Conti, 2001). In Study Four, active and motivated people (experiencing high Positive Affectivity, and arguably in a 'flow' state) were not more likely to record that they had taken longer to check, respond or deal with email. Indeed, people who were active or motivated before receiving an email estimated that they spent longer dealing with it (see Chapter Six). Such a finding indicates that much is still to be discovered in understanding how timing estimates are made, how they relate to measurement methodology, self-regulation, task and emotional demands.

In future, attempts to monitor time spent in email activity, this study indicates that a ratio measurement of prospective time estimation, using momentary diary methodology is a valid approach to take.

Chapter summary
The purpose of this chapter was to outline the rationale and approach taken for studying email interruptions in goal directed work, using the diary method. Traditional research into interruptions and new technology in mental information work has been criticised for lacking external validity. The principles outlined by ART and Hockey were presented as a guide for study to be adopted within this thesis, as these highlight the importance of study context and the need to generalise results back into the work domain.
Accordingly, the diary method was considered to be an appropriate way of measuring real-world phenomena in a quantifiable and robust manner, without compromising the ecological validity of studying such variables within the context of people's real goals and experiences. It is diary-study methodology that has thus been adopted as a study tool in the remaining two phases of this research programme.

MRCM techniques were then discussed, and the analytical procedure used for the diary-study results in Phases Two and Three were presented. This section should provide a useful reference point, when reading the results in Chapters Six and Seven. Finally, the validity of the wellbeing scale and strategy measure (subjective estimates of time taken to check, respond and deal with an email interruption) used on the diary record forms were presented in Studies Two and Three. These studies report that both measures are deemed to be valid and appropriate to use in diary-study methodologies.

In the next two chapters then, diary-method approaches to studying strategies for dealing with email interruptions in goal-directed work will be presented. Examining how email interruptions occur in people's real working environments by using non-experimental, naturalistic methodology is an approach rarely undertaken within interruptions research.
Chapter Six:
The Role of Wellbeing and Personality in Strategic Responding

Introduction

As noted in Chapter One, most of the published research on interruptions to goal-directed work has concluded that interruptions are disruptive (Bailey et al., 2000; Bailey et al., 2001; Cутrell et al., 2001; Czerwinski et al. 2000b; Czerwinski et al., 2001; Einstein et al., 2003; Eyrolle & Cellier, 2000; Gillie & Broadbent, 1989; McFarlane, 2002; McFarlane & Latorella, 2002; Miller, 2002; Trafton et al., 2003). Primarily such research has involved forcing an interruption into the participant's attention field and measuring how this affects performance on the interrupted task. However, Study One demonstrated how people are glad to receive email interruptions when they need a break, or are bored. Thus it seems important to acknowledge that email interruptions - as controllable and asynchronous interruptions - can offer stimulation, variety, or a cognitive break, and can thus be beneficial to one's work experience.

In this second phase of studies of email interruptions to goal-directed work Study Four follows up on the issues of wellbeing, personality and the potential for email interruptions to have a positive effect on people. Specifically this study addresses the research questions 1, 2 and 6 outlined in Chapter Four. It looks at how wellbeing both influences (as an antecedent) and is influenced by (as a consequence) one's strategic response to email interruptions. Further, the issue of individual differences is explored by assessing whether personality variables are related to strategic responding. When an individual has a choice about whether to respond to an interruption, the choice itself reveals a strategic decision (however conscious).

The goal-directed theories of Hockey and ART are central to this next phase of study. Firstly, by exploring wellbeing in goal-directed work, the concept that
wellbeing priorities are compared with task priorities in deciding on action and how to regulate it is addressed. ART does not discuss the role of wellbeing in shaping action, but Hockey's framework (1997, 2000, 2002), and work by Hancock & Warm (1989), indicates that this is a concept that should not be overlooked. In Chapter Four, it is recommended that an amalgamated approach is therefore taken, to recognise that wellbeing is a parameter that influences, and is influenced by, strategy choice. This study phase will explore whether such a recommendation is valid.

Secondly, ART does allude to the importance of personality in goal-directed behaviour, but it is poorly conceptualised and a peripheral consideration in their grand theory approach. Hockey also does not test the role of personality in a consistent or structured way in his model, attending mainly to issues of coping style. This second phase of studies attempts to give personality a more central role, to examine whether it does have a significant impact on people's action and wellbeing.

In this second phase of studies then the main study (Study Four) is a diary study, using event-sampling methodology, and designed to establish whether wellbeing is both an antecedent and consequence of strategic responses (at Time 1, 2, and 3 – see Figure Five on page 117 of Chapter Four) to email interruptions, and whether individual differences influence or moderate strategy or wellbeing. Results from this study are analysed using multilevel random coefficient modelling (MRCM) techniques. A small post-hoc study is then reported that examines the extent to which results from Study Four can potentially be generalised to the real world via content analysis of participants' debrief comments (Study Five).
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Study 4: The relationship between wellbeing, personality, and strategy used for dealing with email interruptions

Introduction
The framework represented in Figure Five in Chapter Four demonstrates where strategic action will occur in an interruptions timeline, and what the likely antecedents (Boxes A, B and C) and consequences (Box D) of action are at each stage. This study is especially concerned with measuring wellbeing as an influence and consequence of action, and personality as an influence on action at Times 1, 2, and 3.

Wellbeing
Although there are few studies that explore how interruptions affect one's wellbeing, both Hockey (1997, 2000, 2002; Hockey et al., 2000) and Schönpflug (1983, 1986, 1992) indicate that people who are engaged in optimising performance in goal directed work, are not simply concentrating on work goals. They state that wellbeing goals are also involved in the equation of efficiency trade-off. As discussed in Chapter Four, Hockey (2000, 2002) notes that when people select a strategic response (or action program in ART terms), in the face of environmental or task demands they may choose to preserve task output (which may require extra effort and result in strain or fatigue) or they may choose to preserve wellbeing (which may mean inhibiting task performance, or disengaging from the task goal) (Schönpflug, 1983). As mentioned, Zijlstra et al.'s (1999) study found that when certain individuals increased effort (in the face of increased interruption demands), wellbeing suffered. This demonstrates the possible presence of a strategic response to ensure that task goals are protected at the expense of wellbeing goals.

This study aims to assess whether one's strategic response to email interruptions affects wellbeing levels (see Box D in Figure Five).

When wellbeing has been explored in the context of work demands (including interruptions), it is usually measured as a consequence or dependent variable.
For example, when work demands are too great (i.e., if a task is difficult, complex or time pressured) or too small (i.e., if a task is boring) people report lower wellbeing (Scerbo, 2001; Schellekens et al., 2000; Zijlstra et al., 1999). However, both Hockey (2000) and Schönpflug (1983) have indicated how wellbeing may also be an antecedent to action (see Boxes A, B and C in Figure Five). When one experiences low levels of affective wellbeing, such as anxiety, boredom, or fatigue, this may encourage a strategic response to boost wellbeing, perhaps in seeking stimulation (i.e., if bored – see Fisher, 1998), a cognitive break or rest (Hockey, 2000) or in attempting to reduce demands (i.e., ignoring email interruptions). Thus, this study will explore wellbeing levels as both a precursor and consequence to strategic response to email interruptions. This offers a unique approach to studying wellbeing in interruptions research, addresses research questions 1 and 2 from Chapter Four, and shapes the first two hypotheses for Study Four:

**H1: Different strategies chosen to deal with email interruptions in goal-directed work have a different impact upon one's affective wellbeing afterwards.**

**H2: Levels of affective wellbeing are predictive of the strategy chosen to deal with an email interruption in goal-directed work.**

Support for Hypothesis One lends support to Hockey and Schönpflug – activity has an influence on wellbeing, not just task performance. Although ART does not refute that activity can cause positive wellbeing (it mentions the learning and development consequences of action), it does not explicitly deal with this concept, and nor does it indicate how emotional consequences might affect the shape of subsequent action programs stored in the OIS (Daniels et al., 2004). As ART only discusses the impact of activity on task goal achievement, it is only how the strategic process affects task goal success that is mentioned as a criterion for influencing how action programs are shaped and stored for future use. Should Hypothesis One be supported, ART may wish to amend their theory to acknowledge that strategic action has a direct effect on wellbeing.

ART does not entertain the notion that wellbeing may influence the action programs formed by people in pursuit of their goals. Rather ART stresses that
action programs are selected according to external factors such as task parameters. Support for Hypothesis Two then will indicate that Hockey and Schönpflug are also supported in making wellbeing a consideration in understanding work activity, and that ART needs to amend its theory to encompass this amalgamation of perspectives (the ‘third way’ in Chapter Four).

**Personality**
Both interruptions researchers (Fischbach et al., 2003; Fisher, 1998; Frei et al., 1999; van den Berg et al., 1996; Zijlstra et al., 1999) and theorists working in the domain of activity and goal-directed behaviour (Connor & Abraham, 2001; Frese et al., 1987; Frese & Zapf, 1994; Hockey, 2002; Hockey et al., 2000; Miller et al., 1960; Schönpflug, 1992) acknowledge that individual differences in personality are likely to be involved in shaping one’s response to interruptions, and strategic approach to goal directed work, respectively (see Boxes A, B and C in Figure Five). Yet, possibly because of the cognitive tradition within these fields, the topic of individual differences has received scant empirical attention. When personality differences in strategic response have been explored, operational definitions have been underdeveloped (e.g., Frese & Zapf, 1994) and a relevant paradigm for the measurement of such variables overlooked (Miller et al., 1960). Nevertheless there does appear to be some research available, suggesting how extraversion, anxiety, and self-control relate to goal-directed work output and interruptions:

**Extraversion-Introversion**
Fisher (1998) hypothesised that extraverts are more likely to experience improved wellbeing and satisfaction when interrupted during boring work. van den Berg et al. (1996) found that people with a high need for excitation (as extraverts have, according to Eysenck, 1990) found interruptions to be less disruptive to their work tasks than those with a low need for excitation. Due to their desire for external stimulation and variety, it is anticipated that people with higher scores on extraversion scales will be more likely to respond quickly to an email interruption, and additionally to experience higher wellbeing as a result of having attended to it. This shapes the next two hypotheses:
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H3: People with higher scores on extraversion scales employ speedy response strategies for dealing with email interruptions in goal-directed work.

H4 People with higher scores on extraversion scales experience an increase in affective wellbeing after dealing with an email interruption.

Neuroticism/Anxiety

'Worriers' attempt to compensate for increased demands at work by increasing effort, and thus maintaining, or even improving (Schönpflug, 1992) performance, until their levels of anxiety become so extreme that they narrow attention, miss important work cues, and consequently are less effective (M. Eysenck, 1982). Additionally Type A personalities have been found to experience overload in the face of increasing demands, to a greater extent than other personalities (Kirmeyer, 1988). Connor & Abraham (2001) say worriers are more motivated to act because they are worried. People who score high on neuroticism scales (worriers) may therefore attend quickly to an interruption because they are worried about it, or may respond slowly to an interruption, because of attentional narrowing and the cognitive interference of worrying. Additionally, they may experience a greater emotional reaction to the presence of email, and thus find wellbeing levels are more likely to be affected by an interruption.

Hockey et al. (2000) found that although people take riskier decisions when fatigued this is not so if tired people also have higher levels of trait anxiety. In such circumstances they show a preference for safe options – possibly because the fear of failure or making mistakes is able to override fatigue, and ensure that cognitive processing is maintained. This is likely to suggest that anxious people may use more energy to ensure decision-making does not suffer when they are fatigued – but, long-term this could lead to even greater levels of fatigue, or even stress (Schönpflug, 1986).

It is difficult to predict from the research on 'worriers' how those with high scores on neuroticism scales will strategically react to an email interruption, and how this will affect their wellbeing. Thus specific hypotheses for neuroticism have not been generated. Rather, neuroticism will be explored in the context of Hypotheses Six and Seven (see below).
Conscientiousness/Self-control

Connor & Abraham (2001) found that conscientious people form better plans and intentions to act and consequently are more likely to achieve their goals. Fischbach et al. (2003) note that individuals exerting high levels of self-control will ignore distractions and that this is linked to their ability to avoid 'temptation', stick to their main goals and achieve them. Frei et al. (1999) have found that people who limit their interruptions tend to produce more work. As such, it is likely that people with high scores on conscientiousness scales will be less readily distracted by email interruptions, but that they may spend more time dealing with them (in order to satisfy the interruption goal) once they have been distracted. The following hypothesis has consequently been constructed:

H5: People with higher scores on conscientiousness scales will be slower to check, respond to and deal with an email interruption, when choosing strategies of response in goal-directed work.

Miner et al. (2005) indicate that extraversion, neuroticism and conscientiousness are worth measuring as having an effect on within-subjects ratings of mood and wellbeing. Extraversion, Anxiety and Conscientiousness/Self-control are three of the factors comprising the Five Factor Model (FFM) of personality, the dominant paradigm within the individual differences field (Hogan, 1998; Goldberg, 1992; Salgado, Moscoso & Lado, 2003) and referred to as "...the most influential formulation of individual differences in personality." (McAdams, 1997, p.27). The FFM not only appears to demonstrate a consensus in how personality is described and measured across situations, contexts and cultures, but the FFM personality factors have been demonstrated to be valid predictors of job and organisational behaviours (Salgado, 2003).

The Five Factor Model is thus used as the central organising framework for measuring personality in this study, with personality conceptualised as "...dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings and actions" (Costa and McCrae, 1997 p.270). In measuring the FFM factors within applied settings, validity is maximised when psychometric measures are used that are borne from the FFM paradigm (Salgado, 2003; Anderson & Ones, 2003) – measures such as the HPI, or
IP/5F (Salgado, 2003; Salgado et al., 2003). An appropriate FFM measure will be used as a tool for assessing personality here, therefore.

Assessing each of the five factors of personality with reference to their impact on strategies chosen to deal with email interruptions, and how their wellbeing is affected by the intrusion of an email interruption, should provide some clarity and coherence to the study of individual differences within the field of interruptions research and goal-directed behaviour. As such the following generic hypotheses will be tested:

**H6:** Different personality characteristics in the Five Factor Model are differentially predictive of strategic responses to email interruptions.

**H7:** Different personality characteristics in the Five Factor Model are differentially predictive of affective wellbeing levels after dealing with an email interruption.

It is hypothesised that personality may also be a moderator of the relationship between wellbeing and strategy choice. For example, low positive affectivity (boredom and tiredness) may especially predict speed of response to an email alert if one also has higher scores on extraversion scales. This is because people with higher scores on extraversion scales appear to need more variety and stimulation than introverts, and this need could be especially pronounced when such people are inactive. There is little research evidence available to indicate where moderating effects of personality may occur, and so once again, a generic hypothesis will be tested to establish how and if personality acts as a moderator:

**H8:** The relationship between strategy choice and wellbeing, in dealing with email interruptions in goal-directed work will be moderated by individual differences in personality, measured according to the Five Factor Model of personality.

Hypotheses Three to Eight are designed to tap into research question 6, outlined in Chapter Four. Support for any of these personality-related hypotheses will demonstrate that both ART and Hockey would benefit from applying a structured approach to explaining how individual differences are
involved in the formation and regulation of action programs and strategies in goal-directed work.

**Method**

*Participants*

Six organisations provided participants for this study. An opportunity sample was gathered as a contact within each organisation emailed individuals that use email in their work and are connected to the email system at all times. These individuals were asked if they wanted to participate in the study and a flyer was attached, to explain what would be required of them. Incentives to take part included entry into a £50 prize draw, plus free, confidential feedback on their personality profile (produced if they completed the HPI and MVPI questionnaires as part of the study). The sample statistics and response rates for each organisation are summarised in the table below:

**Table Four**: Sample statistics and response rates for participating organisations

<table>
<thead>
<tr>
<th>Organisation</th>
<th>No. of individuals initially emailed</th>
<th>Individuals agreeing to participate</th>
<th>Individuals who returned study packs</th>
<th>Overall response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>unavailable</td>
<td>14</td>
<td>9 (-1)</td>
<td>unavailable</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>100%</td>
</tr>
<tr>
<td>C</td>
<td>unavailable</td>
<td>32</td>
<td>23 (-3)</td>
<td>unavailable</td>
</tr>
<tr>
<td>D</td>
<td>unavailable</td>
<td>8</td>
<td>8 (-2)</td>
<td>unavailable</td>
</tr>
<tr>
<td>E</td>
<td>52</td>
<td>20</td>
<td>12 (-1)</td>
<td>23%</td>
</tr>
<tr>
<td>F</td>
<td>46</td>
<td>3</td>
<td>3</td>
<td>6.5%*</td>
</tr>
<tr>
<td><strong>Total Participants</strong></td>
<td><strong>61 (54)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The poor response rate from organisation F is believed to be due to the fact that the recruitment email was circulated when the majority of the 46 team members were away at a conference. N.B. figures in parentheses indicate number of returned packs spoiled or containing insufficient data.

Organisation A is the financial credit division of a large multi-national vehicle design and manufacturing company, based in Essex; Organisation B is a small practice of architects and designers, based in Sussex; Organisation C is an overseas development charity, based in London; Organisation D is a public services broadcaster, based in London; Organisation E is a multi-national risk assessment and insurance company, based in London; Organisation F is a multi-national practice of chartered accountants, finance specialists and business consultants, based in London. These organisations represent design, development, media and finance sectors of the work community. Seven study packs were spoiled or contained insufficient data, and so the final number of
participants in this study was 54. Of the 54 participants, 6% are senior management grade, 39% are middle or project management, 30% are between administrative and management levels, and 24% are at administrative level. 70% of participants are female. The modal age range of participants is 21-30 (43%), and the modal number of years participants have been using email in their job is 8-11 years (48%). 20% of participants use Lotus Notes as their email operating system, with 80% using Microsoft Outlook or Outlook Express. The modal number of years participants had been working at their current organisation was 0-3 years (46%).

Measures
Participants were provided with 25 individual diary records (one side of A4) to complete after dealing with each email that interrupted their work in a given working day. The diary record was fully trialled in two small pilot studies\(^\text{15}\), with changes made to length and content. The final diary record was estimated to take 30-60 seconds by participants. Each diary record comprised several sections of questions or checkboxes, designed to elicit measures of email characteristics and controls, and wellbeing. In addition to completing a diary record for every interrupting email received, participants were also asked to complete two measures of personality — the HPI and MVPI — at a time convenient to them. The HPI and MVPI could be completed on-line, and full instructions were given to participants in their study packs. Note that only the HPI results were of interest in the context of this study. MVPI results were gathered for use at a later date, in reference to research being carried out relating to the structure of wellbeing and personality that is beyond the scope of this thesis.

Email characteristics and controls
We know (from previous studies on how interruptions affect performance) that manipulating the complexity, similarity, length and frequency of an interruption can affect task performance, but the multitude of characteristics that might be used to describe an email will not be assessed as potential moderators in the relationship between strategic response and wellbeing in

\(^{15}\) Two pilot studies were run before the study proper, to ensure that all instructions and question formats were understandable and sensible. In the first pilot study, double-sided versions of the Individual Email Survey took 60-120 seconds to complete. In the second pilot study, it was reported that the amended single-sided Individual Email Survey took less than a minute to complete, by all but one participant, who reported that this took between 5-6 minutes.
this study. Rather, email characteristics will be measured and used as controls. Participants in this study were asked whether they felt positive, negative or neutral, about the email that interrupted them. Such a simple question will help to establish whether, whatever the characteristics of an email, the relationship between wellbeing and strategy choice differs according to one's personal experience of the email (Daniels et al., 2004; Lazarus, 2000; Zijlstra, 1993). If wellbeing is found to be significantly related to strategic responses, then the third phase of studies (see Chapter Seven) will further examine how this is balanced against task performance antecedents and consequences.

Participants were asked to record what 'type' of email had just been dealt with. Nine email type categories were provided, according to the types that emerged from the exploratory study and the pilot study (e.g., junk, personal/social, job/project related). In addition, each email was rated in terms of how long, difficult, clear or important to the participant it was (on a 6-point rating scale). These categories are explained as being involved in decision making by the Action Regulation Theorists, when people choose their action programs (Frese & Zapf's parameters, 1994). They also reflect the categories used in Whittaker & Sidner's (1997) email study.

Strategies

Having recorded the characteristics of the email, participants were then asked to record the strategy chosen to deal with the email. The distraction strategies measured were based on those identified in the exploratory study. Participants in Study One consistently demonstrated that in different situations their response to email differed in terms of the:

- Time taken to attend to an alert (Time 1 in Figure Five)
- Time delay before processing the email (Time 2 in Figure Five)
- Time spent in the email system (Time 3 in Figure Five)

Measures on these three variables represent the distraction strategies reported in Study One, and refer to the interruption lag (Time 1), the negotiation lag (Time 2) and the period between the end of the negotiation lag and beginning of the resumption lag (Time 3) in Figure Five. Participants were asked to estimate how quickly they checked an email after the alert, how long it then took for them to respond to the email, and how long they
spent in the email system, to the nearest second. Study Three has validated the use of these subjective timing estimates as accurate measures to use in this study.

**Wellbeing**

Participants were then asked to rate their affective wellbeing on two occasions. Firstly they were asked to retrospectively consider how they had felt right before receiving an email interruption. Secondly they were asked to rate how they felt at the very point of completing the diary record (i.e., immediately after having dealt with the email). To ensure the diary survey was as brief as possible (to limit intrusion to participants' daily work) the ten-item version of Daniels' (2000) five-factor questionnaire was used (kindly supplied with permission from the author). Study Two has demonstrated that this measure is an effective means for measuring affective wellbeing in occupational domains. Short versions of Daniels’ questionnaire have been used in diary studies of goals and affective wellbeing successfully (Harris et al., 2003). Participants were asked to rate on a six-point scale the extent to which 'you felt this way right before being interrupted by the email alert', and 'you feel this way right now, that is, at the present moment' (Watson et al., 1988).

**Personality**

Personality characteristics from the Five Factor Model (FFM) were measured using the Hogan Personality Inventory, or HPI (Hogan, 1992). This is a 206-item questionnaire that uses a forced choice true-false response format. Unlike other five factor measures, such as the NEO, the HPI has been designed for and validated within occupational environments and is fully standardised for a UK population. An independent review of personality questionnaires by the British Psychological Society gave the HPI the highest rating of all of the five factor measures available (BPS Review of Personality Instruments, 2001). The HPI shows strong convergent validity with other measures of the five-factor model, including Goldberg's five factor markers (Goldberg, 1992), the IP/5F, PCI, and NEO-PI-R. (Salgado, 2003). It also shows strong predictive validity performance in occupational settings (Drakeley & Kellett, 1995; Greig, 1998; Hogan & Hogan, 1997). The 7 HPI primary scales are for Adjustment (FFM Emotional Stability), Ambition and
Sociability (FFM Extraversion), Agreeability (FFM Agreeableness), Prudence (FFM Conscientiousness), and, Intellectance and Scholarship (FFM Openness).

The HPI was administered via an on-line testing site, 'Psykey'. Participants were given an instruction sheet containing codes enabling them to access the on-line testing site and complete the measure. On completion of the questionnaire, a data stream of the individuals' results was directly emailed to the researcher to score using specialist software.

Procedure
Once employees had expressed their interest in participating, they were sent a 'thank-you email' (see Appendix Five) as an acknowledgement. Then, all participants were sent a study pack (paper copy – see Appendix Six), which comprised:

- an Instructions letter
- An 'Instructions and Information' document
- A 'Personal Information' form
- Twenty-five 'Individual Email Survey' forms
- A Current Wellbeing form
- Instructions for completing the HPI and MVPI on-line
- A postage-paid envelope (for returning all Information to me), with a reminder contents sheet folded inside.

Within the Instructions letter, participants were asked to select a day, from three options provided (different options provided for different samples), when they would like to participate in the study. The reasons for asking people to select a day in advance were twofold. Firstly, by committing to a day, and by entering this into their diaries, it was hoped that a strong response rate could be achieved. Secondly, by logging when each participant was to complete the study, they could also be included in the timing validity study (see Study Three).

On the day chosen, participants were asked to monitor their response to email interruptions over the course of a working day. At the beginning of the day participants read a full instruction sheet (part of the Instructions and

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16 In the end this information was not required. It may have been necessary had the 'Change' measures been used – see Results section.
Information document) outlining what was involved in the study and what they were being asked to do. Participants were clearly informed at this point that they had the right to withdraw at any point. For those happy to continue, the Current Wellbeing form was completed – this oriented them towards the information they needed to record when measuring wellbeing in the study proper, thus enabling participants to tune into how they felt on the different dimensions. They were then asked to fill in some demographic and technical details in the Personal Information form.

After this initial form-filling participants were asked to log on to their email system and download any email that may have been sent before the start of their working day. Once they had done this they were then asked to begin work as normal, staying on-line throughout the whole day. During the course of their normal work, participants were characteristically interrupted by email alerts as they received their normal incoming email traffic. They were asked to respond to these as they usually would. The only difference being that each time they actually finished processing an email that had interrupted them they were requested to then immediately complete an Individual Email Survey - the diary record form - before returning to their main task.

At the end of the working day, participants were asked to collect together all of the surveys and return them in an postage paid envelope to the researcher, along with the Current Wellbeing and Personal Information form. A written reminder of what to send back was folded into the envelope.

Participants were also asked to complete the Hogan Personality Inventory on-line at a time convenient to them, within the next five days.

At the end of the allocated study day, each participant was sent a thank-you email (Appendix Seven), which informed them what would happen next, and also contained some debrief questions and good practice questions. Responses to these questions were content analysed in Study Five to establish the potential generalisability of the study to the real world.

A full debrief was sent in a letter (Appendix Eight). As a 'thank-you' for completing the study, participants were invited to telephone for feedback on
their personality profile, if they so wished. All participants were also entered into a prize draw to win £50.

**Results**

To examine the relationship between wellbeing, personality and strategic responses to email interruptions, multilevel random coefficient modelling (MRCM) analysis was employed. There were two levels to the data. At level-one individual email data was used (pertaining to each email interruption responded to across the duration of the study). At level-two, the individual participants were the unit of analysis. For an explanation of the principles of multilevel modelling see Chapter Five.

**Variables**

Tables Five and Six describe the variables\(^{17}\) that were used as explanatory variables or outcome variables in the multilevel analysis.

All measures were converted to z-scales in order to centre them. All centring is grand mean centred (Tschan et al., 2005). Group mean centring would remove differences in individuals, and thus would mean that between-person variability would be less likely to be accounted for in multilevel random coefficient modelling (MRCM)\(^{18}\). However, grand mean centring ignores the fact that data is non-independent (see Kreft & de Leeuw, 1998, for a discussion). As the ‘Time 1-3’ variables were skewed and leptokurtic, they were transformed using logarithm transformation to improve the distribution (improving symmetry and flattening the curve).

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\(^{17}\) N.b., LOG3: There may be concerns that if LOG3 predicts wellbeing change after an email, this will only be because over time people do have changes in mood – regardless of what they are doing. However, so long as LOG3 predicts wellbeing change in a particular direction (i.e., the fixed effect coefficient is significant – not just the random error term), then this will mean that although wellbeing has changed over time it has done so in the same direction for everyone. This means that there must be something happening during that time that causes this affect. In this study we know that people were dealing with email between before and after ratings and so we can specifically pinpoint what might be responsible for the change. If time per se is responsible for wellbeing change then one would expect as many people to increase wellbeing as decrease wellbeing, which would cause a centring effect. In this situation the random error term might be significant, but the fixed coefficient would not be. In the models that follow this hasn’t happened. Thus, we can be confident that it is time spent dealing with email, not time alone that is causing wellbeing change.

\(^{18}\) See for example Harries et al.’s (2003) and Elfering, Grebner, Semmer, Kaiser-Freiburghaus, Lauper-Del Ponte & Witschi’s (2005) studies which failed to find between-group variation.
Table Five: Level-one variables and descriptive statistics (not centred or transformed)

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Definition</th>
<th>Rating scale</th>
<th>Mean</th>
<th>Median</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positivity</td>
<td>How positive was the email construed to be</td>
<td>1 = negative; 2 = neutral; 3 = positive</td>
<td>2.31</td>
<td>2</td>
<td>0.68</td>
</tr>
<tr>
<td>Length</td>
<td>How long was the email construed to be</td>
<td>1-6 scale (where 6 = most lengthy)</td>
<td>1.99</td>
<td>1</td>
<td>1.44</td>
</tr>
<tr>
<td>Difficulty</td>
<td>How difficult was the email construed to be</td>
<td>1-6 scale (where 6 = most difficult)</td>
<td>1.73</td>
<td>1</td>
<td>1.27</td>
</tr>
<tr>
<td>Clear</td>
<td>How clear was the email construed to be</td>
<td>1-6 scale (where 6 = most clear)</td>
<td>4.51</td>
<td>5</td>
<td>1.74</td>
</tr>
<tr>
<td>Important</td>
<td>How important was the email construed to be</td>
<td>1-6 scale (where 6 = most important)</td>
<td>3.49</td>
<td>3</td>
<td>1.66</td>
</tr>
<tr>
<td>Time1 (LOG1)</td>
<td>The participants' estimates about how long it took them to check the email</td>
<td>Time measured in seconds, then transformed by logarithmic transformation</td>
<td>910</td>
<td>60</td>
<td>10207</td>
</tr>
<tr>
<td>Time2 (LOG2)</td>
<td>The participants' estimates about how long it took them to respond to the</td>
<td>Time measured in seconds, then transformed by logarithmic transformation</td>
<td>628</td>
<td>0</td>
<td>6336</td>
</tr>
<tr>
<td>Time3 (LOG3)</td>
<td>The participants' estimates (in seconds) about how long they then spent</td>
<td>Time measured in seconds, then transformed by logarithmic transformation</td>
<td>526</td>
<td>60</td>
<td>3777</td>
</tr>
<tr>
<td>BefPA</td>
<td>Positive Affectivity before receiving the email interruption. Participants</td>
<td>6-point response scale (1 = not at all; 6 = very much). Ratings for Active</td>
<td>4.08</td>
<td>4.25</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>were asked how well each PA wellbeing adjective described them.</td>
<td>and Motivated were added to reversed ratings for Tired and Bored and then</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>divided by 4 to give an average PA score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BefNA</td>
<td>Negative Affectivity before receiving the email interruption. Participants</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Anxious</td>
<td>2.28</td>
<td>2.00</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>were asked how well each NA wellbeing adjective described them.</td>
<td>and Annoyed were added to reversed ratings for At ease and Calm and then</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>divided by 4 to give an average NA score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BefDP</td>
<td>Depression-Pleasure before receiving the email interruption. Participants</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Happy</td>
<td>4.94</td>
<td>5.00</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>were asked how well each D-P wellbeing adjective described them.</td>
<td>were added to reversed ratings for Gloomy and then divided by 2 to give an</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>average DP score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AftPA</td>
<td>Positive Affectivity after leaving the email system. Participants were</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Active</td>
<td>4.08</td>
<td>4.25</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>asked how well each PA wellbeing adjective described them.</td>
<td>and Motivated were added to reversed ratings for Tired and Bored and then</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>divided by 4 to give an average PA score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AftNA</td>
<td>Negative Affectivity after leaving the email system. Participants were</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Anxious</td>
<td>2.37</td>
<td>2.25</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>asked how well each NA wellbeing adjective described them.</td>
<td>and Annoyed were added to reversed ratings for At ease and Calm and then</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>divided by 4 to give an average NA score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AftDP</td>
<td>Depression-Pleasure after leaving the email system. Participants were</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Happy</td>
<td>4.93</td>
<td>5.00</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>asked how well each D-P wellbeing adjective described them.</td>
<td>were added to reversed ratings for Gloomy and then divided by 2 to give an</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>average DP score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ChangePA</td>
<td>Change in Positive Affectivity from before to after dealing with the email</td>
<td>BefPA scores are subtracted from AftPA scores</td>
<td>0.00</td>
<td>0</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>interruption.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ChangeNA</td>
<td>Change in Negative Affectivity from before to after dealing with the email</td>
<td>BefNA scores are subtracted from AftNA scores</td>
<td>0.10</td>
<td>0</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>interruption.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ChangeDP</td>
<td>Change in Depression-Pleasure from before to after dealing with the email</td>
<td>BefDP scores are subtracted from AftDP scores</td>
<td>-0.01</td>
<td>0</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>interruption.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table Six: Level-two variables and descriptive statistics (uncentred)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Rating Scale</th>
<th>Mean</th>
<th>St. Dev</th>
<th>UK Mean</th>
<th>UK St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADJ</td>
<td>HPI Adjustment: A measure of emotional stability. High scorers are steady, calm and self-accepting; low scorers are self-critical and tense.</td>
<td>Possible raw scores are from 1-37.</td>
<td>22.22</td>
<td>7.476</td>
<td>24.50</td>
<td>6.94</td>
</tr>
<tr>
<td>AMB</td>
<td>HPI Ambition: A measure of extraversion. High scorers are socially self confident, driven and energetic; low scorers are reticent and unlikely to push themselves forward in their work.</td>
<td>Possible raw scores are from 1-29.</td>
<td>20.00</td>
<td>5.362</td>
<td>22.59</td>
<td>5.68</td>
</tr>
<tr>
<td>SOC</td>
<td>HPI Sociability: A measure of extraversion. High scorers need and enjoy interacting with others; low scorers dislike being the centre of attention and busy social events.</td>
<td>Possible raw scores are from 1-24.</td>
<td>13.33</td>
<td>5.014</td>
<td>14.97</td>
<td>4.70</td>
</tr>
<tr>
<td>AGR</td>
<td>HPI Agreeability: A measure of agreeableness. High scorers are perceptive, tactful and socially sensitive; low scorers are unconcerned about people's opinions and can be brusque and forthright.</td>
<td>Possible raw scores are from 1-22.</td>
<td>18.10</td>
<td>3.043</td>
<td>18.50</td>
<td>2.80</td>
</tr>
<tr>
<td>PRU</td>
<td>HPI Prudence: A measure of conscientiousness or self-control. High scorers are conscientious, conforming and dependable; low scorers are flexible, careless and disorganised.</td>
<td>Possible raw scores are from 1-31.</td>
<td>16.98</td>
<td>4.914</td>
<td>17.96</td>
<td>4.47</td>
</tr>
<tr>
<td>INT</td>
<td>HPI Intellectance: A measure of openness. High scorers appear bright, curious and open to experience; low scorers are cautious and like familiar or routine work.</td>
<td>Possible raw scores are from 1-25.</td>
<td>12.37</td>
<td>5.032</td>
<td>14.53</td>
<td>4.70</td>
</tr>
<tr>
<td>SCH</td>
<td>HPI Scholarship: A measure of openness. High scorers enjoy academic activity and continuous educational opportunities; low scorers dislike formal learning.</td>
<td>Possible raw scores are from 1-14.</td>
<td>9.24</td>
<td>2.260</td>
<td>8.79</td>
<td>3.09</td>
</tr>
</tbody>
</table>
Note from Table Five that the 'Change' ratings reveal very little change in wellbeing ratings from before the email to after the email. The mean of zero might reflect the possibility that everybody experiences some change but the negative changes are counterbalanced by positive changes, causing an averaging around zero. Changes in wellbeing from 'before' to 'after' receiving the email were not used as an outcome measure here. As wellbeing 'change' statistics (see above) had means close to zero and very low variation, it would be difficult to run a model, as with little variance to account for most predictors would be nullified.

Email category types were also entered as possible control measures at level-one. Category types were collected as nominal data and then given binary ratings by category, where '1' indicates membership of the category type, and '0' indicates exclusion from the category type. Eight category types of email were recorded, as follows:

- **Type A** - Job/Project related email  
  (274/581 recorded)
- **Type B** - Meeting/Diary/Calendar entry  
  (55/581 recorded)
- **Type C** - Acknowledgement or receipt of email  
  (45/581 recorded)
- **Type D** - Personal/Social email  
  (105/581 recorded)
- **Type E** - Junk/Spam email  
  (17/581 recorded)
- **Type F** - Misdirected email  
  (4/581 recorded)
- **Type G** - Company administration/information  
  (47/581 recorded)
- **Type H** - Other  
  (34/581 recorded).

The MRCM approach used to formulate the following models is outlined in Chapter Five.

Models are run by adding all possible explanatory variables against each DV or outcome variable. Therefore, in each model several hypotheses may be addressed. Although it may be preferable to deal with each hypothesis in turn, when reporting study results, it is unavoidable that in multilevel modelling a model-by-model reporting style must be adopted. To add clarity, Table Seven shows how each hypothesis relates to each model. In addition, reference to each hypothesis that has been supported will immediately follow each model.
A comprehensive review of whether the hypotheses were supported or refuted will then be provided at the end of the Results section.

**Table Seven:** Relating the Study Four hypotheses to the MRCM models

<table>
<thead>
<tr>
<th>Model</th>
<th>Hypotheses tested</th>
<th>Theory supported if hypothesis is supported:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>* 2 * 3 * 5 * 6 * 8</td>
<td>* Hockey/ Amalgamation approach * The role of personality * The role of personality * The role of personality</td>
</tr>
<tr>
<td>5</td>
<td>* 2 * 3 * 5 * 6 * 8</td>
<td>* Hockey/ Amalgamation approach * The role of personality * The role of personality * The role of personality * The role of personality</td>
</tr>
<tr>
<td>6</td>
<td>* 2 * 3 * 5 * 6 * 8</td>
<td>* Hockey/ Amalgamation approach * The role of personality * The role of personality * The role of personality * The role of personality</td>
</tr>
<tr>
<td>7</td>
<td>* 1 * 4 * 7 * 8</td>
<td>* Hockey/Schönpfug * The role of personality * The role of personality * The role of personality * The role of personality</td>
</tr>
<tr>
<td>8</td>
<td>* 1 * 4 * 7 * 8</td>
<td>* Hockey/Schönpfug * The role of personality * The role of personality * The role of personality * The role of personality</td>
</tr>
<tr>
<td>9</td>
<td>* 1 * 4 * 7 * 8</td>
<td>* Hockey/Schönpfug * The role of personality * The role of personality * The role of personality * The role of personality</td>
</tr>
</tbody>
</table>

**Strategy as outcome**

The first set of models establishes the explanatory variables for email strategy as an outcome.

**Time taken to check after alert (Predictors of Time 1 in Figure Five)**

For this outcome it was nonsensical to enter email category type or email characteristics as controls, as before having checked the email people would not be able to rate the email characteristics. Therefore, for LOG1, modelling began at Step 2 (see Chapter Five).
Model Four: Predictors of time taken to check email, on receipt of an alert

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 2 Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>-0.007 (0.087)</td>
<td>0.019 (0.083)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>BePA</td>
<td>0.142 (0.057)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>Uoj</td>
<td>0.323 (0.078)**</td>
<td>0.285 (0.070)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.646 (0.040)**</td>
<td>0.594 (0.037)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>1468.444 (569 cases)</td>
<td>1379.742 (557 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit: Chi Squared 88.702 (1df) p>0.000

The higher one's positive affectivity (active and motivated) the longer it takes to check email. However, if one is bored or tired, email is checked more speedily, on receipt of an alert. The average time taken to check appears to differ significantly between people (Uoj) and within people (Eij). The degree to which PA affects time taken to check does not differ significantly between people, and hence a 'random intercepts only' model was the best fit here. This model supports Hypothesis Two, as wellbeing before the email alert predicts the strategy chosen to deal with an email interruption.

Time taken before dealing with email (Predictors of Time 2 in Figure Five)

Model Five: Predictors of time taken to respond to email after checking

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 1 Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>-0.013 (0.068)</td>
<td>-0.017 (0.074)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Length</td>
<td>0.135 (0.096)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficult</td>
<td>0.172 (0.099)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clear</td>
<td>-0.007 (0.058)</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Length</td>
<td>0.197 (0.081)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VAR Difficult</td>
<td>0.199 (0.084)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VAR Clear</td>
<td>0.067 (0.031)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Length/Intercept</td>
<td>0.040 (0.050)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Difficult/Intercept</td>
<td>0.042 (0.051)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Clear/Intercept</td>
<td>-0.036 (0.030)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Length/Difficult</td>
<td>-0.151 (0.073)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Length/Clear</td>
<td>-0.009 (0.038)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Difficult/Clear</td>
<td>0.003 (0.039)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.148 (0.047)**</td>
<td>0.189 (0.055)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.838 (0.052)**</td>
<td>0.527 (0.037)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>1561.154 (567 cases)</td>
<td>1360.729 (545 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit: Chi Squared 200.425 (12df) p>0.000

= p>0.05; ** = p>0.01
In this final model the fixed coefficients for Length, Difficult and Important (which had been individually significant after the null model) became non-significant when entered en masse. However, the variance around the slope of Length and Difficult became significant (Clear retained its significant random error term when entered en masse). The significant covariation of Length and Difficult indicates that these explanatory variables were probably accounting for similar variance in their individual models, and why they therefore cancelled each other out by mediating each others' effect when entered together. The Step 1 final model for LOG2 suggests that after checking an email, the Length, Difficulty and Clarity of the email will affect the time taken to respond to the email, but the strength of this relationship differs between people. The significant variation in the slopes means that while some people will take much longer to respond if an email is seen as long, difficult or unclear on checking, for other people these factors have less of a bearing on their response speed. The average time taken to respond after checking an email appears to differ significantly between people (Uoj) and within people (Eij). It is noteworthy that this final model accounts for a greater proportion of the variance between people (making up 26% of total variance) compared to the null model (where between-person variance makes up 15% of the total variance).

This model supports the presence of a negotiation lag (the characteristics of an interruption affects the time taken to respond). It is suggested that those who delay responding to an email, after checking, may do so, (i) for reasons of avoidance (the email has negative valence because it is long, difficult and unclear), or (ii) in order to go back and finish their task off first, in the knowledge that a long, difficult or unclear email may need more attention, making resumption of an interrupted task more difficult if it isn't marked or completed (see Trafton et al., 2003).

None of the hypotheses formed in the Introduction were supported by this model, however.
Time spent in email system (Predictors of Time 3 in Figure Five)

**Model Six:** Predictors of time spent dealing with email

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 4 Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed effects</td>
<td>Intercept</td>
<td>-0.002 (0.086)</td>
<td>-0.151 (0.085)</td>
</tr>
<tr>
<td></td>
<td>Type A</td>
<td>0.311 (0.076)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Length</td>
<td>Not entered</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficult</td>
<td>0.302 (0.039)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BefPA</td>
<td>0.130 (0.058)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BefNA</td>
<td>0.110 (0.051)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCH</td>
<td>0.025 (0.083)</td>
<td></td>
</tr>
<tr>
<td>Interaction effects</td>
<td>BefPA*SCH</td>
<td>0.156 (0.068)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BefNA*SCH</td>
<td>0.124 (0.068)</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>Uoij</td>
<td>0.309 (0.076)**</td>
<td>0.202 (0.056)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.649 (0.041)**</td>
<td>0.546 (0.037)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>1421.118 (554 cases)</td>
<td>1124.243 (473 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit: Chi Squared 296.875 (7df) p>0.000

Improvement in model from Step 2 to Step 4: Chi Squared 95.356 (2df) p>0.000

* = p>0.05; ** = p>0.01

Type A, B, C and E email were significant predictors of LOG3, but on entering the email control characteristic variables (Length, Difficult and Important), Type B, C and Important lost significance. By Step Four, Length had also lost significance.

Model Six reveals that before receiving an email, the higher one’s positive affectivity (active and motivated) was rated to be, the longer one spent dealing with email – or the lower one’s positive affectivity (bored and tired) was rated to be, the less time was spent dealing with email. Additionally, before receiving an email, the higher one’s negative affectivity (annoyed or anxious) was rated to be, the longer one spent dealing with email – or the lower one’s negative affectivity (calm or at ease) was rated to be, the less time was spent dealing with email.

Active, motivated, annoyed and anxious feelings describe people in a high state of arousal, whereas bored, tired, calm and at ease feelings describe people in a lower state of arousal. The positive relationship of both PA and NA with LOG3 therefore suggest that people in a high state of arousal spend more time dealing with email. The fact that both PA and NA account for variance in LOG3 in the same direction also provides support for those who view Positive and Negative affectivity not as bipolar opposites of the same
scale, but as two separate dimensions for explaining wellbeing (Tellegen et al., 1999).

These findings – that wellbeing influences strategy taken in Time 3 – demonstrate support for Hypothesis Two.

Although no personality variables were significant predictors at Step 3, when entered individually, after the control and level-one predictors, the interaction term BefPA*SCH showed a significant fixed coefficient (but only when BefNA*SCH was also present, despite its non-significance). Step 4 thus indicates that whilst people who feel active and motivated beforehand are likely to spend more time dealing with email, this is especially so if they are also ‘foresighted, thorough and painstaking’ in nature (terms used to describe people with HPI Scholarship, Hogan & Hogan, 1997, p.58). This provides support for Hypothesis Eight and demonstrates that personality may be a moderator of the relationship between wellbeing and strategy choice.

The final model for LOG3 has a significantly improved 2* loglikelihood function and indicates that time spent dealing with email can be predicted by the characteristics of the email (what type it is and how difficult it is), and how anxious, annoyed, active and motivated a person feels before receiving the email (especially predictive for ‘scholarly’ personalities).

Wellbeing as outcome
The next set of models explores predictors of wellbeing experienced immediately after dealing with an email (relating to Box D in Figure Five). As the greatest predictor of wellbeing after an email is likely to be wellbeing before an email, the ‘before’ rating for each wellbeing variable was entered as the first explanatory variable each time. All variance left unexplained following entry of ‘before’ ratings can then be explained as being due to what happens between the before and the after ratings - i.e., dealing with email. Using the before rating as a lagged control on ‘after’ ratings, prevents the data from having a confounding effect for serial dependence (Lazarus, 2000; Miner et al., 2005). Subsequent explanatory variables were entered after the ‘before’ ratings in each model.
CHAPTER SIX

Positive affectivity afterwards

Model Seven: Predictors of positive affectivity after dealing with email

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 4 Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed effects</td>
<td>Intercept</td>
<td>0.043 (0.126) Fixed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BfpA</td>
<td>0.854 (0.031)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOG3</td>
<td>0.032 (0.017)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AMB</td>
<td>0.052 (0.020)**</td>
<td></td>
</tr>
<tr>
<td>Interaction effects</td>
<td>LOG3*BefPA</td>
<td>-0.076 (0.020)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AMB*LOG3</td>
<td>0.057 (0.017)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR BefPA</td>
<td>See Uoj</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV BefPA/Intercept</td>
<td>Not entered</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.806 (0.163)**</td>
<td>0.023 (0.008)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.236 (0.015)**</td>
<td>0.116 (0.008)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>993.497 (580 cases)</td>
<td>378.425 (490 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit: Chi Squared 615.072 (4df) p>0.000
Improvement in model from Step 3 to Step 4: Chi Squared 20.345 (-1df) p>0.000
* = p>0.05; ** = p>0.01

After controlling for the effects of BefPA, the Step 1 model reveals that if an email is appraised as positive and important to an individual, then positive affectivity (active and motivated) will be higher after having dealt with it. Or, if an email is appraised as negative or unimportant it may be linked to feelings of boredom or tiredness after it has been dealt with.

In Step 2 the model shows that the more time one spends dealing with email, the higher one’s positive affectivity (active and motivated) is afterwards. In the final Step 2 model (adding in email characteristics and email strategy) ‘Important’ was removed as it ceased to be significant with the introduction of LOG3 (suggesting LOG3 took up the variance previously accounted for by Important). By the end of Step 2 it seemed that the time spent dealing with email was positively related to affective wellbeing. This suggests that spending more time in email is associated with high levels of activity and motivation immediately afterwards.

Thus Hypothesis One is supported as the strategy chosen to deal with email affects wellbeing afterwards. In particular, adopting a strategy for spending longer dealing with email at Time 3 is predictive of positive affectivity. This also supports the notion that email interruptions can be positive.
However, LOG3 as a predictor does not conclusively tell us whether email activity makes someone feel better or worse than they did before the email interruption. In order to understand whether a bored/tired person who spends a long time in email then feels less bored or tired afterwards, one needs to enter an interaction effect to the model. This would help to establish whether email itself is actively making a difference to one’s wellbeing.

Thus, in the next step (Step 2 with interactions), entering the interaction term rendered the slope for Positivity, as an email characteristic, non-significant, and so it was removed. The interaction effect was significant however, indicating that if one feels bored or tired (negative BefPA) before receiving an email interruption, and then spends a long time dealing with the email (positive LOG3), one will experience higher motivation and activity (positive AftPA) afterwards. Again, this supports Hypothesis One, but this finding also specifically supports the amalgamated approach (see Chapter Four) – that taking time to deal with email when in need of a break or underloaded (bored or tired) can boost wellbeing. It also indicates, in Figure Five that the Time 3 box acts as a moderator between wellbeing experienced in Box C and wellbeing experienced in Box D.

In Step 3, personality was found to be a significant predictor of how one feels immediately after dealing with an email. Energetic, self-assured and keen to advance people (terms used to describe people with HPI Ambition, Hogan & Hogan, 1997, p.58) are likely to feel more active and motivated. This could be because they have just finished dealing with something (i.e., potentially achieved a goal). Adding the level-two predictor resulted in LOG3 losing significance. However, it was retained at Step 3 because of the significant interaction term. The intercept also demonstrated zero variation with no standard error term when the level-two predictor was added, and so the intercept was fixed for a more parsimonious model. As there is no variation around the intercept, this model strongly suggests that the explanatory variables are explaining most of the variation in AftPA (see Snijders & Bosker, 2002, p.40). As Ambition is a measure of extraversion, Hypothesis Four is lent support by this finding, indicating that people with higher scores on extraversion scales experience increased wellbeing after dealing with an email interruption.
In the Step 4 model, the intercept remained fixed. After entering AMB (which has a significant effect) the interaction between AMB and LOG3 was also found to have a significant fixed coefficient. So, 'energetic, competitive, ...and eager to advance' (terms used to describe people with HPI Ambition, Hogan & Hogan, 1997, p.58) people who spend a long time dealing with email will feel even more active and motivated afterwards. This finding demonstrates support for Hypothesis Eight – as personality has clearly moderated the relationship between strategy choice and wellbeing, and again indicates that Figure Five needs amending to include this moderating effect.

In the null model, 77% of the total variance was explained by between-person variance. However, in the final model, just 2% of the total variance is explained by between-person variance. BefPA accounts for a great deal of the variance in AftPA, and appears to be responsible for the non-significance of variance around the intercept (Uoj), suggesting that the greatest difference between people in accounting for AftPA is their positive affectivity before the email. The covariance between BefPA and the AftPA intercept demonstrates that as BefPA increases, so too does the mean for AftPA. It might be suggested that with no significant Uoj term it would be more parsimonious to remove it. However, in subsequent models the intercept was kept random in order that specific distribution of between-person variance could be assessed. In the final Step 4 model for example, one can see that most of the between-person variance is explained by the variation in the slope of BefPA. However, not all of the variance is explained by this factor. It was decided then that the Uoj term be preserved in all subsequent wellbeing models, unless it became zero with no standard error (to two decimal places).

**Negative affectivity afterwards**

The next set of modelling involved looking at Negative Affectivity after an email. Again, 'before' ratings for NA were entered first before adding in other explanatory variables. BefNA was entered in the following model without a random error term as this was not significant, after the null model. As the variance around the intercept was still significant, this suggests that BefNA does not differ significantly between people, and that there is still a significant proportion of variance around the mean of AftNA to be accounted for by between-person variables.
**Model Eight**: Predictors of negative affectivity after dealing with email

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 4 Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>-0.051 (0.113)</td>
<td>-0.001 (0.029)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>BefNA</td>
<td>0.788 (0.022)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positivity</td>
<td>-0.133 (0.029)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficult</td>
<td>0.104 (0.046)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOG2</td>
<td>0.050 (0.021)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADJ</td>
<td>-0.054 (0.022)**</td>
<td></td>
</tr>
<tr>
<td>Interaction</td>
<td>Difficult*BefNA</td>
<td>-0.151 (0.031)**</td>
<td></td>
</tr>
<tr>
<td>effects</td>
<td>BefNA*ADJ</td>
<td>-0.055 (0.018)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Positivity</td>
<td>0.016 (0.007)*</td>
<td>0.052 (0.018)**</td>
</tr>
<tr>
<td></td>
<td>VAR Difficult</td>
<td>0.052 (0.018)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Positivity/Intercept</td>
<td>-0.012 (0.006)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Difficult/Intercept</td>
<td>0.028 (0.010)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Positivity/Difficult</td>
<td>-0.014 (0.009)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>U0j</td>
<td>0.612 (0.130)**</td>
<td>0.014 (0.007)*</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.428 (0.026)**</td>
<td>0.168 (0.012)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>1290.052 (578 cases)</td>
<td>582.207 (483 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit: Chi Squared 707.845 (12df) p>0.000
Improvement in model from Step 3 to Step 4: Chi Squared 6.633 (1df) p>0.036
* = p>0.05; ** = p>0.01

The Step 1 model revealed that after accounting for negative affectivity before the email (BefNA), if an email is appraised as negative and difficult, then negative affectivity (anxiety and annoyance) will be higher after having dealt with it. Or, if an email is appraised as positive or easy it may be linked to feelings of calm and ease after it has been dealt with. The degree to which the negativity and difficulty of an email affects the relationship with negative affectivity after an email appears to differ significantly between people. The significant covariation of difficulty with the intercept indicates that the more difficult the email was rated to be, the higher the average AftNA figure was. There is also significant covariation between negativity and difficulty ratings, although each variable still accounts for its own variance to a significant level.

Adding the interaction terms for Difficult and Positivity with BefNA rendered only Difficult*BefNA significant in its coefficient and random error term. Positivity*BefNA was not entered and the final Step 1 model with interaction terms was fitted. All other Step 1 variables retained their significance. This interaction term demonstrated that if someone is anxious and annoyed before receiving an email and the email is appraised as difficult, then they will be

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even more annoyed and anxious afterwards. The degree of negative affectivity felt afterwards in such instances differed significantly from person to person at the end of Step 1 with interactions.

In Step 2, after accounting for negative affectivity before the email, the time taken to respond to an email after checking (LOG2) and time spent dealing with email (LOG3) was positively related to negative affectivity after the email. This suggests that people feel anxious or annoyed if they delay responding to an email they have checked. The degree to which time spent dealing with email is related to negative affectivity after an email differed significantly between people in Step 2, with some people finding that spending time in email substantially increased negative affectivity, with others finding it only moderately increased NA afterwards. In the Step 2 final model (adding variables that retained significance by the end of Step 1 with interactions, along with the Step 2 variables) LOG3 lost significance as a predictor of AftNA. However, LOG2 retained significance, indicating that avoiding dealing with email after checking causes an increase in negative affect. These findings show support for Hypothesis One, as different strategies affected wellbeing (in this case negative affect) after dealing with the email interruption.

As with the PA models, it was decided that adding an Interaction term might inform as to whether strategy for dealing with email can specifically increase or decrease wellbeing. Interaction terms for BefNA with LOG2 did not demonstrate significance. This suggests that people who are anxious or annoyed before the email, who then delay responding, will not necessarily feel even more negative afterwards.

In Step 3, personality variables were entered as predictors. It seems that people who are self critical and tense (terms used to describe people with low HPI Adjustment, Hogan & Hogan, 1997, p.58) are likely to experience higher levels of anxiety and annoyance after dealing with an email, or conversely, people who are calm and self-accepting (terms used to describe people with high HPI Adjustment, Hogan & Hogan, 1997, p.58) will feel calm and at ease after dealing with an email. This supports the notion that people with high scores on neuroticism scales may experience greater change in wellbeing after dealing with an email. As Adjustment was not a significant predictor in
the PA model however, it seems that emotionally unstable people experience greatest change with respect to negative wellbeing, and not to positive wellbeing. These findings show some support for Hypothesis Seven, that personality will affect wellbeing after dealing with an email.

In the final Step 4 model, the interaction term BefNA with ADJ was found to be significant and negative. This indicates that tense, self-critical people (low HPI Adjustment) who feel annoyed and anxious before an email are likely to feel even more annoyed and anxious afterwards. So the process of dealing with an email appears to exacerbate negative affectivity if one also has an emotionally unstable personality.

**Alternative Model Eight: Predictors of negative affect after email**

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 4 Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.051 (0.113)</td>
<td>-0.008 (0.029)</td>
<td></td>
</tr>
<tr>
<td>Fixed effects</td>
<td>BefNA</td>
<td>0.784 (0.023)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positivity</td>
<td>-0.125 (0.031)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difficult</td>
<td>0.117 (0.045)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LOG2</td>
<td>0.042 (0.022)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADJ</td>
<td>Not entered</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AMB</td>
<td>-0.22 (0.22)</td>
<td></td>
</tr>
<tr>
<td>Interaction effects</td>
<td>Difficult*BefNA</td>
<td>-0.140 (0.031)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AMB*LOG2</td>
<td>0.043 (0.019)*</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Positivity</td>
<td>0.020 (0.008)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VAR Difficult</td>
<td>0.049 (0.017)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Positivity/Intercept</td>
<td>-0.006 (0.006)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Difficult/Intercept</td>
<td>0.026 (0.009)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Positivity/Difficult</td>
<td>-0.014 (0.009)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uij</td>
<td>0.612 (0.130)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.428 (0.026)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>1290.052 (578 cases)</td>
<td></td>
</tr>
</tbody>
</table>

Improvement in model fit: Chi Squared 704.457 (12df) p>0.000
Improvement in model from Step 3 to Step 4: Chi Squared 3.245 (1df) p>0.072
* = p>0.05; ** = p>0.01

This alternative model to Model Eight is included (despite its weaker fit of the data) because it is interesting. The interaction term of AMB with LOG2 could not be included in the first Model Eight as the model would not converge. However, when ADJ and its interaction term is removed, and a separate
model for AMB and its interaction term is fitted, convergence occurred. The alternative Model Eight demonstrates that energetic, self-assured and competitive people (terms used to describe people with HPI Ambition, Hogan & Hogan, 1997, p.58) who delay responding to an email will feel even more negative afterwards. It suggests that people who are goal focused dislike putting off dealing with an email – it makes them feel annoyed and anxious afterwards. Choosing such a strategy presumably has other benefits. Perhaps it makes people more productive or efficient, even if it causes negative wellbeing. This finding supports Hypothesis Eight as it reveals that personality moderates the relationship between strategy choice and wellbeing.

So, although the original Model Eight is the best fit of data, the alternative Model Eight should not be omitted, or this interesting outcome would be overlooked.

**Depression-pleasure afterwards**

The next model looks at depression-pleasure as an outcome. Again BefDP was entered after the initial null model, but as its random error term was not significant only its fixed effect coefficient was entered in subsequent models.
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Model Nine: Predictors of depression-pleasure after email

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Step 4 Final Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.050 (0.120)</td>
<td>0.023 (0.039)</td>
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</table>

Fixed effects

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>BefDP</td>
<td>0.667 (0.030)**</td>
<td></td>
</tr>
<tr>
<td>Positivity</td>
<td>0.120 (0.036)**</td>
<td></td>
</tr>
<tr>
<td>Difficult</td>
<td>-0.133 (0.027)**</td>
<td></td>
</tr>
<tr>
<td>AMB</td>
<td>0.145 (0.032)**</td>
<td></td>
</tr>
<tr>
<td>INT</td>
<td>-0.121 (0.035)**</td>
<td></td>
</tr>
<tr>
<td>SCH</td>
<td>0.002 (0.037)</td>
<td></td>
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</tbody>
</table>

Interaction effects

<table>
<thead>
<tr>
<th>Interaction</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positivity*BefDP</td>
<td>Not entered</td>
<td></td>
</tr>
<tr>
<td>Difficult*BefDP</td>
<td>-0.029 (0.039)</td>
<td></td>
</tr>
<tr>
<td>BefDP*AMB</td>
<td>-0.068 (0.026)**</td>
<td></td>
</tr>
<tr>
<td>BefDP*INT</td>
<td>0.145 (0.033)**</td>
<td></td>
</tr>
<tr>
<td>BefDP*SCH</td>
<td>0.079 (0.035)*</td>
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</tr>
</tbody>
</table>

Random effects

<table>
<thead>
<tr>
<th>Random</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positivity</td>
<td>0.035 (0.012)**</td>
<td></td>
</tr>
<tr>
<td>Difficult*BefDP</td>
<td>0.031 (0.012)**</td>
<td></td>
</tr>
<tr>
<td>Positivity/Intercept</td>
<td>-0.027 (0.010)**</td>
<td></td>
</tr>
<tr>
<td>Difficult*BefDP/Intercept</td>
<td>0.003 (0.010)</td>
<td></td>
</tr>
<tr>
<td>Positivity/Difficult*BefDP</td>
<td>0.021 (0.010)*</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Covariates</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uoj</td>
<td>0.715 (0.147)**</td>
<td></td>
</tr>
<tr>
<td>Eij</td>
<td>0.321 (0.020)**</td>
<td></td>
</tr>
</tbody>
</table>

2*Log Likelihood

<table>
<thead>
<tr>
<th>Level</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>579 cases</td>
<td>1148.181</td>
<td></td>
</tr>
<tr>
<td>502 cases</td>
<td>652.897</td>
<td></td>
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</tbody>
</table>

Improvement in model fit: Chi Squared 495.284 (15df) p>0.000
Improvement in model from Step 3 to Step 4: Chi Squared 27.372 (4df) p>0.072

* = p>0.05; ** = p>0.01

In Step 1, after accounting for pleasurable feelings before the email, if an email is appraised as positive and easy, then happiness will be higher after having dealt with it. Or, if an email is appraised as negative or difficult it may be linked to feelings of gloominess after it has been dealt with. In addition, it seems that the degree to which the positivity of the email is related to depression-pleasure differs significantly between people.

In Step 1 with interactions, interaction terms between the email characteristics and BefDP were added and found to be significant. Thus if one is happy before receiving an email, and they then receive a positive email, they will feel even happier after having dealt with it. This shows how email interruptions may increase already positive wellbeing, if the email itself is also positive. The model also shows that if one is feeling happy before receiving an
email and they then receive a difficult email the degree to which their happiness improves afterwards will differ from person to person.

In Step 2, as with the other models, the timing strategy predictors were then entered, after BefDP, as individual predictors. None of the timing strategies showed a significant effect, either as fixed coefficients or with random error terms. So, one's happiness after an email does not appear to be influenced by the strategy adopted to deal with the email, and Step 2 models for AftDP were not fitted. This finding shows a lack of support for Hypothesis One, indicating that, with reference to happiness ratings, strategy choice does not affect wellbeing.

In Step 3, entered individually after the Step 1 with interactions final model, ADJ was a significant positive predictor of AftDP but it lost significance when entered en masse with Ambition. The Step 3 final model concluded that people who are energetic, self-assured and eager to advance (terms used to describe people with HPI Ambition, Hogan & Hogan, 1997, p.58) are likely to feel happier after dealing with an email. Again, this demonstrates support for Hypothesis Four, as Ambition is a measure of extraversion.

In Step 4 the personality cross-level interaction terms were explored. When added individually after Step 3, SOC*BefDP also demonstrated a significant interaction term (positive) but became non-significant when entered en masse with the other interaction terms. In the final Step 4 model, Positivity*BefDP became non-significant and so was not entered. This rendered the new interaction terms for BefDP with AMB (negative), INT and SCH significant – and also included INT as a new predictor as a single fixed effect. The interaction terms for AMB and INT are interesting as the term is in the opposite direction to the single fixed effect. It is seen that energetic, self-assured, competitive people (terms used to describe people with HPI Ambition, Hogan & Hogan, 1997, p.58) are happier after dealing with an email, whilst imaginative, inventive and quick-witted people (terms used to describe people with HPI Intellectance, Hogan & Hogan, 1997, p.58) are gloomier after dealing with an email. This shows support for Hypothesis Seven.
However, if people with higher scores on the Ambition scale feel gloomy before dealing with an email (BefDP*AMB – negative) they feel much more happy afterwards. This indicates how dealing with email can raise wellbeing levels for people who are goal-focused and energetic. Creative and bright people who are happy before receiving an email (BefDP*INT – positive) become even happier afterwards – despite the fact that normally email appears to make them gloomy. In this case dealing with email may only be advantageous to improving email for high Intellectance people if they are already happy. Finally, the interaction term for BefDP*SCH suggests that foresighted, thorough and painstaking people (terms used to describe people with HPI Scholarship, Hogan & Hogan, 1997, p.58) who felt happy before dealing with an email, will feel even happier afterwards. Both Intellectance and Scholarship relate to the openness to experience dimension in the five factor model, and it is interesting that email is only beneficial to “open” people’s wellbeing, if they are already happy.

**Clarifying support for the hypotheses**

The findings from the MRCM thus relate back to the study hypotheses as follows:

**Wellbeing**

**H1: Different strategies chosen to deal with email interruptions in goal-directed work have a different impact upon one’s affective wellbeing afterwards.**

The strategies measured here related to those mentioned in Study One, and Figure Five. The time taken to check an email after alert (Time 1 – the interruption lag), the time taken to respond to an email after checking (Time 2 – the negotiation lag), and the time spent dealing with an email (Time 3 – the period between the end of the negotiation lag and beginning of resumption lag), were all measured using participant estimates (see Study Four for a discussion).

The MRCM analysis revealed that this hypothesis was partially supported. The strategy chosen to deal with an email does affect wellbeing afterwards, but only for Time 2 and Time 3 strategies. In particular, taking longer to respond (Time 2) can increase negative affectivity, especially if one is ambitious by nature. Spending a long time dealing with email (Time 3) can improve
positive affectivity, especially if one felt bored or tired beforehand, and if one is ambitious by nature.

**H2: Levels of affective wellbeing are predictive of the strategy chosen to deal with an email interruption in goal-directed work.**

The previous hypothesis looked at wellbeing as a consequence of strategy chosen. This hypothesis looks at wellbeing as an antecedent. Again, the hypothesis is partially supported, for Time 1 and 3 strategies but not for Time 2. It appears that when people are bored or tired (low positive affectivity) they will check email more quickly (Time 1). In addition if people have high levels of activation (active, motivated, anxious and annoyed) they will spend longer dealing with email (Time 3). This is especially so for painstaking and thorough people (HPI Scholarship).

**Personality**

**H3: People with higher scores on extraversion scales employ speedy response strategies for dealing with email interruptions in goal-directed work.**

Two scales on the HPI measure ‘extraversion’ – Sociability and Ambition. Neither scale predicted speed of response to an email interruption at Time 1 or 2. Therefore, this study does not support the notion that people with higher scores on extraversion scales will respond more quickly to email interruptions.

**H4: People with higher scores on extraversion scales experience an increase in affective wellbeing after dealing with an email interruption.**

After dealing with an email interruption, people with higher scores on Ambition were rated to feel more positive (active and motivated) and happy than they had beforehand. However, Sociability was not found to be a predictor here. Thus, this hypothesis is supported, but only partially.

**H5: People with higher scores on conscientiousness scales will be slower to check, respond to and deal with an email interruption, when choosing strategies of response in goal-directed work.**

HPI measures conscientiousness on its Prudence scale. However, this was not predictive in any of the models for Time 1, 2 and 3. Consequently this hypothesis is rejected.
H6: Different personality characteristics in the Five Factor Model are differentially predictive of strategic responses to email interruptions. No other personality characteristics had a direct relationship with strategy choice at Time 1, 2 and 3. Therefore, this hypothesis is rejected.

H7: Different personality characteristics in the Five Factor Model are differentially predictive of affective wellbeing levels after dealing with an email interruption. Apart from the Ambition finding (see Hypothesis Four), it was also found that people with low levels of Adjustment experienced greater negative affectivity after dealing with an email, compared to beforehand. Therefore, in the FFM, measures for extraversion (as discussed) and neuroticism (HPI Adjustment: low) were predictive of wellbeing after dealing with an email interruption. This hypothesis is partially supported.

H8: The relationship between strategy choice and wellbeing, in dealing with email interruptions in goal-directed work will be moderated by individual differences in personality, measured according to the Five Factor Model of personality. The moderator effects of personality variables were found in several models. One model demonstrated how personality moderated the impact of wellbeing on strategy choice. People who were foresighted and thorough (HPI Scholarship), who felt active and motivated before an email interruption, would spend longer dealing with the email interruption.

Two models demonstrated how personality moderated the impact of strategy on wellbeing. People with higher scores on the Ambition scale who spent more time dealing with email (interaction of Ambition and Time 3 strategy) had higher positive affectivity afterwards, compared to beforehand. Also, people with higher scores on the Ambition scale who took longer to respond to the email after checking (interaction of Ambition and Time 2 strategy) had higher negative affectivity afterwards.

These results show support for Hypothesis Eight.
Other significant findings:
In addition to the findings discussed with reference to the study hypotheses above, other significant findings are worth reporting here, as follows:

- The strategy chosen to deal with email is influenced by the characteristics of the email itself:
  - Long, difficult and unclear email influence how long it takes people to respond to an email – some people respond more quickly, others more slowly.
  - People spend longer dealing difficult email.
  - People spend more time dealing with email when it is related to their job or projects.

- Characteristics of email affect wellbeing:
  - Negative and difficult email increases anxiety and annoyance – to a different extent for different people, with difficult email making people feel even worse (to different degrees) if they were already feeling anxious and annoyed beforehand.
  - Positive and easy email increases happiness afterwards, with people who were already happy feeling even happier after dealing with positive email. Some people who felt happy anyway find that difficult email increases happiness, others find it causes them to feel more gloomy.

- Personality moderates the effect of wellbeing before the email on wellbeing after the email:
  - Tense and moody people who felt anxious and annoyed before the email feel even worse afterwards.
  - People who have higher scores on openness to experience scales, who feel happy before an email, feel even happier afterwards.
  - People with higher scores on the Ambition scale who feel gloomy before receiving an email feel even happier afterwards.

Discussion
A number of hypotheses were postulated to improve our understanding of goal-directed work behaviour. The role of wellbeing and personality in Action
Regulation Theory (Hacker, 1985, 1994; Frese & Zapf, 1994; Frese et al., 1987; Frese & Sabini, 1985), and Hockey's (1997, 2000, 2002) compensatory control cognitive-energetical framework were used to provide a theoretical framework to the study. Contributions from Schönpflug (1983, 1986, 1992) and Hancock & Warm (1989) were also considered.

Figure Five provides a framework for studying strategic choice at three stages in the interruptions timeline and provides a context for this study. Research questions 1, 2 and 6, outlined in Chapter Four, were specifically addressed here across eight hypotheses relating to wellbeing and personality. These hypotheses are discussed now below, and related back to how findings might support or refute the position taken by Hockey, ART and Schönpflug in their discussion of how people plan and regulate activity at work.

**H1: Different strategies chosen to deal with email interruptions in goal-directed work have a different impact upon one's affective wellbeing afterwards.**

This hypothesis was supported. People who spend a long time dealing with email (Time 3) feel more active and motivated afterwards, and people who take a long time to respond to an email interruption after checking (Time 2) feel more annoyed and anxious afterwards. These findings directly support the work of Hockey and Schönpflug, who argue that strategic action has consequences for wellbeing.

The finding that delaying dealing with email (Time 2) may cause negative wellbeing provides support for the claim that when people protect performance on the current task (e.g., by ignoring the email interruption) this has negative consequences for wellbeing. Hockey (1997) specifically predicts such outcomes in discussing attentional narrowing as a form of performance protection.

The finding that spending time dealing with email can result in people feeling active and motivated afterwards is very interesting. It indicates that dealing with email interruptions may be related to some kind of short-term goal fulfilment for people, and that dealing with email interruptions need not be construed simply as disruptive to goal fulfilment, but as potentially affording goal fulfilment properties of its own (Walji et al., 2004). This supports the
CHAPTER SIX

notion that email interruptions need to be recognised as having their own goals in multi-goal environments. ART says that dealing with something that does not benefit a current action program or activity cycle is inefficient. However, these findings demonstrate that dealing with email interruptions has positive implications, which may therefore be beneficial to wellbeing, and/or the work goal afforded by the interruption. This offers firm support for Hockey (1997, 2000, 2002).

H2: Levels of affective wellbeing are predictive of the strategy chosen to deal with an email interruption in goal-directed work.

This hypothesis was supported. People who were bored or tired were quicker to check email after an alert (Time 1), and people who were experiencing a higher level of arousal (annoyed, anxious, active and motivated) spent longer dealing with email (Time 3). The ‘third way’ presented in Chapter Four is thus supported. It seems that wellbeing does directly influence strategic behaviour in goal directed work, suggesting Hockey and ART’s perspectives could now be amalgamated to account for this.

The first finding supports the position of Hancock & Warm (1989) and Parasuraman & Hancock (2001). They argue that when people are understimulated at work they will adopt strategies to reduce their experience of underload. This links in with Hockey’s model (1997, 2000, 2002). For although he does not specifically discuss underload, Hockey does acknowledge that a desire to improve wellbeing may influence strategic action. This finding indicates that Hockey may benefit from extending his model now to more explicitly deal with underload as a predictor of when extra energy or effort may be employed. The finding also shows some support to ART, as Hacker (1985, 1994) states that people may be distracted by other goals when they need some challenge or variety (as bored or tired people may do). However, ART would benefit from amending its theory, on the basis of these results, to clearly demonstrate that it is not just external task parameters that influence strategic choice (Russell et al., 2005), but that wellbeing – an internal, personal parameter – will also influence the shape of the action program chosen to deal with work tasks.

The second finding is theoretically curious. It seems sensible that annoyed and anxious people may spend longer in email, because by avoiding the task
that caused the anxiety and annoyance, they may attempt to heighten wellbeing. The avoidance strategy (an emotion-focused coping strategy) as a method for decreasing stress and negative wellbeing is discussed by Hockey and Schönpflug in their models. Again, this finding reveals how dealing with email interruptions may be construed as positive. The fact that people who felt bored and tired, then feel less bored and tired (or more active and motivated) after spending a long time dealing with email suggests that the interruption has given them a chance to recharge or engage in an activity that improves wellbeing. This supports Hockey (1997), who indicates that when people begin to experience fatigue they may choose to engage in another activity in order to preserve or boost wellbeing goals\textsuperscript{19}. I.e., in terms of Hockey's model, if people are operating in Loop B, and beginning to experience negative affect, dropping back down to Loop A, to deal with something else for a period, can be beneficial to energy levels.

However, if someone is active and motivated, they also appear to spend longer dealing with email. This is a finding that is difficult to explain, from the perspective of Hockey, Schönpflug or ART. Yet, if one considers that it is high activation or arousal terms that predicted the time spent dealing with email, the picture may become clearer. Rather than focusing on why people with high positive affect wanted to spend longer dealing with email interruptions, one might concentrate on why people who have high levels of activation may want to spend longer dealing with email interruption. From Hockey's perspective, operating at a high level of arousal can be demanding. People can only operate in Loop B for short periods of time, because the energy required in this loop can cause strain after a while. Consequentially, people may choose to drop into the lower loop to reduce demands and energy levels for a period (dealing with an email may afford them the break to do this). From ART's perspective it is still difficult to find an adequate explanation. People operating at a high level of regulation are more likely to be aroused than those operating at a low level. At high levels of regulation people are more aware of environmental cues. However, ART does not consider that people can work on more than one action program when engaging a high

\textsuperscript{19} Miner et al. (2005) champion the use of multilevel modelling to explore affect at work, because this is a technique that can attribute variance to either within or between person effects. By focusing only on between-person effects (as most studies of affect do) over 50\% of variance in mood is not accounted for.
level of regulation, and so one would not imagine that people would be willing to deal with email interruptions in such a state, let alone for a prolonged period of time.

Despite the difficulty in justifying the latter finding, support for the hypothesis that wellbeing predicts strategy choice is an exciting one. Hockey's model can be supported, with amendments, as a result, and ART's theory is shown to be lacking by not including wellbeing as a predictor in action program formation.

**H3: People with higher scores on extraversion scales employ speedy response strategies for dealing with email interruptions in goal-directed work.**

This hypothesis was not supported. Neither Hockey nor ART make any predictions about whether people with higher scores on extraversion scales may respond more quickly to distractions (such as email interruptions).

**H4: People with higher scores on extraversion scales experience an increase in affective wellbeing after dealing with an email interruption.**

This hypothesis is supported, but only partially, as the 'pure' measure of extraversion (Sociability) was not significant. It was found that people with higher scores on the Ambition scale felt more active, motivated and happy after dealing with email interruptions. This lends support to Fisher (1988) who hypothesised that extraverts will feel increased wellbeing and satisfaction after being interrupted. These findings suggest that achievement-focused 'extraverts' benefit most from receiving distractions and variety in their work. It also further suggests that an email interruption may have some intrinsic 'goal satisfaction' component, and it is the fulfilment of this that may enhance wellbeing for people with higher scores on Ambition scales.

Again, neither ART nor Hockey explicitly discuss extraversion and how it relates to wellbeing after engaging in strategic action. However, support for this hypothesis aligns with Hockey's view that individual differences, such as personality, are involved in the strategic action-wellbeing equation. If activity makes someone feel good (as dealing with email interruptions appears to do for people with higher scores on the Ambition scale) this is likely to have a direct bearing on the action programs that people choose when similar situations appear in the future (Daniels et al., 2004). From an ART perspective then, personality is another internal factor that is likely to
influence action program choice and formation. Again, their theory would now benefit from considering personality, along with wellbeing and task parameters, as influencing the selection of action programs from the OIS.

H5: People with higher scores on conscientiousness scales will be slower to check, respond to and deal with an email interruption, when choosing strategies of response in goal-directed work.

This hypothesis was not supported. Neither Hockey nor ART make any predictions about whether people with high scores on conscientiousness scales may respond more quickly to distractions (such as email interruptions).

H6: Different personality characteristics in the Five Factor Model are differentially predictive of strategic responses to email interruptions.

No other personality characteristics had a direct relationship with strategy choice. Therefore, this hypothesis was not supported. Neither Hockey nor ART make any predictions about whether other FFM personality variables respond in any particular fashion when faced with distraction from other goals.

H7: Different personality characteristics in the Five Factor Model are differentially predictive of affective wellbeing levels after dealing with an email interruption.

HPI Adjustment is a measure of neuroticism or anxiety, in the reverse direction. People with low levels of Adjustment were more likely to feel anxious and annoyed after dealing with an email interruption. This hypothesis was therefore partially supported. Schönpflug (1986, 1992) indicates that anxious personalities may feel adverse wellbeing effects after engaging in decision-making, because it is worrying and draining for them. If making a decision to deal with an email interruption fits into his model, then support for this hypothesis demonstrates support for Schönpflug.

Personality also acts as a moderator of wellbeing from before to after dealing with the email interruption. People who have tendencies towards neuroticism (low on Adjustment) who felt annoyed and anxious before dealing with the email interruption, feel even more annoyed and anxious afterwards. Whereas people who have higher scores on openness to experience scales (Scholarship and Intellectance) who felt happy before receiving the interruption, feel even happier having dealt with it. In addition, people with higher scores on 'goal-
focused’ extraversion scales (Ambition) who felt gloomy before the email, will feel happier after having dealt with it. These moderator effects again demonstrate support for the notion that high scorers on neuroticism scales find dealing with demands to have a negative affect on wellbeing (Schönpflug, 1986, 1992). However, they also show support for the idea that people with a higher need for excitation (people with higher scores on openness and extraversion scales) experience a boost in happiness by dealing with an interruption, if they were already happy.

H8: The relationship between strategy choice and wellbeing, in dealing with email interruptions in goal-directed work will be moderated by individual differences in personality, measured according to the Five Factor Model of personality.

This hypothesis was supported, with Ambition and Scholarship acting as the moderator variables.

This again supports the notion that dealing with an email interruption appears to have some sort of goal satisfaction component to it. Dealing with an email interruption for a longer period of time appears to make people with higher scores on the Ambition scale feel more active and motivated. This may be because activating an action program from start to finish (as may occur when people spend a long time dealing with email) may be satisfying, especially if one is a goal-focused type.

People with higher scores on the Ambition scale, who delay responding to email (interaction of Ambition with Time 2 strategy) have higher negative affectivity afterwards, compared to beforehand. This indicates that ‘energetic and self-assured’ people find performance protection of the current task is anxiety and annoyance inducing. This supports Hockey and his discussion of how performance protection can evoke negative wellbeing. However, because it is people with higher scores on the Ambition scale who feel this most acutely, this also indicates that attending to the current task goal in preference to attending to other goals (as afforded by the email) is intrinsically dissatisfying. People with higher scores on the Ambition scale may dislike the fact that application of such a strategy may thwart their non-task goal achievement capabilities. Hockey (2000) argues that to be effective in multi-goal environments people are required to switch between goals, and yet
this has detrimental effects on goal orientation. As such, suppressing the
tendency to be flexible is the best strategy to take, according to Hockey, even
though (because it has a negative influence on wellbeing) it may be difficult to
apply. People with higher scores on the Ambition scale, with their strong level
of goal-focus may be capable of avoiding task switching (hence the delay
strategy), but, because they probably recognise the need to satisfy other
goals afforded by the email, this strategy presents a conflict that makes them
feel anxious and annoyed.

People who are high on HPI Scholarship (i.e., are thorough, painstaking and
well-informed) and who have higher positive affectivity before being
interrupted by an email (interaction of Scholarship and BefPA) spend longer
dealing with the email (Time 3 strategy). Although HPI Prudence was not
found to be a predictor in any of the models, this finding might add some
support to the work by Connor & Abraham (2001), Fischbach et al. (2003),
and Frei et al. (1999). These researchers suggest that conscientious and self­
controlled individuals may be less distractible, but once they are dealing with
a task (i.e., once they have oriented to the interruption) they work at it
carefully and completely until a goal is achieved. As high Scholarship is
associated with being thorough, methodical and painstaking (Hogan & Hogan,
1997) this may explain why Scholarship is associated with spending longer
dealing with email, especially if people are already feeling active and
motivated about their work.

In light of these moderator effects it seems prudent to conclude that
personality has a moderating effect on the relationship between wellbeing and
strategic choice in dealing with interruptions. A box (Box E) is added to Figure
Five to reflect this conclusion. These findings further support the premise that
personality is a variable that should be taken into account by interruptions
researchers and goal-directed theorists in understanding how people are likely
to respond to email interruptions, and the effect this is likely to have on their
wellbeing.

Summary
The findings from Study Four indicate clearly that wellbeing is both an
antecedent and consequence of strategies chosen to deal with email
interruptions in goal directed behaviour. This supports Hockey and
Schönpflug’s positions, and clarifies the need to take an amalgamated approach now, to understand how wellbeing affects action program formation. Further, this study demonstrates that whilst characteristics of the email may influence strategy choice, internal factors (such as wellbeing and personality) are also involved. This indicates that ART needs to amend its theory to allow for this. It is also evident that personality plays a key role in understanding people’s strategies and how these impact upon wellbeing. Finally, this research also suggests that email interruptions can have positive benefits for people, in terms of their wellbeing, but the extent to which an email interruption is construed as either positive or negative may largely depend upon one’s personality characteristics.

Theoretically, these findings suggest that:

- Action Regulation Theory would benefit from including ‘current wellbeing’ as a consideration in its ‘conditions of execution’ stage of the activity cycle. It seems that people’s current wellbeing may influence the strategic decisions they make in selecting an action program to work towards the goal of dealing with an email interruption. That one consciously appraises one’s wellbeing state is not assumed (Emmons, 1997; Lazarus, 1985).

- Hockey (1997, 2000, 2002) is likely to be valid in this instance, in suggesting that people may choose strategies that help them to improve their wellbeing (and not just their task) goals. In several models it was found that dealing with an email interruption improved wellbeing, sometimes even reversing someone’s mood from negative to positive.

- It is recommended that personality, as a construct, receives greater weight in theories of goal-directed behaviour. It appears to influence the strategic decisions that people make in selecting an action program, and, in light of these findings could now be worked into the activity cycle of ART. It also has an effect on the degree to which one feels positively or negatively about an interruption. Such a finding should help interruptions researchers better understand their findings, which are often contradictory. Strategic differences in dealing with interruptions and differences in people’s performance, may be due to personality differences.
These findings should also add value to the interruptions literature by explaining how strategies are applied when dealing with interruptions that can be controlled in some way. This study demonstrates how email interruptions need not always be construed as disruptive to one’s tasks and thus as inefficient (Jackson et al., 2003), but as a potentially positive influence on one’s capacity to be efficient (Walji et al., 2004; O’Conaill & Frohlich, 1995). This is a perspective that has barely been entertained within the literature on interruptions.

**Future directions**

This study dealt with the research questions 1, 2 and 6 posed in Chapter Four. The next research phase will deal with questions 3, 4, 5 and 6. In addition however, this study raised a number of additionally interesting issues that would benefit from future exploration.

**Why do people delay?**

When people with higher scores on the Ambition scale delayed responding to an email interruption it made them feel annoyed and anxious. Eifering, Grebner, Semmer, Kaiser-Freiburghaus, Lauper-Del Ponte & Witschi (2005) found similar results in their study, concluding that strategies such as avoidance can reduce wellbeing because people experience pleasure from tackling tasks and problems head-on (problem-focused coping). In this study, it is not clear why people delayed response to the email. Were they prevented from responding in some way, or did they strategically decide to avoid the email for the time being, even though this frustrated them? It could be that as many ‘delayers’ are ambitious personalities they may have appreciated the need to remain with the current task before being distracted by another goal, but knowing another goal was in waiting caused them to experience negative affect. Prioritising task goals over wellbeing is a strategy acknowledged by Hockey (1997, 2000, 2002) and by Schönflug (1983, 1992). Appreciating when and why such a strategy is adopted could provide a focus for future research. Thus, in the next phase of studies it will be worthwhile asking future participants why they delay checking or responding to an email interruption.

**Do email interruptions afford goal fulfilment opportunities?**

The MRCM analyses indicate that dealing with email interruptions appears to have some sort of goal-fulfilment affordance for people. For people interested
in achieving goals (high Ambition), dealing with an email interruption has apparently positive benefits for them in terms of improving wellbeing. If such people have to delay their response, this appears to cause them anxiety and annoyance. In addition, people who have higher scores on openness to experience scales seem to find dealing with email to be a satisfying experience, indicating that email can offer variety and stimulation to those who need higher levels of this in their work. Understanding whether people consider that their strategy has helped or hindered their goal achievement may assist in our understanding of whether email interruptions offer goal-fulfilment opportunities. Hence, why they also appear to be appraised positively by people. Thus, perceptions of goal achievement may be important to consider in the next study phase.

Arousal and positive effects
It is clear that the apparently positive benefits of email interruptions are not experienced by all people. Those who are more anxious by nature tend to find that negative wellbeing is exacerbated by the presence of an email interruption. Additionally, people who are temporarily feeling anxious and annoyed do not find that email interruptions alleviate this. Contrarily, those experiencing low arousal and low positive affect feelings (boredom or tiredness) appear to benefit from spending time dealing with email. Those experiencing high arousal and high positive affect feelings (active and motivated) also appear to benefit. These 'arousal' findings are interesting, and provide a caveat to the traditional Yerkes-Dodson inverse 'U' arousal-motivation curve.

Rather than high levels of arousal reaching a satiation point, which can then negatively affect performance and motivation (Scerbo, 2001; Schellekens et al., 2000), it seems that one needs to ascertain the valence of the arousal first. If the arousal is negative, then it seems that too much arousal could have negative implications, but if the arousal is positive, increasing one's arousal (i.e., by presenting another stimulus such as an email) can enhance performance and motivation even further – indicating a linear increase. Further investigation into such a possibility might be of interest to wellbeing researchers.
CHAPTER SIX

Limitations

There were several limitations to this study, which should be highlighted here. These limitations affected the sample and potential generalisability of the study, and attempts to reduce these problems in future studies is encouraged.

- The study sample was gathered by ‘opportunity’, with key members of each organisation emailing and persuading colleagues to take part. As such the sample was self-selected, and it is possible that people may have opted out of taking part because they were too busy. The sample may therefore have been made up only of low-level email users. However, other incoming email that did not interrupt people's work, would not be included in this total amount. Study One demonstrated that most people receive between 11 and 30 email a day. In this study, an average of 11 email interruptions were received by participants over the course of one day. Therefore, the average number of email in this study is at the low end of average.

- One of the requirements for participating in the study was that participants had to remain on-line throughout the day, in order that email would come straight to their inbox and interrupt them when it arrived (hence constituting an interruption). Some people opted out of the study because they weren't usually on-line at all times and did not want to, or could not, change their system for the purpose of the study. Despite the fall out of some participants for this reason, at least those who remained were subject to controlled conditions – they were all ‘interrupted’ by email when it arrived.

- In completing the diary forms participants were asked to rate wellbeing, timing strategy, etc. once they had finished dealing with an email interruption. However, some people may have delayed responding to the email for longer than the study period. Therefore, email delayed for over one day would not be included or reported in this study. Thus, very low importance, or particularly difficult email may not have been recorded. The other limitation to asking people to complete the form after dealing with the email is that retrospective recall may have suffered if the email was delayed for a long period of time. It is likely to be easier for people to remember their wellbeing feelings when they have recently experienced them, compared to when they are rating them several hours later.

Practical implications
This study has made an important contribution to the domain of interruptions research by demonstrating how controllable, asynchronous interruptions can have a positive impact on people’s work experience.

By understanding what strategies are associated with improved wellbeing in dealing with email interruptions, organisations can be informed about how best to train their staff to ensure that their use of email is productive and efficient. By understanding more about how differences in individuals’ personality affect the relationship between strategic responses to email interruptions and wellbeing, this also has implications for selection and training. For example, as individuals with lower emotional stability levels react negatively to email interruptions, especially when they are already annoyed and anxious, then it is probably best not to recruit such people into high stress job roles where interruptions are important (e.g., air traffic control, or call centre environments).

From a training perspective, by understanding how different personalities react differently to email, individuals can be given person-specific guidance on how best to deal with email. For example, those with low emotional stability may be advised to limit their interruptions (perhaps by switching email off and logging in periodically to download) whereas, those who are higher scorers on openness to experience or ambition scales, may be encouraged to ensure their email system is continuously switched on.

Conclusion
This study established that wellbeing and personality are important factors in influencing strategic action in goal-directed behaviour. Support for various components of boxes A, B, C and D in Figure Five has thus been achieved. These variables are highlighted by shading, in the amended figure below. Further, the presence of personality as a moderator between action and wellbeing, and wellbeing and action (Time 3) is represented by the addition of boxes E and F.
**Figure Five (amended):** Antecedents and consequences to strategic action in a controllable email interruptions timeline

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**Interruption timeline**

- **Begin Primary Task**
- **Email Alert**
- **Check Email**
- **Begin Email Task**
- **End Email Task**
- **Resume Primary Task**

**Box A**
- Current wellbeing
- Personality
- Activation of current task goal
- Demands of current task

**Box B**

**Box C**
- Current wellbeing
- Personality
- Relative importance of task versus email to one's goals
- Relative demands of current task versus email

**Box D**
- Strategic action at time 1, 2 or 3 influences:
  - Current task achievement
  - Overall work task achievement
  - Wellbeing goal achievement

**Box E**
- Personality

**Wellbeing**

---

The next phase of studies will move on to address the other variables from the boxes in Figure Five. In particular, Phase Three explores the issue of acting in multi-goal environments, and how strategic action is related to perceptions of success at single and multiple goal levels. As discussed at
length in Chapter Four, this should further understanding of how controllable interruptions are dealt with, and should continue to contribute to the goal-directed activity theories.

**Study 5: A post-hoc evaluation of ecological validity**

**Introduction**

Chapter Five of this thesis argues the importance of running Occupational Psychology research programmes that have ecological validity. The Action Regulation Theorists (Hacker, 1985, 1994; Frese & Zapf, 1994) along with Hockey (1997, 2000, 2002) argue that in order to appreciate reasons for action and the development of strategies, studies should be grounded in a context that contains multiple goals, an opportunity for an individual's past experience and goal values to impact upon their behaviour, and an appropriate time period. Often laboratory studies involve testing one singular component of activity according to the researcher's goals and limited time frame. Whilst this may reveal important information about how cognitive processes operate, it is devoid of utility when understanding how these cognitive components interact with an environment, a situation and a personality in the real world (Symon, 2000a).

As such, in Study Four the diary method was adopted. The diary method and its benefits is discussed at length in Chapter Five. Owing to the value placed on ensuring this study represents actual and complete activity in relation to dealing with email interruptions at work, it was deemed important to establish the ecological validity of Study Four. Appreciating the extent to which the study reflected what happens in reality, allows us to comment on whether the study is potentially generalisable and valid.

This post-hoc study therefore attempts to establish whether Study Four achieved ecological validity.
CHAPTER SIX

Method

Sample
Thirty-four participants from Study Four took part in this post-hoc study. Two of the thirty-four did not have their results included in Study Four because of spoiled or incomplete data. Twenty-five participants were female. Four people were from Organisation A, 1 from Organisation B, 16 from Organisation C, 4 from Organisation D, 7 from Organisation E and 2 from Organisation F.

Materials and equipment
Participants needed direct access to email, obtained in 100% of cases by using either Microsoft Outlook or Lotus Notes. The researcher used Microsoft Outlook 2003, to correspond by email with participants.

Procedure
Immediately after participating in Study Four all participants were sent a thank you email to debrief them (see Figure Eight below). This email posed two questions, to help establish the ecological validity of the study.

Figure Eight: Debrief email sent to participants

Dear Name

Many thanks for participating in this University of Surrey study on email interruptions. Shortly after receiving your 'Individual Email Survey' forms, personality results and Personal Information Forms back, I will write to you again to more fully explain how your results have helped. I will also give you details at that stage about how to call me for feedback on your personality profile.

However, while the study is still fresh in your mind I have just two more questions to ask:

1. Did you feel that taking part in this study affected the way you would normally deal with email interruptions (if yes, please indicate in what way)?
2. Did the process of rating your emotional response affect the way that you felt (if yes, please indicate in what way)?

I would be extremely grateful to receive your feedback on these or any other points that you feel are relevant to this study. Again, please be assured that any correspondence engaged in with me will remain strictly confidential.

Again, many thanks for your time today, and if this study has raised any issues for you that you would like to discuss in more detail, then please do not hesitate to contact me.

Kind regards

Emma Russell BSc MSc CPsychol
Department of Psychology
University of Surrey
Question One in the debrief email asked whether people felt that taking part in the study had affected their normal email strategy in any way - and if so, how. This was to ascertain whether the study had managed to sample reality adequately, or whether people had had to substantially alter their behaviour to satisfy study requirements. One of the requirements for participating in Study Four was that people had to remain on-line to email throughout the study, so that as email arrived it interrupted them. In order that the interruption did not go unnoticed, participants were asked to ensure an email alert was switched on.

Question Two asked participants whether responding to items relating to wellbeing had affected them in any way - and if so how. This was to establish whether focusing on wellbeing and emotions affected how participants' thought about their feelings, and ultimately altered their natural state. If people did feel that the surveys sensitised them to their emotions, this needed to be recorded as it could demonstrate that the study itself, and not the email, was responsible for inducing certain wellbeing experiences.

Results
After compiling all 34 answers to each question, answer categories were created for each question. For Question One, 6 specific categories within 3 broad categories were elicited, and for Question Two 8 specific categories within 3 broad categories were elicited.

For Question One, 19 participants broadly answered that 'No' the study did not affect the way they would normally deal with email interruptions; 13 answered 'Yes' that broadly the study did affect their normal response to email interruptions; and 2 participants made 'No Comment'. Of the thirteen participants who did feel their normal response had been affected, 2 commented that they 'responded to email when they would normally have left it', 5 commented that 'filling in the form changed their behaviour', 5 commented that they 'responded to email interruptions more quickly than normal' and 1 commented that they 'had the email alert switched on when it was normally off'.

For Question Two, 24 participants broadly answered that 'No' rating their emotions did not affect their emotional response; 8 participants broadly
answered that 'Yes' rating their emotions did affect how they felt; and 2 participants made 'No Comment'. Of the eight participants who had been affected by rating their emotions, 5 claimed that 'filling out the form affected their emotions (irritated, annoyed, confused)', 2 said they 'became more aware of email that annoyed or irritated them', and 1 said they 'felt more anxious than normal'.

The following pie charts summarise the distribution of comments across participants:

**Figure Nine:** Categories of comments made in response to debrief email Question One (as established via content analysis)

<table>
<thead>
<tr>
<th>Category Code</th>
<th>Comment</th>
<th>Specific N</th>
<th>Broad N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>No change to behaviour</td>
<td>19</td>
<td>19 'No'</td>
</tr>
<tr>
<td>1.2</td>
<td>Responded to email when normally leave it</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Filling in the form changed behaviour</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1.4</td>
<td>Responded to email more quickly than normal</td>
<td>5</td>
<td>13 'Yes'</td>
</tr>
<tr>
<td>1.5</td>
<td>Had email alert on when it was normally switched off</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>1.6</td>
<td>No Comment</td>
<td>2</td>
<td>2 'No Comment'</td>
</tr>
</tbody>
</table>
Figure Ten: Categories of comments made in response to debrief email Question Two (as established via content analysis)

<table>
<thead>
<tr>
<th>Category Code</th>
<th>Comment</th>
<th>Specific N</th>
<th>Broad N</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>No change to emotional response</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>2.2</td>
<td>No change but more aware of emotions</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2.3</td>
<td>No change but then attempted to reduce negative emotions when aware of them</td>
<td>2</td>
<td>24 'No'</td>
</tr>
<tr>
<td>2.4</td>
<td>No change but had to resist temptation to note differences</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>Filling out the form affected emotions (irritated/annoyed/confused)</td>
<td>5</td>
<td>8 'Yes'</td>
</tr>
<tr>
<td>2.6</td>
<td>More aware of email that annoyed/irritated</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2.7</td>
<td>More anxious than normal</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2.8</td>
<td>No comment</td>
<td>2</td>
<td>2 'No Comment'</td>
</tr>
</tbody>
</table>

Discussion
This post-hoc assessment of ecological validity demonstrates that for the majority of participants sampled, participating in this study did not affect their normal work experience. In response to question one, 55% of participants felt that the study did not impact on how they would normally deal with their email interruptions, and thus, the study appears to have quantitatively sampled naturalistic behaviours in situ - an advantage of the diary method (Conway & Briner, 2002; Czerwinski et al., 2004; Harris et al., 2003, Miner et
al., 2005; van Erde et al., 2005). For those who did comment that the study had affected them, most suggested that this was because they were more aware or attentive towards email than normal, as a result of the study intervention (they were more responsive, had a more prominent alert set up, or responded more quickly). Five participants commented that the process of filling in the form changed behaviour. For example, one candidate commented, “I tended to finish what I was doing first before opening the email because I knew I had to fill in the form. Normally I would open and read and then ignore until I finished the first job.” It is disappointing that the benefits of momentary diary methodology, such as ensuring direct and timely access to naturally occurring behaviours, can, by their very nature, also have costs to ecological validity (Czerwinski et al., 2004). There is little point in having direct and timely access to behaviours in the workplace if the diary intervention itself is altering the ‘naturalness’ of these behaviours. Only 15% of participants felt that they specifically changed strategy because of the diary intervention, but nevertheless one should be aware that the diary method can, paradoxically, confound results.

In response to Question Two, 71% did not feel that rating their emotional response to an email actually changed their response, although participants conceded that they may have become more aware of their emotions, and even attempted to reduce negative emotions afterwards. For example, one participant commented, “rating my [emotional] response... didn’t actually change the way I felt, but it did make me think about why I was feeling the way I was – and made me do something about it – so if I was feeling anxious, I then tried to be less anxious and solve the cause of the anxiety.” So, it seems that after filling in a record, some participants spent time thinking about the emotional response they had made and may have deliberately dealt with this. The outcome measures for wellbeing looked at wellbeing after dealing with an email, and used the before email rating as a lag to control for emotional spillover.

This means that this raised awareness of emotion shouldn’t have confounded results (Miner et al., 2005). For those who felt that rating their emotions affected their response, five people commented that the study itself caused them some irritation or annoyance, thus heightening such emotions. One person felt more anxious, as a result of participating. Various studies have
commented on how important it is to keep momentary diary records as short and concise as possible, in order to encourage full participation (Butler et al., 2005; Miner et al., 2005). Two pilot studies were conducted prior to Study Four, which attempted to trim the diary record to take no longer than 30 seconds to complete, and also to assess participants' level of irritation with the form. The final form used in Study Four was rated to be of an acceptable length and complexity, but in future studies researchers may wish to consider reducing the size of the record, or potentially the time sampled, to limit potential for participants to be irritated by the form. Finally, two people were more aware of their annoying email, suggesting that rating negative emotions at such time may have been exaggerated, compared to normal.

Conclusion
Overall, this study has shown how important it is to ask participants to comment on whether a study intervention method has affected their naturalistic behaviours. The broad impression, from people's comments is that event-sampling by momentary diary method is a sound and ecologically valid approach. However, this post-hoc study does alert one to the fact that, despite the advantages of such methodology, few methods for studying workplace behaviour can be exempt from drawbacks, and one needs to be constantly alert as to what these might be when designing interventions.

Phase Two summary
This phase of research utilised event-sampling diary methodology and multilevel random coefficient modelling (MRCM) analysis to explore the relationship between wellbeing, personality and strategies for dealing with email interruptions in goal directed work. The studies used a wellbeing measure that captured the dimensions of affect highlighted by Schönpflug (1983, 1992) and Hockey (1997, 2000, 2002; Hockey et al., 2000), and measured wellbeing in a balanced and theoretically defensible format (see Study Two). Ecological validity was maximised by use of the diary method, which links variables as they occur in the real world and in real time, and through studying complete activity, rather than individual components devoid
of a real world context. Study Five indicated that ecological validity was achieved imperfectly.

The main study from Phase Two identified that email interruptions can have a positive effect on wellbeing, and that wellbeing itself can predict strategies chosen to deal with interruptions. This amalgamates the position taken by ART and Hockey (2000, 2002), as it seems that wellbeing is an antecedent that influences the development of action over and above task or situation parameters. Different personality characteristics are related to different strategies employed, and affect experienced. Study Four indicated that individual differences are an essential component needing attention in studies of interruptions and goal-directed strategising. This supports Eysenck's (1998) call for experimental psychologists to include measures of individual differences in their work, to rescue it from 'drowning in the error term' (Davies, 2004).

The finding that internal, personal factors are involved in the development of strategies for dealing with email interruptions is of interest to both interruptions researchers and goal-directed theorists. Using controllable, asynchronous interruptions as a unit of study has demonstrated how people may go about developing strategies in goal-directed work, as outlined in Chapter Four, but further research is needed to better understand:

- Why people delay response to interruptions, especially if it makes them feel bad.
- Whether a strategy prioritises wellbeing or task goals, and whether this is related to individual differences or post-interruption wellbeing.
- What people are doing when they are interrupted, and whether this influences strategy choice.
- The relative influence of the task, the email and current wellbeing on strategy choice.
- Whether people consider that their strategy has helped or hindered goal achievement and whether this relates to wellbeing experiences.

Such research should serve to clarify issues within Hockey's theory about whether goals are weighed up and prioritised in people's strategy development, and should add depth to ART in indicating the extent to which internal parameters are involved in an activity cycle. The final phase of
research, discussed in Chapter Seven, will attempt to examine these points, in light of research questions 3-6 posed in Chapter Four. Chapter Eight then brings together all results from the three phases to convene a consensus about how strategies for dealing with email interruptions in goal-directed work relate to wellbeing, personality and multi-goal achievement and priorities.
Chapter Seven:
Prioritising Different Goals in Multi-goal Environments

Introduction

Phase Two of this thesis found that: (i) interruptions have a positive effect on one's work experience; (ii) wellbeing is both a precursor and consequence of strategic approaches to email interruptions; (iii) personality characteristics are directly related to consequential wellbeing, and also moderate the relationship between strategy and wellbeing, and wellbeing before and after an interruption; and, (iv) non-experimental, ecologically valid approaches can yield useful and valid quantitative data, that can be subjected to robust statistical analysis.

These findings provide confirmation for the presence of wellbeing and personality variables in Figure Five. They demonstrate that Internal factors (wellbeing and personality) are involved in people's choice of action program. This contrasts with the emphasis of Action Regulation Theory that largely focuses on how situational parameters or cognitive conditions of execution influence strategy choice, regulation and execution. However, the role of wellbeing in strategic action provides support for Hockey (1997, 2000, 2002), Schönpflug (1983, 1986, 1992) and Hancock & Warm (1989). The presence of personality as an antecedent and moderator of the action-wellbeing relationship indicates support for the goal-directed theorists (Hockey, ART, and Miller et al., 1960) who highlighted its importance, even if they hadn't studied personality in any structured or coherent fashion to date.

In this final phase of research studies, the remaining variables from Figure Five will be explored, with specific reference to the research questions 3, 4, 5, and 6 generated in Chapter Four. In particular, these research questions deal with how efficiency is rated and tasks prioritised in multi-goal environments. Study Six provides an assessment of how people prioritise and weigh up their
respective goals in dealing with email interruptions, and how this relates to the strategies they choose. In addition, having generated a strategy, the study aims to acknowledge whether people consider this has helped or hindered them in achieving their multiple goals. Finally, the role of individual differences is explored, to establish whether the prioritisation of different goals is related to differences in personality. Again, dealing with these issues relates directly to the theories of goal-directed behaviour outlined in Chapters Two and Four, and aims to highlight their respective strengths and weaknesses.

Study 6: Examining how strategic action in dealing with email interruptions relates to multi-goal achievement

Introduction
Referring back to Figure Five, presented in Chapter Four and amended at the end of Chapter Six, this study is concerned with establishing whether the other variables noted in Boxes A, B, C and D play a part in strategic responding when dealing with email interruptions. In particular, these variables deal with how people weigh up the demands of multiple goals in deciding how to act, and the impact that action then has on multiple goal achievement.

Dealing with multiple goals
Introducing an interruption whilst somebody is executing an action program associated with a current task, means that we can study how multiple-goals push and pull attention and resources away from each other. ART admits that people may be encouraged to move from an existing action program to another, if they are operating at a low level of regulation, or if they need a change (Hacker, 1985, 1994). However, ART expends little attention to the question of how multiple goals and action plans are compared and executed, and have been criticised accordingly (Zijlstra, 1993). In reality, at work, people are faced with multiple goals throughout their working day (Schönpflug, 1983).
Hockey (1997, 2000, 2002) argues that in multi-goal environments people are constantly faced with distractions from other goals. These are weighed up in terms of how new goals compare with the existing goal, and in terms of whether action is likely to satisfy the current task, other work tasks or wellbeing. He also says that individual differences will effect whether one is more concerned with satisfying work or wellbeing goals in multi-goal activity. Rather than rating efficiency in goal directed behaviour according to the successful completion of a current action program compared to effort expended, as ART does, Hockey and Schönpflug indicate that the criterion for effectiveness should involve the attainment of other work goals and wellbeing goals too (Walji et al., 2004). This is represented by the variables mentioned in Box D of Figure Five.

When are people distracted by other goals?

Introducing an interruption, when people are engaged in task behaviour, offers the prospect of distraction by a new goal (the interruption). When faced with a controllable interruption (e.g., email), we can directly examine what influences whether someone will respond immediately or delay, and how this relates to respective goals.

As discussed in Chapter Four, Altmann & Trafton (2002) suggest that people will switch to another task goal (i.e., that afforded by an interruption) if the current goal has low activation in current memory. This may be because the current task is lengthy, dull, or some way off from completion (Hockey, 2002; Fisher, 1988). ART suggests that people attend to another goal in multi-goal environments if they are operating at low levels of regulation, as this is when more cognitive resource is available (Hacker, 1985, 1994). At higher levels of regulation people are more likely to delay responding to another goal, because current demands are too high. ART also says that a conflicting goal will be oriented towards if it is more important than an existing goal. Yet it isn't clear how or whether other goals are checked for when working at high levels of regulation, as this is usually when attentional narrowing occurs (Hockey, 1997; Fischbach et al., 2003; Koole & van't Spijker, 2000).

New goals may offer distraction from current goals if they afford variety (Hacker, 1994; Frese & Zapf, 1994). Indeed, Hacker (1985) suggests that high performers need multiple and variable goals at work, if they are to feel
satisfied. Robertson (2003) supports the fact that novel and challenging goals often demand attention. Hockey (2000, 2002) suggests that both goal activation and alternative goal distraction are involved as people make decisions about whether to act. As discussed, in Chapter Four, it seems plausible, especially based on the results of Study One and Four, that people may be quick to check an email interruption if the current goal has low activation (i.e., people are bored or tired) and quick to respond to the interruption if it affords a more important or interesting goal than the current one (i.e., it relates to people’s jobs). Referring back to Figure Five, at the checking stage (Time 1) goal activation may be pertinent in terms of people’s decisions to act (Box A), and at the decision-making stage (Time 2) the valence or importance comparison of goals may influence decisions to act (Box B).

Previous work on interruptions would benefit from clarification on these issues. Most of the studies of task-switching when faced with interruptions were experimental designs, whereby the interrupting task was forced into consciousness, meaning people had to leave the original action program and switch to the interruption (Gillie & Broadbent, 1989; Speler et al., 2003; Czerwinski et al., 2000b; Cutrell et al., 2001). Task switching invariably had negative consequences on the original task performance.

In the few studies where participants had control over how to respond to an interruption, strategies for delaying were identified as demands increased (Zijlstra et al., 1999), and when the current task was longer and more complex (Czerwinski et al., 2004; van Solingen et al., 1998). This suggests that the delaying response found in Study Four may well occur when email users are faced with higher levels of demands. Study Four suggested that one’s strategy for dealing with an interruption was in part influenced by the characteristics of the email being presented. For example, the length, difficulty and clarity of an email influenced how quickly people responded to and dealt with the email (supporting the findings by Whittaker & Sidner, 1997). However, Study Four did not indicate how the email characteristics compared with the task. So, whilst a short email may distract people more easily than a long email, if the task itself is also short, would the same effect occur? The following hypotheses were generated to test how strategies are
related to current task demands, and the comparison between task and email:

**H1:** If the demands of the current task are high, people are likely to adopt 'delay' strategies (taking longer to check and respond) for dealing with an email interruption.

**H2:** After checking the email interruption, the difference between characteristics of the email, and characteristics of the task, will influence how quickly one responds to and deals with the interruption.

In Figure Five, these hypotheses relate to the variables 'Demands of the current task' in Box A and 'Relative demands of current task versus email' in Box B, respectively. Hypotheses One and Two address research question 4 from Chapter Four. If Hypothesis One is supported this indicates that attentional narrowing may be a strategy that is used to protect performance on demanding tasks (Hockey, 1997, 2000, 2002). This would also support ART: at high levels of regulation people cannot work on more than one action program. Support for Hypothesis Two would support Hockey’s claim that people weigh up differences in task goals before selecting a strategy. It could also support ART if people choose the strategy to switch to deal with the interruption quickly, if the task is considered to be longer (as people are expected to need a change of goal at such times – Hacker, 1985).

**Task stage**

It seems prudent to pay attention to what stage the individual is at in their current task to understand distraction by other goals better. Although characteristics of the task and email may allow one to measure demands, it may also be that different task stages are differently demanding. For example, Czerwinski et al. (2000b) and Cutrell et al. (2001) found that when working on the early stages of a task interruptions were more disruptive, whereas previous work by these authors found that people working on the later stages of a task were more distracted (Cutrell et al, 2001). Understanding at what point in a task one is more or less distractible by other goals will be of interest in ART, as it could indicate at which point in the activity cycle one’s action program development is most at risk of disruption.
**H3: The stage one is at in a task, when interrupted by an email will influence how quickly one checks and responds to the interruption, and how much time one devotes to dealing with it.**

Again, this hypothesis relates to research question 4 from Chapter Four. If task stage is a factor that affects speed of response at Times 1, 2, and 3 then this can be added to Figure Five boxes A, B, and C. It will also indicate that ART can be amended to include an appreciation that goals are more or less prone to disruption at different stages in the activity cycle.

**The prioritisation of wellbeing goals**

Study Four indicated that people weigh up wellbeing and task priorities when faced with email interruptions. When people were bored or tired they responded quickly to an email interruption, suggesting they were adopting a strategy to boost wellbeing. When people delayed their response (people who score higher on the Ambition scale) this caused wellbeing to suffer, suggesting that they were adopting a strategy to preserve task performance at the expense of wellbeing.

Study Six looks directly at whether people weigh up wellbeing and task goals in deciding how to act. If they do, this further supports the presence of the negotiation lag (Time 2 in Figure Five). Studies One and Four have indicated that people are engaged in some decision making process at a 'Time 2' phase, but this was originally overlooked by Trafton and his colleagues (Trafton et al., 2003), probably because they had concentrated their research efforts on enforced interruptions. If, during a controllable interruption people demonstrate that they are actively weighing up their options (i.e., whether to deal with the interruption or not, and whether to prioritise task goals or wellbeing goals) this provides further support both for the presence of a negotiation lag, and for Hockey’s model.

**H4: Having checked the email interruption, one will respond more quickly to it, and spend longer dealing with it, if it is more important to the achievement of work goals or wellbeing goals than the current task.**

This hypothesis taps into elements of research questions 3 and 4 from Chapter Four. Box B in Figure Five relates to this hypothesis. Hockey says it is
adaptive to check the environment for other goals, and that we will switch if other goals are more important. Support for this hypothesis would thus support Hockey.

**Individual differences in prioritising wellbeing goals**

In Study Four it was found that people who score higher on the Ambition scale may delay their response even though it causes negative affect experiences. This indicates that prioritising task goals over a wellbeing goal may be more likely to occur for people with certain personality characteristics. Study Six will also establish whether prioritising wellbeing or task goals is the predominant strategy for different personalities respectively.

**H5: There are individual differences between people who choose strategies that prioritise work goals over wellbeing goals in dealing with an email interruption.**

Support for this hypothesis (which addresses research question 6 in Chapter Four) will support the presence of a box in Figure Five, linking individual differences with current task, overall task and wellbeing goal achievement. Hockey (2000, 2002) and Lazarus (1985, 1990, 2000) indicate that there are individual differences in how different goals are prioritised, so support for this hypothesis would support their stance.

**Goal prioritisation and wellbeing**

In addition, whether prioritising work goals or wellbeing goals is linked to a reduction or improvement in wellbeing, will also be discussed. Harris et al. (2003) found that progress towards goals increases wellbeing, especially if such goals are personally important. Elfering et al. (2005) interestingly comment that dealing with a task is a problem-focused approach, and yet this causes increased wellbeing. In contrast, avoiding a task is an emotion-focused strategy, which can undermine wellbeing. So, it may be that even if people choose to forfeit wellbeing goals in favour of dealing with a task, this can have positive implications for people.

**H6: People’s perceptions about whether their strategy helped or hindered the achievement of work or wellbeing goal are differentially associated with an improvement in wellbeing levels, after dealing with the email interruption.**
This hypothesis addresses part of research question 3 in Chapter Four. Should this hypothesis be supported it would indicate that goal achievement will predict ‘wellbeing’ in Box D. This would involve splitting Box D so that a directional arrow can be added. If work goal achievement is linked with lower wellbeing, and wellbeing goal achievement with higher wellbeing, this would support Hockey, who indicates that performance protection in demanding situations would negatively affect wellbeing, whereas emotional protection would positively affect wellbeing. However, if work goal achievement is also associated with higher wellbeing, this supports the ‘amalgamated’ approach (outlined in Chapter Four), which purports that strategic action can benefit performance and wellbeing in the face of demands – at the same time.

**Email as affording another work goal**

The interruptions literature assumes that in dealing with an interruption one is forfeiting dealing with a task goal. In the world of work and in multi-goal environments, dealing with an email may in itself involve prioritising a work goal (Walji et al., 2004). If the email relates to an important task then leaving the current task to deal with the email may demonstrate a strong problem-focused approach to satisfy either work or wellbeing priorities. It will be interesting in the next study then to ascertain whether the task or the email is more important to the satisfaction of work or wellbeing goals. In addition, in asking people to appraise the strategy they chose, it will be necessary to establish whether this was related to the fulfilment of the current task goal, other work goals, or wellbeing goals.

**H7: The strategy chosen to deal with an email interruption is related to whether people believe that strategy helped or hindered them in the achievement of current task, other task and wellbeing goals.**

This hypothesis will directly link Times 1, 2, and 3 with Box D in Figure Five. It addresses research questions 3 and 5 in Chapter Four. If supported, it also supports Hockey, who says that people choose strategies that relate to the satisfaction of current task, general work, and wellbeing goals. If people only choose strategies to achieve current task goals, this would support ART.
Individual differences

In Study Four individual differences in personality, as rated on the Five-Factor Model, were not directly linked to strategy chosen to deal with email interruptions. However, personality characteristics were predictive of changes in wellbeing following dealing with an email interruption, with people who score higher on the Ambition scale generally experiencing an increase in affective wellbeing, and low adjustment people (people who score highly on neuroticism) generally experiencing lower affective wellbeing.

This study will explore this finding further. In so doing, individual differences will be operationalised to include a measure of motivational style. Motivation, as a research domain, is vast, consisting of multiple theoretical approaches and debates. A discussion of this research domain goes beyond the scope of this thesis. So whilst an appreciation of this body of work is acknowledged, this study phase will only explore the potential role of motivational style in goal-directed behaviour. Measures of motivational style allow one to appreciate what an individual values, what one is interested in, and therefore, how one may direct their behaviour. Motivational drives or dispositions are considered to be responsible for energising, directing and selecting behaviour (Emmons, 1997) and so are appropriate units for studying goal-directed behaviour. People motivated by power and achievement, for example, value getting ahead and may direct their behaviour to meet challenges and push themselves forward. In goal-directed work such achievement focus may orient these people more strongly towards certain goals and strategy choices (Strickland & Galimba, 2001). In particular, it seems that people experience a heightened sense of wellbeing when they work towards and achieve their goals – especially goals that are personally important (Carver & Sheier, 1990; Harris et al., 2003). Indeed, Harris et al. (2003) comment:

...if people differ in the importance they attach to attaining goals at work, then differences in well-being may be explained – at least partly – by differences in the extent to which work environments afford attainment of personally important goals. (p.402)

Assessing motivational style enables one to establish what goals are personally important to people, which may then be linked with strategy choice and subsequent wellbeing. This is an underdeveloped area in interruptions.
research, and motivational style will thus be tentatively explored in Study Six. In this study, only direct effects will be tested for; the intention being that if motivational style demonstrates incremental predictivity above and beyond personality, this further confirms the necessity to design a range of studies to fully explore the impact of individual differences in goal-directed work. The following two-tailed hypotheses are thus cautiously presented:

**H8: Motivational style is predictive of the strategies chosen to deal with email interruptions.**

**H9: Motivational style is predictive of changes in wellbeing experienced after dealing with email interruptions.**

These hypotheses relate to research question 6 in Chapter Four. Should these hypotheses be supported, then motivational style will be added to boxes A, B, C and E in Figure Five. Again, this would indicate that Hockey and ART could benefit from focusing on individual differences more comprehensively.

**Summary**

To summarise, this final study will attempt to address the research questions 3, 4, 5, and 6 outlined in Chapter Four, and to further test the presence of variables indicated in Boxes A, B, C, D, E and F in Figure Five. Several hypotheses also suggest that additional moderator variables may be involved that affect precursors and consequences to strategic action. If these moderators are present, the figure will be amended accordingly.

This study aims to add clarity to the goal-directed theories of work behaviour referenced throughout this thesis, by focusing on multi-goal achievement issues, as follows:

1. If the demands of the current task influence the strategy chosen to deal with an email interruption, this will help to establish whether the activation or level of regulation of a current goal influences distractibility by other goals. This will clarify the respective positions of Altmann & Trafton (2002) ART (Hacker, 1985, 1994), and Hockey (2000, 2002).
2. If people weigh up the relative importance or demands of the task against the email in selecting strategies for dealing with email interruptions, this will lend support for the theory that there is another stage in the Trafton et al. (2003) interruptions timeline—a 'negotiation lag' stage. This stage is likely to only be apparent when dealing with controllable interruptions, and helps us to understand how people negotiate their activity in multi-goal environments. Such findings will add to ART, helping to confirm how action programs are selected and switched between in multiple goal activity.

3. Study Six aims to establish whether people select strategies that they believe will help them achieve current task goals, other work goals or wellbeing goals when engaged in goal-directed activity. Dealing with an email interruption need not be seen as inefficient, as in multi-goal environments interruptions have work goal properties of their own (Walji et al., 2004). In addition, according to Hockey (1997, 2000, 2002) and Schönpflug (1983, 1992) people balance out the impact a course of action will have on current task performance, against long-term performance, and wellbeing. Thus, people are not only concerned with working to satisfy current task goals in the most efficient manner (as Hacker, 1985, 1994, purports).

4. If efficiency involves measuring the impact on other goals and wellbeing (Hockey; Schönpflug), certain personality/motivational profiles may be more closely associated with a tendency to prioritise work over wellbeing goals in acting. This will pick up on suggestions presented by Hockey (2000, 2002) that problem-focused people prioritise task goals, and emotion-focused people prioritise wellbeing goals. In this study, individual differences will be measured in terms of personality (as structured on the FFM), and motivational style.

5. If motivational style is involved in predicting strategy choice and changes in wellbeing when dealing with email interruptions (above and beyond the influence of personality) this adds more weight to this thesis that internal, personal characteristics are influential in the development of action programs. Again, this will highlight that individual differences need to be studied more comprehensively, and incorporated into ART as a key parameter or determinant of action program choice.
Again, this study will incorporate event-sampling diary methodology as a technique for exploring and measuring the impact of email interruptions on goal-directed behaviour within the real world. This adheres to the guidelines presented by Hockey (2002) and ART (Hacker, 1985, 1994; Frese & Zapf, 1994) that studies of work activity need to be conducted in ecologically valid environments where people are engaged in complete activity, and influenced by their own goals, beliefs and values, if results are to have any generalisability to authentic work experience (see Chapter Five).

Method

Participants

Four organisations provided participants for this study, recruited by opportunity sampling. In three of the organisations, a contact emailed employees who were connected to the email system at all times, inviting participation in a study of email interruptions. A flier was attached, to explain what would be required. The fourth organisation was the University of Surrey. Following receipt of approval from the university ethics committee, four different departments within the university were contacted – (i) the School of Engineering, (ii) the School of Biomedical and Molecular Sciences, (iii) the School of Management, and (iv) non-academic staff in Senate and other such departments. The head of each school and the registry were asked to give their approval for the researcher to contact their staff. At this stage details about the project, suggested methods of participant recruitment, and likely study outcomes were presented. Some correspondence was entered into in some cases.

After each head had given approval, a different participant recruitment technique was used in each school. In the School of Engineering, all academic staff were sent a letter and flier about the study in the internal post. Interested parties were asked to email the researcher and register their participation. They were also emailed in a 'round robin' email from the Head of School (with the flier attached). In the School of Biomedical and Molecular Science the head of school emailed all academic staff (again using a round robin style format) asking them to participate, and including the flier as an attachment. In the School of Management, the Head of School emailed all academic staff with an encouraging memo to participate. The flier was attached to this email. Approximately one week later, the researcher directly
emailed each individual member of the school’s academic staff with a personal note and flier attached. Non-academic staff in Senate, the registry and other administrative departments were emailed directly by the researcher, with a personal memo and the flier attached. This is with the exception of the Finance department who were group emailed the flier as a page in email. Please see Appendix Nine for all examples of participant recruitment correspondence.

The recruitment correspondence detailed the procedure of the study, the reasons for conducting it and outlined what participants would get out of taking part. Incentives to take part included entry into a draw to win one of three £50 prizes, plus free, confidential feedback on their personality profile (produced if they completed the HPI and MVPI questionnaires as part of the study). The sample statistics and response rates for each organisation are summarised in the table below:

**Table Eight: Sample statistics and response rates for participating organisations**

<table>
<thead>
<tr>
<th>Organisation</th>
<th>No. of individuals initially contacted</th>
<th>Individuals agreeing to participate</th>
<th>Individuals who returned study packs</th>
<th>Overall response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation G</td>
<td>16</td>
<td>7</td>
<td>7</td>
<td>44%</td>
</tr>
<tr>
<td>Organisation H</td>
<td>Unavailable</td>
<td>8</td>
<td>4</td>
<td>Unavailable</td>
</tr>
<tr>
<td>Organisation J</td>
<td>Unavailable</td>
<td>7</td>
<td>4</td>
<td>Unavailable</td>
</tr>
<tr>
<td>UniS - SoE</td>
<td>115</td>
<td>3</td>
<td>3</td>
<td>3%</td>
</tr>
<tr>
<td>UniS - SBMS</td>
<td>89</td>
<td>1</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>UniS - SoM</td>
<td>84</td>
<td>18</td>
<td>10</td>
<td>8%</td>
</tr>
<tr>
<td>UniS - non academic</td>
<td>182</td>
<td>30</td>
<td>24</td>
<td>13%</td>
</tr>
<tr>
<td>Total Participants</td>
<td>52</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Organisation G is a quality furniture maker, based in East Sussex. Staff contacted here were in the head office, dealing with orders, accounts and administration; Organisation H is an international digital security company based in Holland, that conducts its business using English as a first language. Staff contacted here were in the finance and accounting department; Organisation J is a nationwide hygiene, safety and security solutions company.

In the university environment, the academic schools contacted have been described above. The administrative departments contacted included: the Alumni and Development Office (N=8), Careers (N=3), Estates and Facilities (N=5), Human Resources (N=29), Marketing and Public Affairs (N=10), UniS
Direct (N=14), Finance (N=60), Staff Development (N=4), Internal Audit (N=3), International Office (N=4), Planning (N=7), Procurement and Planning (N=1), Registry (N=18) Student Care Services (N=3), Counselling Service (N=3) and miscellaneous others (N=10). These sample groups represent members of the academic community, administration (including HR, staff development, accounts and finance, and customer service personnel), and IT communities.

On return some study packs were spoiled or contained insufficient data. The final number of participants in this study was 52. Of the 52 participants, 2% were academic professorial or reader level, 12% were senior management or academic senior lecturer/researcher grade, 31% were middle or project management, or academic lecturer/researcher level, 21% were between administrative and management levels, or academic junior lecturer/researchers, and 33% were at administrative level or academic research assistant level. 54% of participants were female.

The modal age range of participants was 21-30 (33%), and the modal number of years participants had been using email in their job was 8-11 years (48%). 1 person used gmail (provided by Google) as the email operating system, with 51 participants (98%) using Microsoft Outlook or Outlook Express. The modal number of years participants had been working at their current organisation was 0-3 years (48%).

Measures
Participants were provided with 10-20 individual diary records (one and a half sides of A4) to complete after dealing with each email that interrupted their work over the course of half a working day (up to four hours in length). The diary record contained similar sections to that used in Study Four (see Chapter Six) along with some additional sections. As these additional sections made completion of the questionnaire longer, the amount of time for participants to spend on this study was reduced to a maximum of four hours (compared to a full working day in Study Four). This heeds recommendations by Miner et al. (2005) that diary studies should be as brief as possible to ensure adequate response rates, or else, time periods for taking part should be reduced. Each diary record comprised several sections of questions or checkboxes, designed to elicit the following measures:
Wellbeing
Participants were asked to rate their affective wellbeing on two occasions, using Daniels (2000) 10-item scale, validated in Study Two. As in Study Four, participants were firstly asked to retrospectively consider how they had felt right before receiving an email interruption. Secondly they were asked to rate how they felt at the very point of completing the diary record (i.e., immediately after having dealt with the email).

Email and task characteristics
The stage one was at when the email interruption interrupted the task could be noted by participants by indicating if they were ‘just starting’, ‘in the middle of’, ‘near the end of’, ‘just finishing’ a task. Participants could also record if they had been doing something else (i.e., had not been engaged in a task). It would have been desirable for the stages on the form to reflect the stages in the ART activity cycle (see Chapter Two), but it was considered that participants would have found it too complex to indicate if they were, for example, ‘orienting towards a goal’, or ‘appraising conditions of execution’, etc. As such, the stages represent the life cycle of a task, and are also stages examined by interruptions researchers such as Czerwinski et al. (2000b), and Cutrell et al. (2001).

Participants were then asked to rate, on a 6-point scale (where 1 = not at all and 6 = very much so) the degree to which the interrupted task was lengthy, difficult, clear and specific, and effortful. This reflects the rating process used in Study Four, and reflects the task parameters highlighted by ART, and used by Whittaker & Sidner (1997). Next, participants were asked to rate on a 6-point scale (where 1 = not at all and 6 = very much so) the degree to which the interrupting email was lengthy, difficult, clear and specific, and effortful.

After rating the email and task characteristics, participants then had to comment on the relative importance of the task and the email. Participants had to consider whether, in ‘fulfilling work goals and obligations’ the email was more important, the task was more important, or neither was more important. They were also asked to consider whether, in ‘fulfilling one’s need to feel well and satisfied’ the email was more important, the task was more important, or neither was more important. These questions were designed to
elicit information about the relative importance of the task and email, but in terms of wellbeing and work goals, to understand how strategy choice may be linked to how people prioritise task and wellbeing goals. In hypotheses where the task or email characteristics are not relevant, these measures were still included in the analyses as control variables (as per Study Four).

**Strategies**

Having recorded the characteristics of the email and the task, participants were asked to record the strategy chosen to deal with the email. The distraction strategies measured were based on those identified in the exploratory study, and were the same as those used in Study Four, representing:

- Time taken to attend to an alert (Time 1)
- Time delay before processing the email (Time 2)
- Time spent in the email system (Time 3)

In addition, to asking for timing estimates, in this study, participants were also asked to give a reason if they delayed checking or responding to the email interruption. Participants were simply asked to note down (if they had delayed) why they had not checked the email immediately on alert and/or why they had not responded to the email immediately after checking it.

**Goal priorities**

In this section of the diary record form, participants were asked to indicate (by ticking the appropriate box) whether they believed that their strategy had ‘helped’, ‘hindered’, or ‘neither helped not hindered’ them in achieving their current task goals, other work goals, their wellbeing goals, or other life goals.

After recording goal achievement details, the diary record was completed. In addition to completing a diary record for every email received, participants were also asked to complete two measures of personality – the HPI and MVPI. The HPI and MVPI could be completed on-line, and full instructions were given to participants in their study packs.

**Personality**

Personality characteristics from the FFM were measured using the Hogan Personality Inventory, or HPI (Hogan & Hogan, 1997), as per Study Four.
Details about this instrument can be found in Chapter Six. The sister measure to the HPI, the Motives, Values, Preferences Inventory (MVPI) was included as an additional measure of individual differences, focusing on motivational style.

The MVPI is a 200-item questionnaire that uses a forced choice 'agree' – 'uncertain' – 'disagree' response format. The MVPI was developed by Joyce and Robert Hogan (1998) and is intended to measure ten motivational styles, which comprise an all-encompassing taxonomy of preferences, interests and motives in working adults. These ten themes were captured following intensive literature review, using research conducted by Spranger (1928), Allport (1961), Murray (1938) and Holland (1966, 1985a) amongst others. The MVPI does not have equivalent weight of independent validity support that the HPI has behind it, but has received a good review from the British Psychological Society (BPS Review of Level B Assessments, 2001), and has been used in occupational environments to successfully measure the motivations of people at work (Greig, 1998; Voulgaraki, 1998).

Procedure
Once employees had expressed their interest in participating in this study, they were sent a 'thank-you' email (see Appendix Ten) as an acknowledgement. Then, all participants were sent a study pack (paper copy – see Appendix Eleven), which comprised:

- An Instructions letter
- An 'Instructions and Information' document
- A 'Personal Information' form (slightly different for academics compared with non-academics, in order to cover appropriate job families)
- Ten 'Individual Email Survey' forms
- A Current Well-being form\(^{20}\)
- Informed Consent form to sign
- Instructions for completing the HPI and MVPI on-line
- A postage-paid envelope (for returning all information to me), with a reminder contents sheet folded inside.

\(^{20}\) This was included to ensure the procedure was standardised with Study Four, and to direct people's attention to rating wellbeing, for practice, before the study proper.
Within the Instructions letter, participants were asked to select half a day (of up to four hours), within a selected working week, when they would like to participate in the study. On the half-day chosen, participants were asked to monitor their response to email interruptions over the course of the study period. At the beginning of the study period participants read the Instructions and Information document, outlining what was involved in the study and what they were being asked to do. Participants were clearly informed at this point that they had the right to withdraw at any point. For those happy to continue, the Informed Consent form was signed, and the Current Wellbeing form was completed. They were then asked to fill in some demographic and technical details in the Personal Information form.

After this initial form-filling, participants were asked to log on to their email system and download any email that may have been sent before the start of their study period. Once they had done this they were then asked to begin work as normal, staying on-line throughout the study period. During the course of their normal work, participants were characteristically interrupted by email alerts. They were asked to respond to these as they normally would. The only difference being that each time they actually finished processing an email that had interrupted them they were requested to then immediately complete an Individual Email Survey - the diary record form - before returning to their main task.

At the end of the study period, participants were asked to collect together all of the surveys and return them in an SAE, along with the Current Wellbeing form, Informed Consent form and Personal Information form. A written reminder of what to send back was folded into the SAE.

Participants were also asked to complete the HPI and MVPI on-line at a time convenient to them. Results from the questionnaires were automatically emailed back to the researcher, in confidence.

At the end of the allocated study period, each participant was sent a thank-you email (see Appendix Twelve), which informed them what would happen next, and also contained some debrief questions. A follow-up letter (see Appendix Thirteen) was then sent out, providing a full study debrief, including
details of the prize draw and how to telephone for feedback on their personality profile.

Results
To examine the relationship between strategies used for dealing with email interruptions and how this relates to multi-goal achievement, multilevel random coefficient modelling (MRCM) was adopted. As in Study Four there were two levels to the data. Level-one included individual email data (how each individual email was responded to), and level-two included person data (each participant was a datapoint, and data was collected about their personality and motivational style). There were 52 participants at level-two, and 376 datapoints (relating to each email interruption) at level-one21.

Reasons given for delaying checking or responding to email interruptions were analysed by content analysis. Details of this procedure are outlined in Chapter Three.

Variables
Tables 9-11 outline the variables that were used as explanatory level-one or two variables, or outcome variables in the multilevel analysis. After being prepared as detailed, all non-binary measures at levels one and two were converted to z-scales in order to centre them. All centring is grand mean centred (Tschan et al., 2005). As with Study Four, because the 'Time 1-3' variables were skewed and leptokurtic, they were transformed using logarithm transformation to improve the distribution (improving symmetry and flattening the curve).

The MRCM approach used to formulate the following models is outlined in Chapter Five. Only models that showed significant predictors for a DV are reported (as some DV's did not have any significant predictors in the 'Considering the effectiveness of strategy adopted in achieving one's goals' section below).

21 Debate about the relative acceptability of different sample sizes in multilevel modelling abounds (see JISCMAIL MULTILEVEL users group, March 13, 2006). Elfering et al. (2005) who had 120 level-one datapoints and 23 level-two points, and Harris et al. (2003) who had 228 level-one datapoints and 22 level-two points have recently been published in the well-respected Journal of Occupational and Organizational Psychology.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Rating Scale</th>
<th>Mean</th>
<th>Median</th>
<th>St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>BefPA</td>
<td>Positive Affectivity before receiving the email interruption. Participants were asked how well each PA wellbeing adjective described them.</td>
<td>6-point response scale (1 = not at all; 6 = very much). Ratings for Active and Motivated were added to reversed ratings for Tired and Bored and then divided by 4 to give an average PA score.</td>
<td>4.06</td>
<td>4</td>
<td>0.85</td>
</tr>
<tr>
<td>BefNA</td>
<td>Negative Affectivity before receiving the email interruption. Participants were asked how well each NA wellbeing adjective described them.</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Anxious and Annoyed were added to reversed ratings for At ease and Calm and then divided by 4 to give an average NA score.</td>
<td>2.42</td>
<td>2.25</td>
<td>0.89</td>
</tr>
<tr>
<td>BefDP</td>
<td>Depression-Pleasure before receiving the email interruption. Participants were asked how well each D-P wellbeing adjective described them.</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Happy were added to reversed ratings for Gloomy and then divided by 2 to give an average DP score.</td>
<td>4.78</td>
<td>5</td>
<td>0.91</td>
</tr>
<tr>
<td>AftPA</td>
<td>Positive Affectivity after leaving the email system. Participants were asked how well each PA wellbeing adjective described them.</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Active and Motivated were added to reversed ratings for Tired and Bored and then divided by 4 to give an average PA score.</td>
<td>4.06</td>
<td>4</td>
<td>0.84</td>
</tr>
<tr>
<td>AftNA</td>
<td>Negative Affectivity after leaving the email system. Participants were asked how well each NA wellbeing adjective described them.</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Anxious and Annoyed were added to reversed ratings for At ease and Calm and then divided by 4 to give an average NA score.</td>
<td>2.45</td>
<td>2.25</td>
<td>0.92</td>
</tr>
<tr>
<td>AftDP</td>
<td>Depression-Pleasure after leaving the email system. Participants were asked how well each D-P wellbeing adjective described them.</td>
<td>6 point response scale (1 = not at all; 6 = very much). Ratings for Happy were added to reversed ratings for Gloomy and then divided by 2 to give an average DP score.</td>
<td>4.80</td>
<td>5</td>
<td>0.93</td>
</tr>
<tr>
<td>ChangePA</td>
<td>Change in Positive Affectivity from before to after dealing with the email interruption. BefPA scores are subtracted from AftPA scores</td>
<td>0.01</td>
<td>0</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>ChangeNA</td>
<td>Change in Negative Affectivity from before to after dealing with the email interruption. BefNA scores are subtracted from AftNA scores</td>
<td>0.03</td>
<td>0</td>
<td>0.48</td>
<td></td>
</tr>
<tr>
<td>ChangeDP</td>
<td>Change in Depression-Pleasure from before to after dealing with the email interruption. BefDP scores are subtracted from AftDP scores</td>
<td>0.02</td>
<td>0</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>Email Length</td>
<td>How long was the email construed to be 1-6 scale (where 6 = most lengthy)</td>
<td>2.00</td>
<td>1</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>Email Difficult</td>
<td>How difficult was the email construed to be 1-6 scale (where 6 = most difficult)</td>
<td>1.79</td>
<td>1</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Email Clear</td>
<td>How clear was the email construed to be 1-6 scale (where 6 = most clear)</td>
<td>4.49</td>
<td>5</td>
<td>1.62</td>
<td></td>
</tr>
<tr>
<td>Email Effort</td>
<td>How effortful was the email construed to be 1-6 scale (where 6 = most effortful)</td>
<td>2.07</td>
<td>2</td>
<td>1.38</td>
<td></td>
</tr>
<tr>
<td>Task Length</td>
<td>How long was the task construed to be 1-6 scale (where 6 = most lengthy)</td>
<td>3.39</td>
<td>4</td>
<td>1.72</td>
<td></td>
</tr>
<tr>
<td><strong>Table Nine cond...</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>-------------------------</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Task</strong></td>
<td><strong>How difficult was the task construed to be</strong></td>
<td><strong>1-6 scale (where 6 = most difficult)</strong></td>
<td><strong>3.01</strong></td>
<td><strong>3</strong></td>
<td><strong>1.52</strong></td>
</tr>
<tr>
<td><strong>Task Clear</strong></td>
<td><strong>How clear was the task construed to be</strong></td>
<td><strong>1-6 scale (where 6 = most clear)</strong></td>
<td><strong>4.26</strong></td>
<td><strong>4</strong></td>
<td><strong>1.50</strong></td>
</tr>
<tr>
<td><strong>Task Effort</strong></td>
<td><strong>How effortful was the task construed to be</strong></td>
<td><strong>1-6 scale (where 6 = most effortful)</strong></td>
<td><strong>3.32</strong></td>
<td><strong>4</strong></td>
<td><strong>1.58</strong></td>
</tr>
<tr>
<td><strong>Difference in Length</strong></td>
<td><strong>How many 'points' more lengthy the task is than the email. A negative score indicates the email was more lengthy.</strong></td>
<td><strong>The email score for length was subtracted from the task score for length. -5-5 (where 5 = the task was much more lengthy than the email)</strong></td>
<td><strong>1.41</strong></td>
<td><strong>1</strong></td>
<td><strong>1.99</strong></td>
</tr>
<tr>
<td><strong>Difference in Difficult</strong></td>
<td><strong>How many 'points' more difficult the task is than the email. A negative score indicates the email was more difficult.</strong></td>
<td><strong>The email score for difficult was subtracted from the task score for difficult. -5-5 (where 5 = the task was much more difficult than the email)</strong></td>
<td><strong>1.21</strong></td>
<td><strong>1</strong></td>
<td><strong>1.80</strong></td>
</tr>
<tr>
<td><strong>Difference in Clear</strong></td>
<td><strong>How many 'points' more clear and specific the task is than the email. A negative score indicates the email was more clear and specific.</strong></td>
<td><strong>The email score for clear and specific was subtracted from the task score for clear and specific. -5-5 (where 5 = the task was much more clear than the email)</strong></td>
<td><strong>-0.22</strong></td>
<td><strong>0</strong></td>
<td><strong>1.93</strong></td>
</tr>
<tr>
<td><strong>Difference in Effort</strong></td>
<td><strong>How many 'points' more effortful the task is than the email. A negative score indicates the email was more effortful.</strong></td>
<td><strong>The email score for effort was subtracted from the task score for effort. -5-5 (where 5 = the task was much more effortful than the email)</strong></td>
<td><strong>1.29</strong></td>
<td><strong>1</strong></td>
<td><strong>1.99</strong></td>
</tr>
<tr>
<td><strong>Time1 (LOG1)</strong></td>
<td><strong>The participants’ estimates about how long it took them to check the email on receiving the alert</strong></td>
<td><strong>Time measured in seconds, then transformed by logarithmic transformation</strong></td>
<td><strong>275.8</strong></td>
<td><strong>0</strong></td>
<td><strong>644.9</strong></td>
</tr>
<tr>
<td><strong>Time2 (LOG2)</strong></td>
<td><strong>The participants’ estimates about how long it took them to respond to the email after checking it</strong></td>
<td><strong>Time measured in seconds, then transformed by logarithmic transformation</strong></td>
<td><strong>215.2</strong></td>
<td><strong>0</strong></td>
<td><strong>996.8</strong></td>
</tr>
<tr>
<td><strong>Time3 (LOG3)</strong></td>
<td><strong>The participants’ estimates (in seconds) about how long they then spent in the email system.</strong></td>
<td><strong>Time measured in seconds, then transformed by logarithmic transformation</strong></td>
<td><strong>156.3</strong></td>
<td><strong>60</strong></td>
<td><strong>239.3</strong></td>
</tr>
<tr>
<td>Variable</td>
<td>Definition</td>
<td>Number Coded '1'</td>
<td>Number Coded '0'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Start</td>
<td>Participants were given a '1' if they indicate they were working at the start of a task when interrupted by the email, and '0' if they chose any other stage.</td>
<td>56</td>
<td>317</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>Participants were given a '1' if they indicate they were working at the middle of a task when interrupted by the email, and '0' if they chose any other stage.</td>
<td>168</td>
<td>205</td>
<td></td>
<td></td>
</tr>
<tr>
<td>End</td>
<td>Participants were given a '1' if they indicate they were working at the end of a task when interrupted by the email, and '0' if they chose any other stage.</td>
<td>38</td>
<td>335</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finished</td>
<td>Participants were given a '1' if they indicate they had just finished a task when interrupted by the email, and '0' if they chose any other stage.</td>
<td>84</td>
<td>289</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task more important to work</td>
<td>Participants were given a '1' if they ticked the box claiming the task was more important to fulfilling my work goals and obligations, and '0' if they did not.</td>
<td>195</td>
<td>180</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task more important to wellbeing</td>
<td>Participants were given a '1' if they ticked the box claiming the task was more important to fulfilling my need to feel well and satisfied, and '0' if they did not.</td>
<td>138</td>
<td>237</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email more important to work</td>
<td>Participants were given a '1' if they ticked the box claiming the email was more important to fulfilling my work goals and obligations, and '0' if they did not.</td>
<td>82</td>
<td>293</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email more important to wellbeing</td>
<td>Participants were given a '1' if they ticked the box claiming the email was more important to fulfilling my need to feel well and satisfied, and '0' if they did not.</td>
<td>79</td>
<td>296</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy hinders task goal</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'hindered' their achievement of the current task goal. A '0' indicated that they did not tick that relevant box.</td>
<td>132</td>
<td>244</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy help task goal</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'helped' their achievement of the current task goal. A '0' indicated that they did not tick that relevant box.</td>
<td>67</td>
<td>309</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy neither helps nor hinders task goal</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'neither helped nor hindered' their achievement of the current task goal. A '0' indicated that they did not tick that relevant box.</td>
<td>176</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy hinders other work goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'hindered' their achievement of other work goals. A '0' indicated that they did not tick that relevant box.</td>
<td>49</td>
<td>327</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy helps other work goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'helped' their achievement of other work goals. A '0' indicated that they did not tick that relevant box.</td>
<td>150</td>
<td>226</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Strategy neither helps nor hinders other work goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'neither helped nor hindered' their achievement of other work goals. A '0' indicated that they did not tick that relevant box.</td>
<td>176</td>
<td>200</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table Ten cond...

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy hinders wellbeing goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'hindered' their achievement of their wellbeing goals. A '0' indicated that they did not tick that relevant box.</td>
<td>42</td>
<td>334</td>
</tr>
<tr>
<td>Strategy helps wellbeing goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'helped' their achievement of their wellbeing goals. A '0' indicated that they did not tick that relevant box.</td>
<td>124</td>
<td>252</td>
</tr>
<tr>
<td>Strategy neither helps nor hinders wellbeing goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'neither helped nor hindered' their achievement of their wellbeing goals. A '0' indicated that they did not tick that relevant box.</td>
<td>208</td>
<td>168</td>
</tr>
<tr>
<td>Strategy hinders life goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'hindered' their achievement of general life goals. A '0' indicated that they did not tick that relevant box.</td>
<td>31</td>
<td>345</td>
</tr>
<tr>
<td>Strategy helps life goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'helped' their achievement of general life goals. A '0' indicated that they did not tick that relevant box.</td>
<td>37</td>
<td>339</td>
</tr>
<tr>
<td>Strategy neither helps nor hinders life goals</td>
<td>Participants were given a '1' if they ticked the box indicating that their strategy for dealing with the email interruption had 'neither helped nor hindered' their achievement of general life goals. A '0' indicated that they did not tick that relevant box.</td>
<td>305</td>
<td>71</td>
</tr>
</tbody>
</table>

N.B. As strategies for helping or hindering life goals were rarely reported, these variables were omitted from the analyses.
Table Eleven: Level-two variables and descriptive statistics (uncentred)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Rating Scale</th>
<th>Mean</th>
<th>St. Dev</th>
<th>UK Mean</th>
<th>UK St. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADJ</td>
<td>HPI Adjustment: A measure of emotional stability. High scorers are steady, calm and self-accepting; low scorers are self-critical and tense.</td>
<td>Possible raw scores are from 1-37.</td>
<td>22.27</td>
<td>6.95</td>
<td>24.50</td>
<td>6.94</td>
</tr>
<tr>
<td>AMB</td>
<td>HPI Ambition: A measure of extraversion. High scorers are socially self confident, driven and energetic; low scorers are reticent and unlikely to push themselves forward in their work.</td>
<td>Possible raw scores are from 1-29.</td>
<td>18.33</td>
<td>5.62</td>
<td>22.59</td>
<td>5.68</td>
</tr>
<tr>
<td>SOC</td>
<td>HPI Sociability: A measure of extraversion. High scorers need and enjoy interacting with others; low scorers dislike being the centre of attention and busy social events.</td>
<td>Possible raw scores are from 1-24.</td>
<td>11.38</td>
<td>5.00</td>
<td>14.97</td>
<td>4.70</td>
</tr>
<tr>
<td>AGR</td>
<td>HPI Agreeability: A measure of agreeableness. High scorers are perceptive, tactful and socially sensitive; low scorers are unconcerned about people’s opinions and can be brusque.</td>
<td>Possible raw scores are from 1-22.</td>
<td>18.10</td>
<td>2.97</td>
<td>18.50</td>
<td>2.80</td>
</tr>
<tr>
<td>PRU</td>
<td>HPI Prudence: A measure of conscientiousness or self-control. High scorers are conforming and dependable; low scorers are flexible, careless and disorganised.</td>
<td>Possible raw scores are from 1-31.</td>
<td>20.29</td>
<td>4.44</td>
<td>17.96</td>
<td>4.47</td>
</tr>
<tr>
<td>INT</td>
<td>HPI Intellectance: A measure of openness. High scorers appear bright, curious and open to experience; low scorers are cautious and like familiar or routine work.</td>
<td>Possible raw scores are from 1-25.</td>
<td>13.29</td>
<td>4.18</td>
<td>14.53</td>
<td>4.70</td>
</tr>
<tr>
<td>SCH</td>
<td>HPI Scholarship: A measure of openness. High scorers enjoy academic activity and continuous educational opportunities; low scorers dislike formal learning.</td>
<td>Possible raw scores are from 1-14.</td>
<td>8.79</td>
<td>3.00</td>
<td>8.79</td>
<td>3.09</td>
</tr>
<tr>
<td>REC</td>
<td>MVPI Recognition. High scorers value public praise and attention; low scorers are irritated by people who blow their own trumpet.</td>
<td>Possible raw scores are from 20-60.</td>
<td>38.48</td>
<td>7.07</td>
<td>42.3</td>
<td>7.19</td>
</tr>
<tr>
<td>POW</td>
<td>MVPI Power. High scorers value success, accomplishment and control; low scorers prefer to use consensus and collaboration to get things done.</td>
<td>Possible raw scores are from 20-60.</td>
<td>40.33</td>
<td>7.40</td>
<td>45.7</td>
<td>7.31</td>
</tr>
<tr>
<td>HED</td>
<td>High scorers are oriented towards fun, pleasure and enjoyment; low scorers prefer restraint and moderation in the workplace.</td>
<td>Possible raw scores are from 20-60.</td>
<td>39.65</td>
<td>7.43</td>
<td>42.4</td>
<td>6.34</td>
</tr>
<tr>
<td>ALT</td>
<td>MVPI Altruism. High scorers are concerned about the welfare of others; low scorers tend to prioritise their own agenda.</td>
<td>Possible raw scores are from 20-60.</td>
<td>48.65</td>
<td>5.91</td>
<td>47.6</td>
<td>6.98</td>
</tr>
<tr>
<td>AFF</td>
<td>MVPI Affiliation. High scorers desire and enjoy constant and varied social interaction; low scorers are not motivated by being with others.</td>
<td>Possible raw scores are from 20-60.</td>
<td>46.89</td>
<td>6.04</td>
<td>50.7</td>
<td>5.82</td>
</tr>
<tr>
<td>TRA</td>
<td>MVPI Tradition. High scorers are interested in proper, established codes of conduct; low scorers are not motivated by being with others.</td>
<td>Possible raw scores are from 20-60.</td>
<td>43.74</td>
<td>5.31</td>
<td>40.2</td>
<td>6.01</td>
</tr>
<tr>
<td>SEC</td>
<td>MVPI Security. High scorers value certainty, structure and predictability; low scorers enjoy change and variety and are open to risk and uncertainty.</td>
<td>Possible raw scores are from 20-60.</td>
<td>40.83</td>
<td>5.74</td>
<td>38.1</td>
<td>6.76</td>
</tr>
<tr>
<td>BUS</td>
<td>MVPI Business. High scorers are interested in commerce and finance; low scorers do not value the power attributed to money and enterprise.</td>
<td>Possible raw scores are from 20-60.</td>
<td>38.93</td>
<td>6.69</td>
<td>42.6</td>
<td>7.78</td>
</tr>
<tr>
<td>CUL</td>
<td>MVPI Culture. High scorers value art, literature and the appearance of products and things; low scorers are interested in concrete, practical concerns.</td>
<td>Possible raw scores are from 20-60.</td>
<td>35.43</td>
<td>9.09</td>
<td>33.2</td>
<td>8.31</td>
</tr>
<tr>
<td>RAT</td>
<td>MVPI Rationality. High scorers value science and technology; low scorers are more interested in working intuitively.</td>
<td>Possible raw scores are from 20-60.</td>
<td>40.11</td>
<td>8.87</td>
<td>38.4</td>
<td>7.88</td>
</tr>
</tbody>
</table>
As explained in the Study Four Results section, in each model several hypotheses may be addressed. Although it may be preferable to deal with each hypothesis in turn when reporting study results, it is unavoidable that in multilevel modelling a model-by-model reporting style must be adopted. To add clarity, Table Twelve shows how each hypothesis relates to each model. In addition, reference to each hypothesis that has been supported will immediately follow each model. A comprehensive review of whether the hypotheses were supported or refuted, will then be provided at the end of this Results section.

**Table Twelve: Relating the Study Six hypotheses to the MRCM models**

<table>
<thead>
<tr>
<th>Model</th>
<th>Hypotheses tested</th>
<th>Theory supported if hypothesis is supported:</th>
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<tbody>
<tr>
<td>10</td>
<td>1</td>
<td>ART; Hockey</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ART; Hockey</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Task stage matters</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Hockey</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>The role of motivational style</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>ART; Hockey</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ART; Hockey</td>
</tr>
<tr>
<td></td>
<td>3</td>
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</tr>
<tr>
<td></td>
<td>4</td>
<td>Hockey</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>The role of motivational style</td>
</tr>
<tr>
<td>12</td>
<td>1</td>
<td>ART; Hockey</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>ART; Hockey</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Task stage matters</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Hockey</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>The role of motivational style</td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>Hockey/amalgamated approach</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>The role of motivational style</td>
</tr>
<tr>
<td>14</td>
<td>6</td>
<td>Hockey/amalgamated approach</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>The role of motivational style</td>
</tr>
<tr>
<td>15</td>
<td>6</td>
<td>Hockey/amalgamated approach</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>The role of motivational style</td>
</tr>
<tr>
<td>16</td>
<td>5</td>
<td>Hockey; Lazarus</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Hockey/amalgamated approach</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Hockey OR ART</td>
</tr>
<tr>
<td>17</td>
<td>5</td>
<td>Hockey; Lazarus</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Hockey/amalgamated approach</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Hockey OR ART</td>
</tr>
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<td>18</td>
<td>5</td>
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<td>19</td>
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<td></td>
<td>7</td>
<td>Hockey OR ART</td>
</tr>
</tbody>
</table>

The content analyses related to Hypotheses One, Two, and Three.
**Strategies for dealing with email interruptions**

**Model Ten:** Predictors of the speed of response to check an email interruption after having been alerted to its presence

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>-0.064 (0.097)</td>
<td>-0.089 (0.095)</td>
<td>-0.038 (0.093)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Start</td>
<td>-0.296 (0.124)**</td>
<td>-0.365 (0.132)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Finished</td>
<td>0.408 (0.118)**</td>
<td>0.362 (0.127)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Altruism</td>
<td></td>
<td>0.293 (0.090)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rationality</td>
<td></td>
<td>0.227 (0.090)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>Uoju</td>
<td>0.388 (0.095)**</td>
<td>0.319 (0.081)**</td>
<td>0.251 (0.072)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.590 (0.046)**</td>
<td>0.566 (0.045)**</td>
<td>0.537 (0.046)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>952.608 (375 cases)</td>
<td>923.673 (372 cases)</td>
<td>776.455 (322 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 176.153 (4 df) p > 0.000

* = p > 0.05; ** = p > 0.01

At level-one this model demonstrates that when one is at the start of a new task one will respond more quickly to an email alert. However, having finished a task one will take longer to check an email alert, although the degree to which one is tardy differs from person to person. So, it seems one is more easily distracted at the beginning of a new task. On completing a task it appears that people may choose to take a complete break – deciding not to deal with email interruptions, even though they are not doing anything else. The finding that task stage matters, as a predictor of strategy employed, adds support to Hypothesis Three.

On entering the level-two variables however, the 'finished' stage variable was no longer significant. Affiliation, a level-two variable that was individually predictive at random slopes only, also lost significance when entered with the other level-two variables at an earlier stage, and so was omitted. However the final level-two model suggests that people who are motivated by Altruism (helping others and attending to their needs), and Rationality (being logical, rational and methodical) take longer to check an email interruption. Or, to reverse the direction, people who prioritise their own agenda (low altruism) and who are impulsive and intuitive in their approach to work (low rationality)
will check an email quickly after an alert. This supports Hypothesis Eight and indicates that motivational style is a predictor of strategy choice.

**Model Eleven**: Predictors of the speed of response in dealing with the email after checking the email interruption

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>-0.018 (0.078)</td>
<td>0.040 (0.080)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Finished</td>
<td>-0.263 (0.124)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difference in effort</td>
<td>0.196 (0.075)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Difference in effort</td>
<td>0.103 (0.047)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Intercept/Difference in effort</td>
<td>0.052 (0.038)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>U0j</td>
<td>0.192 (0.062)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.775 (0.061)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2*log Likelihood</td>
<td>1008.479 (371 cases)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>920.717 (352 cases)</td>
<td></td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 87.762 (4df) p>0.000
* = p>0.05; ** = p>0.01

Email length, difficulty and effort were also individually predictive when entered into random slopes and intercepts models. However, when entered together into the grand level-one model (in an earlier stage) they lost significance. They were therefore omitted from the final model. The difference in difficulty was also a significant predictor when entered individually (in the variation around the slope). However, when entered together with the difference in effort, a model would not converge. The difference in effort model was thus chosen as superior because it had a better fit (log likelihood).

Finally, after having checked the email, if it was considered to be important in satisfying wellbeing goals, then time taken to respond was quicker. Again though, this variable lost significance when entered into the grand model.

The final level-one model demonstrates that when people have finished a task they are more likely to respond quickly to an email after checking it. So although the previous model indicates that 'checking' the email in the first place may be delayed if people have finished a task, once they have checked the email they are likely to respond to it immediately (rather than deferring it until later). Again, the significance of task stage as a predictor adds support to Hypothesis Three.
In addition, this model reveals that when the task is rated to be more effortful than the email people will delay responding to the email, and for some people, this delay lasts much longer than for other people. This provides supports for Hypothesis Two.

No personality or motivational variables predicted this DV, either individually or in a grand model, which does not support Hypothesis Eight.

**Model Twelve**: Predictors of time spent dealing with the email in the email system

<table>
<thead>
<tr>
<th>Fixed/Random Variable</th>
<th>Null model (2 level) predictors</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-0.006 (0.090)</td>
<td>0.173 (0.091)</td>
<td>0.179 (0.088)*</td>
</tr>
<tr>
<td>Fixed effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Email length</td>
<td>0.144 (0.051)**</td>
<td>0.112 (0.054)*</td>
<td></td>
</tr>
<tr>
<td>Email effort</td>
<td>0.432 (0.050)**</td>
<td>0.479 (0.054)**</td>
<td></td>
</tr>
<tr>
<td>Task more important to wellbeing</td>
<td>-0.308 (0.093)**</td>
<td>-0.341 (0.098)**</td>
<td></td>
</tr>
<tr>
<td>Intellectance</td>
<td></td>
<td></td>
<td>0.218 (0.080)**</td>
</tr>
<tr>
<td>Random effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uoj</td>
<td>0.281 (0.081)**</td>
<td>0.250 (0.067)**</td>
<td>0.194 (0.058)**</td>
</tr>
<tr>
<td>Eij</td>
<td>0.750 (0.062)**</td>
<td>0.465 (0.039)**</td>
<td>0.470 (0.041)**</td>
</tr>
<tr>
<td>2*Log Likelihood</td>
<td>941.425 (345 cases)</td>
<td>752.704 (329 cases)</td>
<td>692.225 (305 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 249.20 (4df) p>0.000
* = p>0.05; ** = p>0.01

Task difficulty (at random slopes only), email difficulty and email clarity, along with the difference in effort, length and difficulty between the task and email were all individually significant as predictors of LOG3. However, these variables lost significance when entered into the grand model (in earlier stages).

The final level-one model indicates that if an email is construed to be lengthy and effortful, people will spend longer dealing with this. This is a sensible finding, and replicates findings from Study Four.
In addition, if the task was perceived to be more important to one's wellbeing goals than the email, people spent less time dealing with the email. This provides some support for Hypothesis Four, as it indicates that people weigh up their wellbeing goal priorities in making decisions about their activity. Plus, it seems that people may well prioritise an action program that promotes wellbeing goals over and above those that prioritise task goals (which were not significant predictors of time spent dealing with email).

In the level-two model, Intellectance and Affiliation (random slopes only) were individually predictive of time spent dealing with email. Entered together into an earlier level-two only model, Affiliation lost significance. The final level-two model then contains all of the level-one variables predictive in the level-one model, along with Intellectance. This reveals that people who come across as bright, analytical and open to new experiences are more likely to spend longer dealing with email. The reverse trend is also insightful here, as people with low Intellectance are described as preferring routine and being narrow-minded. As such, they may be less likely to be distracted away from their work by an email. As motivational style did not add incremental validity beyond personality Hypothesis Eight is not supported. However, the fact that personality directly predicts strategy choice here adds to the results of Study Four.

Content analysis of 'delay' reasons
Participants who delayed checking their email on alert (Time 1) or who delayed responding to the email after checking it (Time 2) were asked to give reasons for delaying. This was to inform as to what processes are involved in people's decisions to act. Thirty-four people delayed checking an email after alert at Time 1 on 121 out of a total 376 occasions. Reasons were recorded for 117 of those 121 times. Twenty-two people delayed responding to an email after checking at Time 2 on 57 out of a total 376 occasions. Reasons were recorded for 54 of those 57 times.

For Time 1, the 117 reasons noted were collated, and then, using content analysis, the reasons were summarised into eight categories and given a code. The 117 reasons were then allocated one of the eight categories, as follows:
Figure Eleven: Category codes allocated to reasons for delaying immediate checking of email (Time 1) following an alert

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
<th>Number of reasons allocated to category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentrating on task</td>
<td>1.1</td>
<td>52</td>
</tr>
<tr>
<td>Finishing something off</td>
<td>1.2</td>
<td>20</td>
</tr>
<tr>
<td>Avoiding interruptions</td>
<td>1.3</td>
<td>2</td>
</tr>
<tr>
<td>Engaged in synchronous exchange</td>
<td>1.4</td>
<td>27</td>
</tr>
<tr>
<td>Called/went away</td>
<td>1.5</td>
<td>3</td>
</tr>
<tr>
<td>Task too important</td>
<td>1.6</td>
<td>1</td>
</tr>
<tr>
<td>Habitual strategy to delay</td>
<td>1.7</td>
<td>11</td>
</tr>
<tr>
<td>Other</td>
<td>1.8</td>
<td>1</td>
</tr>
</tbody>
</table>

All of the categories, bar category 1.7 show that the reason why people may not immediately check an email when interrupted by an alert are preoccupied in their 'moment'. So they have prioritised the task – whatever it is and for whatever reason, over and above the email – even though they don’t know what the email is about or how urgent it is. This provides support for Hypothesis One; people delay because the current task is demanding in its own right. Two categories reveal that people may adopt a specific strategy quite consciously – e.g., 1.3 and 1.7 show that people may delay checking because they are actively avoiding interruptions – either momentarily (1.3) or as part of a general approach to managing email (1.7). Note also that when people are interrupted by a message box alert, or by the presence of email in an open inbox they occasionally reported reasons for delaying as being due to the email not being important. In such cases, where it was clear that email content had been checked, the participants’ responses were moved to Time 2 categories, along with their reasons. This means that Time 1 reasons are not
in any way related to a comparison of email priority to task, as in every case the email has not been opened/checked or assessed.

For Time 2, the 54 reasons noted were collated, and then, using content analysis, the reasons were summarised into six categories and given a code.

The 54 reasons were then allocated one of the six categories, as follows:

**Figure Twelve:** Category codes allocated to reasons for delaying responding to email (Time 2) following checking the email

<table>
<thead>
<tr>
<th>Category</th>
<th>Code</th>
<th>Number of reasons allocated to category code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prioritised task above email</td>
<td>2.1</td>
<td>29</td>
</tr>
<tr>
<td>Email for information only</td>
<td>2.2</td>
<td>5</td>
</tr>
<tr>
<td>Engaged by synchronous interruption</td>
<td>2.3</td>
<td>2</td>
</tr>
<tr>
<td>Waiting to finish or pause task at appropriate point</td>
<td>2.4</td>
<td>9</td>
</tr>
<tr>
<td>Need to clarify/check something before responding</td>
<td>2.5</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>2.6</td>
<td>3</td>
</tr>
</tbody>
</table>

Nine out of fifty-four reasons given for dealing responding to an interruption were attributed to 'finishing off'. This supports Hypothesis One; people delayed because of the demands of the current task. Three out of the six reasons referred to people prioritising the task above the email — i.e., participants make an assessment of the relative importance of the email versus the task, with delays occurring when the task has priority. This supports Hypothesis Two and indicates that people engage in a weighing up process before deciding whether to delay. The other reason given was
attributed to the fact that people may need to check or clarify information before responding to an email. In general though, reasons for delay at this stage refer to the importance of the task over the email.

Interestingly, reasons for delaying response at both Time 1 and Time 2 included prioritising synchronous communications. If participants were talking with someone, either in person, on the telephone, or as part of a meeting, this took priority over checking or dealing with an email. Participants wouldn’t necessarily know if the email content was more important (particularly at Time 1). This indicates that people may adopt different strategies for dealing with synchronous compared to asynchronous communications, and demonstrate that if you really want to be sure of receiving someone’s attention, adopting a synchronous technique may be the best strategy. This is an area that would benefit from further exploration.

Wellbeing after finishing dealing with email

As with Study Four, the ‘before’ rating for each wellbeing construct was entered after the two-level null model, in order that wellbeing after the email interruption only accounted for a change in wellbeing variance (Miner et al., 2005). This means that any predictors of ‘after’ wellbeing ratings are predicting the change in wellbeing from before to after dealing with an email interruption.
**Model Thirteen**: Predictors of positive affectivity after an email interruption

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>0.042 (0.128)</td>
<td>-0.004 (0.025)</td>
<td>0.009 (0.021)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>BefPA</td>
<td>0.909 (0.020)**</td>
<td>Removed</td>
<td>0.918 (0.021)**</td>
</tr>
<tr>
<td></td>
<td>Email more important to wellbeing</td>
<td>0.084 (0.041)*</td>
<td>Removed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategy hinders other goals</td>
<td>-0.003 (0.079)</td>
<td>Removed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business</td>
<td></td>
<td></td>
<td>0.049 (0.023)*</td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Strategy hinders other goals</td>
<td>0.108 (0.050)*</td>
<td>Removed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intercept/strategy hinders other goals</td>
<td>-0.031 (0.015)*</td>
<td>Removed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.769 (0.163)**</td>
<td>0.010 (0.005)*</td>
<td>0.004 (0.004)</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.205 (0.017)**</td>
<td>0.087 (0.007)**</td>
<td>0.098 (0.009)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>580.431 (340 cases)</td>
<td>175.186 (340 cases)</td>
<td>160.743 (291 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 419.688 (2df) p>0.000
* = p>0.05; ** = p>0.01

The level-one model suggests that when the email was considered to be more important than the task in achieving wellbeing goals, people feel more positive (active and motivated) after having dealt with it. In addition, if one considers that their strategy for dealing with email has hindered the achievement of other work goals some people will feel more positive afterwards (active and motivated), whilst others feel less positive (tired and bored). This contradiction may be due to the fact that on some occasions the email was related to achieving other goals, on some occasions the email distracted from other goals.

Entering the level-two predictor, Business, rendered the level-one variables non-significant however. Therefore, the final, grand level-two model suggests that the only predictor of how much more active and motivated one feels after dealing with an email is whether one is motivated by Business values (i.e.,
interested in commerce, profit-making, and enterprise). This finding supports Hypothesis Nine. It is also noted that on entering the level-two variables, the variance attributed to differences between people (Uoj) lost significance, indicating that this had been explained by the explanatory variables.

**Model Fourteen:** Predictors of negative affectivity after an email interruption

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed effects</td>
<td>Intercept</td>
<td>-0.052 (0.115)</td>
<td>0.051 (0.058)</td>
<td>0.041 (0.062)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>BefNA</td>
<td>0.833 (0.029)**</td>
<td>0.847 (0.028)**</td>
<td></td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Email effort</td>
<td>0.154 (0.026)**</td>
<td>0.160 (0.026)**</td>
<td></td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Strategy helps other work goals</td>
<td>0.057 (0.081)</td>
<td>0.047 (0.085)</td>
<td></td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Strategy neither helps nor hinders wellbeing goals</td>
<td>-0.074 (0.073)</td>
<td>-0.006 (0.071)</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>Sociability</td>
<td></td>
<td></td>
<td>0.066 (0.026)**</td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Strategy helps other work goals</td>
<td>0.124 (0.056)*</td>
<td>0.147 (0.061)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Strategy neither helps nor hinders wellbeing goals</td>
<td>0.126 (0.051)**</td>
<td>0.089 (0.043)*</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>COV Intercept/Strategy helps other tasks</td>
<td>0.017 (0.031)</td>
<td>0.010 (0.033)</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>COV Intercept/Strategy neither helps nor hinders wellbeing goals</td>
<td>-0.089 (0.035)*</td>
<td>-0.082 (0.034)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>COV Strategy helps other tasks/Strategy neither helps nor hinders wellbeing goals</td>
<td>-0.007 (0.038)</td>
<td>-0.018 (0.036)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.583 (0.132)**</td>
<td>0.058 (0.028)*</td>
<td>0.061 (0.030)*</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.376 (0.031)**</td>
<td>0.169 (0.015)**</td>
<td>0.168 (0.016)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>751.193 (342 cases)</td>
<td>430.463 (335 cases)</td>
<td>382.043 (310 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 369.15 (10df) p<0.000

* = p>0.05; ** = p>0.01
The clarity and difficulty of the email, and the difference in the effort, difficulty and clarity of email compared to the task were all individually significant, but lost significance in earlier stages of creating the grand level-one model. Additionally, appraising the task as being more important to the fulfilment of wellbeing goals, and spending longer dealing with the email were individual predictors, until entered into the final level-one model. They were omitted when they lost significance. Believing one's strategy neither helped nor hindered the achievement of a task goal was individually predictive, as was the belief that one's strategy hindered the achievement of other task goals. Again, these predictors lost significance en masse and so were removed.

The final level-one model reveals that when one perceives the email to be effortful, they will feel more anxious and annoyed after having dealt with it. So the characteristics of the email itself can affect how one feels about it. For some people, if they believe that their strategy helped them to achieve other work goals they will feel more annoyed and anxious afterwards, whereas for others they will feel calm and at ease. This finding might suggest that annoyance with the email depends upon whether the email itself was involved in the fulfilment of other work goals. If the email was related to other work goals, then people may feel more calm and at ease after dealing with it. Whereas if the email wasn't related to other work goals people may feel annoyed and anxious by its presence. Strategy was interacted with this variable, but no significant effects were found, so one cannot conclude which strategy led to either annoyance or calmness. As such, support for Hypothesis Six is achieved, but the direction of the results is inconclusive.

For some people, if they believe their strategy neither helped nor hindered wellbeing they feel more annoyed and anxious, whereas others felt more calm and at ease. This could be explained if people are frustrated that dealing with email did not have an effect on their wellbeing (so they feel more negative), whereas others may be relieved that the email had no effect on them (either good or bad) and so feel more calm and at ease afterwards. Again, this supports Hypothesis Six, but the conflicting direction of results does not help clarify a direction here.

At level-two, the level-one variables maintained their predictive power, and Sociability was also found to be significant (displacing Agreeableness in a grand
This finding reveals that people who are outgoing, extravert and gregarious feel more annoyed and anxious after dealing with email. In reverse, this also means that people who are introverted, unassuming and quiet feel more calm and at ease afterwards. Due to the fact that motivational style was not predictive here, there is no support for Hypothesis Nine.

**Model Fifteen: Predictors of depression-pleasure after an email interruption**

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>0.100 (0.124)</td>
<td>0.015 (0.052)</td>
<td>-0.009 (0.045)</td>
</tr>
<tr>
<td>Fixed effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BefDP</td>
<td>0.783 (0.030)**</td>
<td>0.825 (0.029)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Email difficulty</td>
<td>-0.118 (0.022)**</td>
<td>-0.130 (0.023)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Task more important to wellbeing</td>
<td>-0.129 (0.051)**</td>
<td>-0.150 (0.051)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategy helps wellbeing goals</td>
<td>0.195 (0.066)**</td>
<td>0.203 (0.062)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategy hinders wellbeing goals</td>
<td>-0.242 (0.083)**</td>
<td>-0.257 (0.081)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjustment</td>
<td></td>
<td></td>
<td>0.056 (0.028)*</td>
</tr>
<tr>
<td></td>
<td>Prudence</td>
<td>0.054 (0.027)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VAR strategy helps wellbeing goals</td>
<td>0.084 (0.038)*</td>
<td>0.053 (0.032)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Intercept/strategy helps wellbeing goals</td>
<td>-0.065 (0.025)**</td>
<td>-0.032 (0.018)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.711 (0.152)**</td>
<td>0.060 (0.020)**</td>
<td>0.023 (0.012)</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.231 (0.019)**</td>
<td>0.137 (0.012)**</td>
<td>0.140 (0.012)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>617.274 (343 cases)</td>
<td>342.563 (336 cases)</td>
<td>301.493 (312 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 315.781 (9df) p>0.000  
* = p>0.05; ** = p>0.01

When entered individually the length (negative), clarity and effortfulness (negative) of the email, along with a belief that the email was more important to wellbeing than the task, predicted an increase in happiness after an email has interrupted. However, when entered en masse, they lost significance. Additionally a belief that one's strategy hindered the achievement of current...
task or other goals, or neither helped nor hindered current task or other goals were individually significant but lost significance in earlier stages of constructing the grand model.

The final level-one model then demonstrates that if an email is perceived as difficult, or if people believe their strategy for dealing with the email has hindered their achievement of wellbeing goals, people feel gloomier after having dealt with it. If people believe that their strategy has helped them achieve their wellbeing goals however, people feel happier after dealing with an email. This provides support for Hypothesis Six, and directly links a perception that one has used a strategy to help wellbeing, with improved wellbeing, and vice versa.

As none of the strategies (LOGS 1-3) were predictive of depression-pleasure after an email, one cannot run interactions to identify quite which strategies are associated with a belief that some strategies help or hinder the achievement of wellbeing goals. This is true of each model in this section.

At level-two, two more predictors emerged, neither of which displaced the level-one variables. People who are calm, steady and even-tempered (high Adjustment) and conscientious, organised and in control (high Prudence) are likely to feel more happy after dealing with an email interruption. Or, in the reverse, people who are moody, worried and emotionally sensitive (low Adjustment) or impulsive, flexible and disorganised (low Prudence) are gloomier after dealing with an email interruption. The failure to find a predictive motivational style here does not provide support for Hypothesis Nine.
**Model Sixteen:** Predictors of whether one feels their strategy helped the achievement of other work goals

<table>
<thead>
<tr>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.377 (0.040)**</td>
<td>0.369 (0.041)**</td>
<td>0.388 (0.043)**</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>LOG3</td>
<td>0.101 (0.026)**</td>
<td>0.095 (0.029)**</td>
</tr>
<tr>
<td>Hedonism</td>
<td></td>
<td></td>
<td>-0.093 (0.042)*</td>
</tr>
<tr>
<td>Random effects</td>
<td>Uoj</td>
<td>0.054 (0.016)**</td>
<td>0.057 (0.017)**</td>
</tr>
<tr>
<td>Eij</td>
<td>0.186 (0.015)**</td>
<td>0.174 (0.014)**</td>
<td>0.175 (0.015)**</td>
</tr>
<tr>
<td>2*Log Likelihood</td>
<td>490.674 (376 cases)</td>
<td>433.238 (345 cases)</td>
<td>373.613 (299 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 117.061 (2df) p>0.000

* = p>0.05; ** = p>0.01

The level-one model here reveals that when people take longer to deal with an email interruption, after being alerted to it, people believe that this strategy helps the achievement of other work goals. This indicates that the email itself may be related to another work goal and hence, taking time to deal with it, helps the other work goal be achieved. This finding supports Hypothesis Seven.

At level-two, low Hedonism is also associated with a belief that one's strategy has helped the achievement of other work goals. People low on Hedonism are serious and restrained and will be de-motivated by fun, frivolous or pleasure-seeking behaviour. So, people who are motivated to act in a serious, work-focused way are more likely to believe their strategy for dealing with email (whatever that may be – interacting LOG3 with Hedonism was not significant) helps them achieve other work goals. This supports Hypothesis Five.
**Model Seventeen**: Predictors of whether one feels their strategy for dealing with an email interruption helps the achievement of their task goal

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>0.167 (0.033)**</td>
<td>0.170 (0.033)**</td>
<td>0.124 (0.029)**</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>LOG2</td>
<td>0.045 (0.019)**</td>
<td>0.056 (0.020)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adjustment</td>
<td>-0.004 (0.048)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR Adjustment</td>
<td></td>
<td>0.063 (0.021)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Intercept/Adjustment</td>
<td></td>
<td>0.009 (0.009)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.041 (0.011)**</td>
<td>0.040 (0.011)**</td>
<td>0.001 (0.005)</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.101 (0.008)**</td>
<td>0.101 (0.008)**</td>
<td>0.100 (0.008)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>273.283 (376 cases)</td>
<td>268.629 (371 cases)</td>
<td>240.293 (342 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 32.99 (4df) \(p<0.000\)

* = \(p>0.05\); ** = \(p>0.01\)

The level-one model demonstrates that people feel it is helpful to the achievement of the current task goal if they delay responding to an email interruption, after having checked it. This indicates then that a longer lag before attending to an email interruption is related to a desire to fulfil the current task goal. This also fits with the qualitative content analysis of people’s reasons for delay. People delay responding to an email if their existing task requires their attention. Such a finding shows clear support for Hypothesis Seven.

At level-two, some people with high Adjustment (calm and self-accepting) believe the strategy helps them achieve their task goal, whereas others with low Adjustment (moody and emotionally sensitive) believe this to be true. Although this finding supports Hypothesis Five, the conflicting direction of the findings is noted.
CHAPTER SEVEN

Model Eighteen: Predictors of whether one feels their strategy for dealing with an email interruption helps the achievement of their wellbeing goals

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>0.311 (0.041)**</td>
<td>0.324 (0.041)**</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>Altruism</td>
<td>-0.095 (0.042)*</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>Uoj</td>
<td>0.061 (0.017)**</td>
<td>0.061 (0.017)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.155 (0.012)**</td>
<td>0.158 (0.013)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>431.897</td>
<td>373.517</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 58.38 (1df) p > 0.000
* = p > 0.05; ** = p > 0.01

Although there were no significant predictors at level-one for this DV, people who achieve low scores for Altruism (at level-two) are more likely to believe that their strategy assisted them in achieving their wellbeing goals. Low scorers on Altruism are motivated by their own personal agenda and are not interested in the personal problems of others or in attending to the ills or injustices in society. This finding supports Hypothesis Five.

Model Nineteen: Predictors of whether one feels their strategy for dealing with an email interruption hinders the achievement of other work goals

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>0.134 (0.033)**</td>
<td>0.129 (0.030)**</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>LOG1</td>
<td>-0.050 (0.024)*</td>
<td>-0.048 (0.015)**</td>
</tr>
<tr>
<td></td>
<td>ChangeDP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR LOG1</td>
<td>0.014 (0.006)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV Intercept/LOG1</td>
<td>-0.017 (0.005)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.045 (0.011)**</td>
<td>0.029 (0.009)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.067 (0.005)**</td>
<td>0.068 (0.006)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>139.257</td>
<td>133.246</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 6.011 (4df) p > 0.198
* = p > 0.05; ** = p > 0.01

The level-one model demonstrates that people who are quicker to check an email interruption after alert believe that this hinders their achievement of other work goals, with some people feeling this more strongly than others. This finding supports Hypothesis Seven.
In addition people feel gloomier after dealing with an email interruption if they feel their strategy has hindered the achievement of other work goals. This provides support for Hypothesis Six. No level-two variables were predictive in this model.

Note that the improvement in loglikelihood from the null model to the final model is not significant. As such, the predictors entered here do not significantly improve the fit of the model data. For reasons of parsimony one might elect to adopt the null model in favour of the explanatory model here.

**Model Twenty**: Predictors of whether one feels their strategy for dealing with an email interruption hinders the achievement of the task goal

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
<th>Level-two predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intercept</td>
<td>0.373 (0.049)**</td>
<td>0.369 (0.048)**</td>
<td>0.403 (0.049)**</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>LOG1</td>
<td>-0.064 (0.027)**</td>
<td>-0.054 (0.027)*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ChangeDP</td>
<td>-0.051 (0.023)*</td>
<td></td>
<td>Removed</td>
</tr>
<tr>
<td></td>
<td>Altruism</td>
<td></td>
<td>-0.110 (0.051)*</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR LOG1</td>
<td>0.007 (0.006)</td>
<td></td>
<td>Removed</td>
</tr>
<tr>
<td></td>
<td>COV Intercept/LOG1</td>
<td>-0.017 (0.009)</td>
<td></td>
<td>Removed</td>
</tr>
<tr>
<td></td>
<td>VAR ChangeDP</td>
<td>0.002 (0.004)</td>
<td></td>
<td>Removed</td>
</tr>
<tr>
<td></td>
<td>COV Intercept/ChangeDP</td>
<td>0.007 (0.008)</td>
<td></td>
<td>Removed</td>
</tr>
<tr>
<td></td>
<td>COV ChangeDP/LOG 1</td>
<td>-0.001 (0.004)</td>
<td></td>
<td>Removed</td>
</tr>
<tr>
<td></td>
<td>Uoj</td>
<td>0.104 (0.025)**</td>
<td>0.087 (0.023)**</td>
<td>0.084 (0.023)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.128 (0.010)**</td>
<td>0.122 (0.011)**</td>
<td>0.136 (0.012)**</td>
</tr>
<tr>
<td></td>
<td>2*Log Likelihood</td>
<td>390.434 (376 cases)</td>
<td>343.862 (342 cases)</td>
<td>344.323 (323 cases)</td>
</tr>
</tbody>
</table>

Improvement in model fit from null to final model: Chi Squared 46.111 (2df) p>0.000
* = p>0.05; ** = p>0.01

LOG2 (time taken to respond after checking) was also positively predictive of the DV in this model initially but lost significance when the grand level-one model was run.
The final level-one model indicates that people who are quick to check an email after being interrupted by an alert are likely to appraise this strategy as a hindrance to the current task goal. This demonstrates support for Hypothesis Seven. People who feel gloomier after dealing with an email may also have appraised their strategy as being a hindrance to the current task goal. The random error terms for these variables were included, despite their non-significance, because otherwise the random intercept parameters lost significance.

At level-two, the random error terms were omitted with no effect on the parameter significance. ChangeDP was also removed as it lost significance, on the inclusion of Altruism. People low on Altruism are more likely to believe that their strategy has hindered the achievement of the task goal. This shows support for Hypothesis Five.

**Model Twenty-one:** Predictors of whether one feels their strategy for dealing with an email interruption hinders the achievement of wellbeing goals

<table>
<thead>
<tr>
<th>Fixed/Random</th>
<th>Variable</th>
<th>Null model (2 level)</th>
<th>Level-one predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td></td>
<td>0.105 (0.029)**</td>
<td>0.120 (0.035)**</td>
</tr>
<tr>
<td>Fixed effects</td>
<td>LOG3</td>
<td>0.003 (0.025)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ChangeNA</td>
<td>0.076 (0.028)**</td>
<td></td>
</tr>
<tr>
<td>Random effects</td>
<td>VAR LOG3</td>
<td>0.014 (0.005)**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV</td>
<td>0.004 (0.006)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intercept/LOG3</td>
<td></td>
<td>0.011 (0.007)</td>
</tr>
<tr>
<td></td>
<td>VAR ChangeNA</td>
<td></td>
<td>0.019 (0.007)**</td>
</tr>
<tr>
<td></td>
<td>COV</td>
<td>0.008 (0.005)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intercept/Change in NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COV LOG3/Change in NA</td>
<td></td>
<td>0.036 (0.004)**</td>
</tr>
<tr>
<td></td>
<td>Uij</td>
<td>0.034 (0.009)**</td>
<td>0.049 (0.012)**</td>
</tr>
<tr>
<td></td>
<td>Eij</td>
<td>0.061 (0.005)**</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Improvement in model fit from null to final model: Chi Squared 62.554 (7df) p&gt;0.000</th>
</tr>
</thead>
</table>

At level-one, it appears that some people believe that spending a long time dealing with email hinders achievement of their wellbeing goals, whereas others believe that spending a short time in email hinders wellbeing. Whilst this supports Hypothesis Seven, it also supports Hypothesis Five, as the
random error term indicates that there are individual differences between people. Some see dealing with email as a positive thing, and others see it as negative.

In addition people who feel more annoyed and anxious, after dealing with an email than they did before, rate their strategy for dealing with the interruption as hindering the achievement of wellbeing goals. Some people feel more annoyed and anxious than others. This demonstrates support for Hypothesis Six. A change in positive affectivity and depression-pleasure were also significant when entered individually, but these factors lost significance in the grand model.

Various personality variables were significant at level-two when entered individually (Power, Adjustment, Agreeability and Scholarship all at random slopes only), but these variables lost significance when entered in a grand model.

Note
Note that because of the poor distribution of scores for life goal strategising (i.e., on most occasions people chose strategies that neither helped nor hindered the achievement of life goals – see Table Ten), models were not run with life goal strategy as outcome variables.

Clarifying support for the hypotheses
The findings from the MRCM thus relate back to the study hypotheses as follows:

Distractions by other goals
H1: If the demands of the current task are high, people are likely to adopt 'delay' strategies (taking longer to check and respond) for dealing with an email interruption.

On the basis of the MRCM results, this hypothesis was not supported as task characteristics were not directly predictive of strategy by the final stage of Models Ten to Twelve. However, the content analysis would show support for this hypothesis, as current task demands were cited as reasons for delaying response at Times 1 and 2. On balance, this hypothesis is therefore partially supported.
H2: After checking the email interruption, the difference between characteristics of the email, and characteristics of the task, will influence how quickly one responds to and deals with the interruption.

This hypothesis is supported, as Model Eleven reveals that people weigh up the demands of the task against the email in deciding how to respond. So, when the task was rated as more effortful than the email, people were slower to respond to the email interruption. The content analysis also support the weighing up of task versus email as being involved in delays experienced at Time 2.

However, relative comparison of the task against the email did not influence how long one spent then dealing with the email interruption (Time 3). Rather, Model Twelve indicates that the email characteristics are directly responsible for time allocated to dealing with email here (the length and effort of the email).

This hypothesis is partially supported here therefore.

H3: The stage one is at in a task, when interrupted by an email, will influence how quickly one checks and responds to the interruption, and how much time one devotes to dealing with it.

This hypothesis is partially supported as task stage was related to strategies for speed of checking (Time 1) and responding (Time 2), but not time spent dealing with the email interruption (Time 3). The MRCM analysis found that if people were interrupted at the start of a task, they were quicker to check on alert. However, when people are interrupted after a task has finished, they are quicker to respond to an email interruption.

Work and wellbeing goal prioritisation

H4: Having checked the email interruption, one will respond more quickly to it, and spend longer dealing with it, if it is more important to the achievement of work goals or wellbeing goals than the current task.

This hypothesis is partially supported. It was found that if the task was deemed more important to the satisfaction of wellbeing goals than the email, then people would spend less time dealing with the email interruption at Time 3. However, relative importance was not related to speed of response (Time
2), and importance to work goals was also not predictive of strategy chosen at either Time 2 or Time 3.

**H5:** There are individual differences in people who choose strategies that prioritise work goals over wellbeing goals in dealing with an email interruption.

People who believe that their strategy helped them achieve other work goals were low on Hedonism. People who believe that their strategy helped them achieve current task goals had high Adjustment, although low Adjustment people also believed this. So, Study Six concludes that people who choose strategies that promote work goals value a serious and self-disciplined approach to work, but, it is also concluded that work goal 'prioritisers' are both calm, self-accepting and confident, and equally may be moody, and prone to worry and self-doubt.

People with lower Altruism scores believe that their strategy helped them achieve wellbeing goals, and hindered current task goals. Thus, people who choose strategies that promote wellbeing, at the expense of the task, tend to prioritise their own agenda and place little value on helping others.

These findings demonstrate that Hypothesis Five can be accepted, but clearly, considering that there are seventeen possible personality and motivational predictors, it is disappointing that so few were predictive.

**H6:** People's perceptions about whether their strategy helped or hindered the achievement of work or wellbeing goal are differentially associated with an improvement in wellbeing levels, after dealing with the email interruption.

If people feel that their strategy hindered the achievement of other work goals, they feel gloomier after dealing with the interruption (although this finding emerged in a model that had no better fit than the null model). If people believe their strategy hindered their wellbeing goals they felt more annoyed and anxious afterwards.

In other models, if people feel their strategy helped, or neither helped nor hindered the satisfaction of other work goals, some people experienced a rise in negative affectivity, whereas others experienced a decline. If people feel that their strategy helped them achieve their wellbeing goals they feel happier
afterwards, whereas they will feel gloomier afterwards if they feel their strategy hindered wellbeing goal achievement. On the basis of all these findings, Hypothesis Six can be supported.

**H7: The strategy chosen to deal with an email interruption is related to whether people believe that strategy helped or hindered them in the achievement of current task, other task and wellbeing goals.**

This hypothesis is supported, based on the MRCM analysis. People who check the email interruption quickly on alert believe that this strategy helps them to achieve other work goals (although in a model that was no more significant than the null), and hindered them in achieving their current task. People who respond to the email more slowly after checking it (i.e., adopt a delay strategy) believe that this strategy helps them achieve their current task goal. People who spend a long time dealing with the email interruption believe that such a strategy helps them achieve their other work goals.

People who believe they adopted a strategy that hindered their wellbeing were either likely to spend a long time dealing with the interruption, or a short time dealing with the interruption.

**Motivational style**

**H8: Motivational style is predictive of the strategies chosen to deal with email interruptions.**

This hypothesis was partially supported, as motivational style was only predictive of time taken to check an email on alert (Time 1). Time taken to respond (Time 2) and time spent dealing with email (Time 3) was not related to motivational style, although the latter was related to HPI Intellectance. This is noteworthy as in Study Four none of the personality factors was directly related to strategy choice (resulting in the rejection of Hypothesis Six in Chapter Six).

**H9: Motivational style is predictive of changes in wellbeing experienced after dealing with email interruptions.**

This hypothesis can be partially supported, but only one motivational style was predictive of wellbeing change, and related only to an increase in positive affectivity. Nevertheless, people with high MVPI Business scores (interested in
commerce, finance and profit-making) felt more active and motivated after
dealing with an email interruption.

In addition to the significant finding of MVPI Business, HPI personality themes
were again predictive of wellbeing after an interruption, but on different scales
to Study Four.

Other significant findings

- The characteristics of the email influence the strategy chosen to deal
  with the email interruption:
  - If the email is long and effortful, people spend longer dealing
    with it (support for 'Demands of email task' in Box C, Figure
    Five).

- Similar to the findings of Study Four, the characteristics of the email
  were found to affect people's wellbeing after having dealt with it:
  - Email that is rated as effortful can result in people feeling more
    annoyed and anxious afterwards.
  - Email that is rated as difficult can result in people feeling
    gloomier afterwards.

Theoretical implications of these findings, and suggestions for future research
will now be explored.

Discussion
In understanding efficiency in goal-directed behaviour, Chapter Four
highlighted that definitions of efficiency may need to include a consideration
of wellbeing and the satisfaction of multiple goals (including wellbeing and
other work goals) beyond the current task. Additionally, individual differences
in personality were considered to be important factors in influencing and
moderating strategic behaviour. The Phase Two studies confirmed that
wellbeing and personality are involved in strategic behaviour. Phase Three
was designed to pick up on the issue of multiple goals, to establish whether
people do consider how their strategies will affect work and wellbeing goals as
well as current goals, in deciding how to act. As with Study Four, the tool for
studying goal-directed behaviour was the controllable email interruption. Its
presence during task behaviour constitutes a potentially new goal. How people choose to deal with an email interruption can indicate how they weigh up and prioritise their goals and associated strategies during action.

This study aimed to clarify the relative positions of the goal-directed theories, outlined in Chapters Two and Four, with respect to multi-goal considerations. Schönpflug (1983, 1985, 1992) and Hockey (1997, 2000, 2002) indicate that efficient work behaviour involves people weighing up the extent to which a strategy will satisfy work or wellbeing goals, and choosing the action program that keeps the balance as harmonious as possible. Prioritising a strategy to protect performance on a task may be considered efficient by ART, but if the longer-term effects of this are that wellbeing suffers and people then have to work at a much lower level to recharge, then this is considered inefficient (Schönpflug, 1983, 1985). In real-world situations, Hockey (2000) indicates that people will usually prioritise wellbeing over work, because this is evolutionary advantageous. Thus, in a work situation where an interruption occurs (offering another demand to people’s workload) choice about whether to deal with or ignore the interruption may be related to how people prioritise work or wellbeing goals.

Research questions 3, 4, 5 and 6, outlined in Chapter Four, were specifically addressed here across nine hypotheses relating to strategic approaches for dealing with multiple goals. These hypotheses are discussed now below, and related back to the relative positions of Hockey, ART and Schönpflug. In addition, findings will be interpreted within the context of Figure Five.

**Distractions by other goals**

**H1: If the demands of the current task are high, people are likely to adopt 'delay' strategies (taking longer to check and respond) for dealing with an email interruption.**

This hypothesis is not supported on the basis of MRCM analysis. Task characteristics alone were not predictive of time taken to check or respond to an email interruption in Models Ten or Eleven. This would indicate that neither goal activation nor level of regulation influence strategy choice. If they did, one would expect that effortful and difficult tasks, that require more attention, and higher levels of regulation would, in themselves, influence whether someone would be distracted easily by the presence of a new goal (i.e., an
email). This indicates that ART, Hockey, and Altmann & Trafton (2002, Goal Activation Theory) cannot be supported. ART indicates that when task demands are high (i.e., when operating at high levels of regulation) people will not be able to deal with other action programs (as afforded by an email) at the same time as the current one.

However, results from the content analysis of reasons for delaying 'checking' an email on alert, indicate that people choose to delay when they are engrossed with their current task or deliberately ignoring interruptions. Additionally, reasons for delaying 'responding' to an email interruption usually related to whether the current task was more demanding than the email. The content analysis then would demonstrate support for the goal activation hypothesis – especially the reasons for delaying 'checking', as people who are 'engrossed' in their current work are not distracted by other goals as their current goal is so pertinent (Altmann & Trafton, 2002). The content analysis also lends support to ART (Hacker, 1985, 1994; Frese & Zapf, 1994). If people are engaged in demanding or important tasks (at a high level of regulation) they are less likely to check or respond to email interruptions, presumably because cognitive resource is not available. The content analysis also indicates that Hockey (1997, 2000, 2002) is supported, as he states that attentional narrowing is a performance protection strategy used to cope with increased demands.

As such, in Figure Five, 'Activation of current task goal', and 'Demands of current task' are tentatively retained in Box A, as possible variables influencing strategy choice at Time 1 (Time 2 is discussed below). Although they are not firmly supported on the basis of the MRCM analysis, their potential importance, as revealed in the content analysis, indicates that these variables would benefit for further research attention before deciding to reject them.

H2: After checking the email interruption, the difference between characteristics of the email, and characteristics of the task, will influence how quickly one responds to and deals with the interruption.

People do weigh up the relative demands of the task against the email in deciding how to act at Time 2. In particular, MRCM analysis found that the relative effortfulness of the task against the email was a key concern, with
people delaying their response to an email when the task was rated as more effortful. The results from the content analysis also reveal that when people consider a current task to be more important or demanding than an email task, people will delay their response. These findings provide some support to Hockey. Hockey indicates that people are continuously engaged in a process of weighing up the relative demands of different goals. The MRCM analysis shows that the most effortful goal is likely to win energy reserves and attention. The content analysis would support this with the revelation that people give priority to the task, because it is more demanding or more important, when delays occur at Time 2. The inclusion of 'Relative demands of current task versus email' and 'Relative importance of task versus email goal' can be confirmed as influential variables in Box B of Figure Five, on the basis of these results.

In context of the Hypothesis One discussion, above, this is interesting. Using MRCM, task characteristics alone do not predict speed of response strategy. It is how the task characteristics compare with the new goal characteristics that will influence strategy. This means that the conclusions made by Zijlstra et al. (1999), and Speier et al. (2003), who demonstrate that people delay response when task demands are high, may be underdeveloped. Rather it seems that people may prefer to check other goals before deciding whether to delay or ignore other goals, regardless of current task demands. Only once it is established that the email is less effortful than the task, will people decide to concentrate on the task and delay their response to email. Such a finding would not have been achieved (and indeed Zijlstra et al., and Speier et al. overlooked this) in a research context that disregards complete activity (Hacker, 1985, 1994) and the fact that strategic responding can only be understood when one examines how multiple goals and activity threads interact in the real world, across a real timeline.

This finding is also of interest, bearing in mind that Whittaker and Sidner (1997) found that quick, easy and unambiguous email is likely to distract attention away from a current task. This demonstrates how important it is to consider how people 'weigh up' current against new goals, as the lower effort level of email did not win attention here. The fact that people do appear to be engaged in a weighing up process before selecting a response strategy after checking provides firm support for the hypothesis that a negotiation lag stage...
exists in the interruptions timeline (Trafton et al., 2003). This is a new and unique finding, within this research domain.

**H3:** The stage one is at in a task, when interrupted by an email, will influence how quickly one checks and responds to the interruption, and how much time one devotes to dealing with it.

People respond quickly to an email alert (Time 1) when they are interrupted at the beginning of a task. However, they respond more quickly (Time 2) when they have finished a task. Task stage was not a predictor of strategic choice at Time 3. Therefore, this hypothesis was partially supported.

These findings are very interesting, in terms of ART. This analysis suggests that people may be open to alternative goals and cues when planning their action program and orienting towards their task goals. So people at that stage may still be scanning the environment to decide whether other goals are more worthy of their effort and attention. However, at that early stage, they are doing just that - scanning and checking for conflicting cues. People tend not to act on the other goals and cues until they have finished their task (as 'start' was not predictive of Time 2 or 3 strategy choice). This may mean that people adapt the action program they choose if they know they have other tasks or goals to deal with (a knowledge acquired after quick checks in early stages). However, they may not shelve the action program or deal with the alternative goals until the original program has been completed (i.e., when the task is finished).

This offers support for ART that states we do not tend to work on more than one action program at a time (Hacker, 1985, 1994; Frese & Zapf, 1994). So although we may be aware of other goals as they present themselves, we tend to follow the original program through (even if this means shortening it or reclassifying the goal) until we believe the task is 'finished'. This may explain why task switching can be so disruptive (Eyrolle & Cellier, 2000). This also supports Zeigarnik's perspective (presenting her work nearly eighty years ago), who said that interruptions can prevent current task closure, and so people prefer to finish what they are doing, before they respond.
Referring back to Figure Five then, it appears that ‘task stage’ can be included now as an influential variable on strategic responding at Time 1 and 2. Thus, this will now be added to Boxes A and B.

**Work and wellbeing goal prioritisation**

*H4: Having checked the email interruption, one will respond more quickly to it, and spend longer dealing with it, if it is more important to the achievement of work goals or wellbeing goals than the current task.*

If a task goal is more important to wellbeing this will affect the strategy chosen. In particular, people spend less time dealing with the email at Time 3. However, relative importance of task and email did not influence strategy at Time 2, and work goal importance was not predictive at Time 2 or Time 3. Hypothesis Four is partially supported therefore.

This supports Hockey’s (2000) view, that in real-life situations, people may prioritise wellbeing goals and choose strategies to cope with demands that ensure wellbeing is preserved, over and above work performance goals. It is interesting however that the MRCM analysis did not find that strategy chosen was also related to the email’s importance to wellbeing goals. So, although Study Four found that dealing with an email appeared to improve activity and motivation, in Study Six, findings indicate people may not choose to deal with an email because they believe it will improve wellbeing.

This finding also offers firm encouragement to ART to incorporate ‘wellbeing’ as a goal that influences strategic behaviour. People’s action programs are clearly linked to a desire to improve or maintain wellbeing, on the basis of these results.

In Figure Five, these results further confirm the presence of ‘Relative importance of task versus email goal’ in Box B (see content analysis reasons for delaying at Time 2 as additional support).

*H5: There are individual differences in people who choose strategies that prioritise work goals over wellbeing goals in dealing with an email interruption.*
- Prioritising work goals

Here low Hedonism was linked to a belief that the strategy chosen helped in the achievement of other work goals. People who believe that their strategy helped them achieve current task goals had high Adjustment, although low Adjustment people also believed this. This supports M. Eysenck (1983) who found that in demanding situations, people with both high and low levels of anxiety perform at the same level. He says that although worriers use up some cognitive space by worrying, they apply more effort to compensate for this, in order to achieve their task goals.

Other studies have found that high anxiety characteristics are linked with higher performance, when measuring task goal output. This is because anxious people are thought to be more motivated or more likely to demonstrate increased effort (Connor & Abraham, 2001; Schönpflug, 1992) to achieve their goals. However, ART states that people who adopt the best strategies when working towards task goals are less anxious, and more calm and controlled in their approach (Frese & Zapf, 1994).

Study Six concludes that people who choose strategies that promote work goals (current or other) value a serious and self-disciplined approach to work, but, reflecting the existing contradictions that abound in the literature, it is also concluded that work goal prioritisers are both calm, self-accepting and confident, but equally may be moody, and prone to worry and self-doubt.

- Prioritising wellbeing goals

People with low Altruism believe that their strategy helped them achieve wellbeing goals, and hindered current task goals. This is interesting as it suggests that focusing on one’s own wellbeing may be a selfish act, whereas focusing on work goals may be more altruistic. This draws again on Hockey’s (2000) claim that adopting to preserve wellbeing has an evolutionary advantage, and that working flat out to achieve task goals can cause strain and other problems (Schönpflug, 1983, 1985; Frei et al., 1989) that perhaps more selfish people are less prepared to suffer from for the sake of their work or organisation. This bucks the trend found in several studies, whereby people choose to perform to a high level at the expense of wellbeing (Zijlstra et al., 1999; Schellekens et al., 2000). However, it supports the findings of Strickland & Galimba (2001) that when people have control over their work,
they elect to set themselves easy and achievable goals, rather than push themselves and expend vital wellbeing-related resources.

Finding that Altruism and Hedonism are predictive of how people prioritise work and wellbeing goals indicates that motivational style is a useful measure to apply in understanding goal-directed behaviour. Hockey (2000, 2002) and Lazarus (1985, 1990, 2000) both believe that there are individual differences in terms of whether people act to meet wellbeing versus work goals. Hockey has tended to explain differential goal prioritisation in terms of coping style, but the findings of this study support the view that people’s motives (along with personality) should continue to be assessed in order to understand what goals people are likely to prioritise at work. In Figure Five, motivational style and personality will be included in another box (Box G), as predictors of work or wellbeing goal achievement.

**H6: People’s perceptions about whether their strategy helped or hindered the achievement of work or wellbeing goal are differentially associated with an improvement in wellbeing levels, after dealing with the email interruption.**

The link between wellbeing and perceptions of strategy choice was made in Models Thirteen to Twenty-one. In Models Thirteen to Fifteen the outcome variable was wellbeing after the email, and perceptions of strategies helping or hindering goal achievement were predictors. In Models Sixteen to Twenty-one the outcome variables were perceptions of strategy helping or hindering goal achievement, with changes in wellbeing acting as predictors. Using these slightly different approaches to testing the same hypothesis yielded a range of interesting results.

When wellbeing was an outcome variable, a decline in wellbeing was associated with strategies that people perceived to hinder the achievement of other goals or wellbeing goals. In addition, if the task was rated to be more important to wellbeing goals than the email, then people feel gloomier after dealing with the email interruption (regardless of strategy chosen). This supports the findings Harris et al. (2003) who conclude that people find inhibition of goals to be linked with diminished wellbeing, especially if such goals are personally important.
When perceptions of strategy choice was an outcome variable, some people felt more annoyed and anxious, and other people felt more calm and at ease when they believed that their strategy had either helped, or neither helped nor hindered, the fulfilment of other work goals. The finding that positive wellbeing can result at the same time as perceptions of task achievement provides support for the amalgamated approach (see Chapter Four). Hockey does not discuss the notion that a strategy for dealing with demands can help wellbeing and performance protection at the same time. Usually satisfying one of these goals is at the expense of the other, according to his framework. However, this finding indicates strong support for the idea that performance protection and wellbeing improvement can occur in tandem. The finding that other people feel more annoyed and anxious when achieving task goals does support Hockey's position, however. Here performance protection comes at the expense of wellbeing goals. Bailey et al. (2001) found that people generally feel anxiety and annoyance after dealing with an interruption. Schönpflug (1983, 1985) specifically argues that coping with demands can be stressful, and direct problem solving in itself has been found to evoke stress (Hockey, 2000).

People who feel their strategy has helped them achieve wellbeing goals will feel happier afterwards, and people who feel their strategy hindered their achievement of wellbeing goals will feel gloomier. This supports Hockey (2000, 2002). If one wants to preserve wellbeing, one needs to choose a course of action that prioritises wellbeing goals.

Hypothesis Six is accepted on the basis of all of these results. Support for this hypothesis demonstrates that people's wellbeing after an email is directly linked with perceptions of how strategy has effected both work and wellbeing goal achievement.

ART simply states that people are only really interested in optimising work goals at work, but these findings indicate that people are equally concerned about achieving wellbeing goals (Hockey, 2000, 2002). This adds weight to the idea that in understanding whether people believe they are working efficiently, both work and wellbeing should be part of the economic equation (Schönpflug, 1983, 1985). However, it is interesting that Hockey (1997) specifically asserts that improved wellbeing is linked with a reduction in effort.
towards a current task (disengagement strategy). Yet strategies that hinder current task achievement were not predictive of wellbeing change in either positive or negative directions.

Support for this hypothesis means that Box D in Figure Five, will be split further to indicate how goal achievement directly predicts wellbeing as a separate part of Box D.

**H7: The strategy chosen to deal with an email interruption is related to whether people believe that strategy helped or hindered them in the achievement of current task, other task and wellbeing goals.**

People who check the email interruption quickly at Time 1 believe that this strategy helps them to achieve other work goals, and hinders them in achieving their current task goal. This fits with the suggestion that an email interruption often affords work goals in its own right (Walji et al., 2004), and so switching attention from the current task goal may not necessarily be wholly inefficient. Although going quickly to check an email may disrupt the current task, this strategy may still involve working towards goal fulfilment — i.e., the fulfilment of another work-related email goal.

People who respond to the email more slowly at Time 2 believe that this strategy helps them to achieve their current task goal. Thus, this would support the work of Frei et al. (1989) and Jackson et al. (2003), who claim that limiting or ignoring interruptions is beneficial to current task achievement.

People who spend a long time dealing with the email Interruption at Time 3 believe that this helps them achieve other work goals. Again, this supports the notion that in multi-goal environments an interruption isn’t always disruptive to work, but in its own right, has work goal properties requiring fulfilment (Walji et al., 2004).

Interestingly, people who believe they adopted a strategy that hindered their wellbeing were either likely to spend a long time dealing with the interruption, or a short time dealing with the interruption. This reiterates the point that interruptions may be construed as negative by some people (in Study Four — low Adjustment people felt more negative after dealing with interruptions; in
this study high Sociability people felt more negative), but positively by other people (people who score higher on the Ambition scale in Study Four, and high scorers on Business, Adjustment and Prudence people in this study). Also, spending a long time dealing with email may negatively affect wellbeing because people who spend longer dealing with email are usually dealing with difficult email (see Study Four), or long and effortful email (Study Six).

These findings support Hockey who asserts that strategic action is linked with the achievement of work or wellbeing goals in multi-goal environments. This serves as a reminder that it is advisable to research the multi-goal environment in order to fully understand people’s strategic behaviour. Choosing to deal with an email interruption is only inefficient if one is only focusing on the current task performance as a criterion for measuring efficacy. In its own right, dealing with an email interruption is a strategy that can enhance overall work performance, if that email is related to the satisfaction of other goals. ART would do well to highlight this, but in particular, interruptions research would benefit significantly if studies were designed to measure the goal achievement properties of interruptions, rather than focusing solely on disruption to singular, current tasks. As such, confirmation of the variables ‘wellbeing goal achievement’, ‘current task achievement’ and ‘overall work task achievement’ in Box D of Figure Five, is made.

**Motivational style**

*H8: Motivational style is predictive of the strategies chosen to deal with email interruptions.*

Motivational style was predictive of strategy choice at Time 1. Motivational style was not predictive of strategy choice at Times 2 and 3, although the latter was related to HPI Intellectual. This hypothesis is partially supported then, but motivational style will only be added to Box A as a predictor of strategic responding at Time 1 only, in Figure Five.

People with higher scores on MVPI Altruism (people who are interested in helping others and showing concern for colleagues at work) and MVPI Rationality (people who adopt a logical, scientific approach to decision-making) were slower to check an email at Time 1. The significance of
Rationality is especially interesting here, as it indicates that impulsivity is related to quick checking, with slow checking a more considered approach.

These findings add weight to the recommendation that ART consider individual differences in understanding why particular action programs are adopted in goal-directed work. It also explains the problems that Frese et al. (1987) faced when they failed to validate action styles for goal orientation and planfulness against actual strategic thinking (see Chapter Four). Action styles do not appear to be a useful unit of analysis in investigating individual differences. In contrast, motivational style (as measured by the MVPI) and personality (as measured by the HPI) are likely to be more useful. It is also noteworthy that in Study Four none of the personality factors were directly related to strategy choice (resulting in the rejection of Hypothesis Six in Chapter Six). The fact that three scales were significant in this study indicates that the study of personal differences is an area still worthy of continued research.

**H9: Motivational style is predictive of changes in wellbeing experienced after dealing with email interruptions.**

This hypothesis is also partially supported. People with high MVPI Business scores (interested in commerce, finance and profit-making) felt more active and motivated after dealing with an email interruption. When the MVPI is factor analysed, Business is part of a power and achievement theme (Hogan & Hogan, 1998). Thus, as with the significant finding of HPI Ambition relating to increased PA in Study Four, people with high scores on achievement focused scales appear to feel active and motivated after dealing with an email, possibly because it affords some short term goal-fulfilment properties. Motivational style will be added to Box E in Figure Five on the basis of this finding.

The HPI scales were also predictive of wellbeing after an interruption (though on different scales to Study Four). In fact, the presence of high Sociability, as related to increased levels of anxiety and annoyance after dealing with an email interruption, would result in Hypothesis Four of Study Four being rejected. It seems that people who score higher on 'pure' extraversion scales don't feel active and motivated by email interruptions, rather they appraise them to be an annoyance. This could indicate that people who score higher on
'pure' extraversion scales dislike asynchronous modes of communication. Although such people are more open to variety and stimulation, Study Six showed that those with introversion tendencies feel less negative after dealing with an email interruption, rather than those who score higher on extraversion. This supports some of the early findings in Study One — whereby self-confessed introverts commented that they like email because it helps them to make contact with people they wouldn’t normally have interacted with, and it is easier for them to deal with than face-to-face or telephone communications.

In addition to the significance of Sociability, Adjustment and Prudence were also significantly related to wellbeing after an interruption. High scorers on Adjustment (calm, self-accepting and confident) felt happier after dealing with an interruption. This fits with the finding in Study Four that low Adjustment people feel more negative after dealing with an interruption. From both studies then it seems that people who score higher on neuroticism/anxiety personality scales do not experience wellbeing benefits from dealing with interruptions, which supports the work of Connor & Abraham (2001), M. Eysenck (1983), and Schönpflug (1992) who report that worriers, or high anxious people, apply more effort than low anxious people, when dealing with increased demands, which subsequently affects their wellbeing. The finding that high scorers on Prudence (conscientious, self-controlled and organise people) feel happier after dealing with an email interruption is interesting. Work by Connor & Abraham (2001) and Fischbach et al. (2003) note that those who are organised and have high self-control tend to limit interruptions and achieve their tasks better. This study indicates that such people feel happier after dealing with an interruption — though reasons why this may be were not explored.

The finding in Study Six then that neuroticism, extraversion and conscientiousness from the five-factor model, are directly related to changes in wellbeing after dealing with an interruption, suggests that, in this instance, Miner et al.’s (2005) request that these three facets be explored in relation to how within-subjects mood ratings are affected in momentary diary studies, is valid. The partial support of the last two hypotheses also indicates that motivational style is a unit of individual differences worthy of research and study, in addition to personality factors.
However, the study of motivational style in goal-directed behaviour is still an extremely under-developed area. Unlike with the Five-Factor Model there is no universally acknowledged taxonomy of motivational style, and so conceptually its inclusion in studies is more difficult to justify. Yet, in this instance, it appears that Hogan (1998) may be right. I.e., in order to advance the study of personality and individual differences it may be more appropriate to be data driven, to gather empirical evidence about what is related to goal-directed behaviour, and then to use this information to help shape and inform theory. It seems, from the results of Study Four and Study Six that serious researchers of workplace behaviour will ignore the effects of individual differences as key explanations of variance, at their "peril" (Eysenck, 1998: cited by Davies, 2004).

Summary

Study Six has demonstrated that people do consider multiple goals when dealing with email interruptions, and that perception of goal achievement in terms of the current task, other tasks and wellbeing goals, is linked to subsequent wellbeing. Further, Study Six confirms that an appreciation of individual differences is important in studying goal-directed behaviour. In particular, differences in personality and motivational style are linked with strategic choice, subsequent wellbeing, and how one prioritises different goals.

These findings link back to Action Regulation Theory (Hacker, 1985, 1994; Frese & Zapf, 1994; Frese & Sabini, 1985; Frese et al., 1987), and Hockey’s compensatory control cognitive-energetical model (1997, 2000, 2002), as follows:

- In multi-goal environments people appear to weigh up the relative demands and importance of a task against an email before choosing a strategy of response. This supports the presence of the negotiation lag in the controllable interruptions timeline. MRCM analysis indicates that demands of the task alone are not predictive of response strategy, despite the fact that ART, Altmann & Trafton (2002) and Hockey indicate that this would be predictive of activity. From ART's perspective a demanding/important task would indicate operation at a
high level of regulation which might predict increased awareness of environmental feedback (i.e., quick checking at Time 1), but delayed responding to other goals (i.e., slow response at Time 2, because multiple action programs cannot be entertained at high levels of regulation). Altmann & Trafton (2002) have demonstrated that goals that have high activation (e.g., important or demanding goals) maintain attention, and so checking/responding of other goals at Times 1 and 2 should be delayed. Hockey (2000) agrees that current goal activation is linked with action. From each perspective one would expect that when a current task is rated as demanding this would influence speed of response at Times 1 and 2. MRCM did not find evidence to this effect, although because qualitative reasons given for delay at Time 1 indicate that the current task demands/activation are related to speed of responding (In the predicted manner) Box A in Figure Five is maintained as it is. In addition, the finding that task stage may influence speed of checking (Time 1) and responding (Time 2) means that Task Stage is added as an influencing variable in Boxes A and B.

Hockey also indicates that in multi-goal environments, people respond to other goals if they are more important than the current one. This latter suggestion is clearly supported by findings from Study Six. Therefore, after checking an email, weighing up the relative importance and demands of the task against the email influences strategic action at Time 2. This confirms the Box B variables in Figure Five, and supports Hockey’s observations.

- In multi-goal environments people are concerned to satisfy the current task goal, other work goals and wellbeing goals in their activity. People differentially prioritise work versus wellbeing goals. A belief that one has chosen a strategy that either helps or hinders work or wellbeing goals is linked to subsequent wellbeing. Also, the strategy that one chooses to deal with an email interruption is interpreted by people as having a helpful or detrimental effect on the satisfaction of multiple goals – not just the current task.
This indicates that, in this instance, ART's claim that people only choose strategies to optimise current task goal achievement, is invalid. In common with Hockey's claims, people choose strategies to satisfy work or wellbeing goals, and indeed experience wellbeing changes according to whether work or wellbeing goals are considered to have been satisfied. However, the amalgamated approach suggested that wellbeing and work goals could be satisfied at the same time, using the same strategy, and indications from this study are that such an approach is valid. Extending definitions of success and efficiency to include an appraisal of the degree to which all goals (current task, other tasks and wellbeing) have been attained is considered necessary to fully understand strategic action at work.

- The role of individual differences as a predictor of activity and subsequent wellbeing was again confirmed in Study Six. Individual differences predict response strategy at Time 1 and Time 3, and also predicted wellbeing after dealing with an email interruption. In particular motivational style was a confirmed predictor of Time 1 strategies, suggesting this variable should replace 'personality' in Box A of Figure Five. However, motivational style did not predict Time 3 strategies. Personality alone can be confirmed as a predictor in Box C. Motivational style will be added to Box E (alongside personality) as a predictor of wellbeing after dealing with a interruption. Further, both personality and motivational style were related to whether one rated their strategy as helping them achieve work or wellbeing goals. Thus a new box will be added to Figure Five linking individual differences with perceptions of differential goal achievement in Box D.

As with Study Four, these findings indicate how individual differences need to be considered if we are to appreciate why people choose the strategies that they do. As a result of Study Six, it appears that motivational style is another individual difference worthy of continued research, alongside personality variables.

Future directions
The finding that task stage matters as a predictor of strategy choice is an interesting and unique finding. Czerwinski, Cutrell and colleagues, along with
Eyrolle & Cellier examined how disruptive an interruption was at different stages in a task's life cycle. However, research had not been conducted to examine how people choose to respond when they have control over an interruption, and receive an interruption at different task stages. This study reveals that task stage will influence whether and how people respond to an interruption, and in the context of ART, it would be worth exploring this further. More insight in this area could indicate when an activity cycle is most likely to be at risk from distraction by other goals.

The fact that this study found support for the role of motivational style as an influence on and moderator of strategic behaviour in dealing with interruptions, supports the view that individual differences should now be examined in a much more comprehensive fashion by the goal-directed theorists. Along with personality and motivational style, research could also focus further on individual differences in ability, cognitive resources, and so forth. However this area proceeds, it seems necessary that the role of individual differences on goal-directed behaviour be ignored no more.

Finally, Study Six revealed that people link their strategic behaviour with a perception of whether this has helped or hindered their goal achievement, which in turn affects their wellbeing. It will be interesting now, from the perspective of ART, to explore whether perceptions of goal success, and improved wellbeing after the application of a strategy influence the way an action program is stored and applied in the future. I.e., is it more likely that strategies linked with improved wellbeing, or with the satisfaction of 'other goal' are strategies that are retrieved from the OIS again? If so, this would lend firm support to ART, whilst also highlighting the need to include wellbeing and multiple goals as variables affecting all areas of the theory.

Limitations
The limitations faced in Study Six were the same as those faced in Study Four, and relate to the sampling method and the selecting out of people who were too busy or who did not use email in the way required in this study. See Chapter Six for a more thorough discussion. In addition, a further limitation refers to this study only. As the diary record form was longer, the study period was halved. Even so, people may have found it too lengthy to want to take part (Miner et al., 2005; Butler et al., 2005).
Practical implications

Study Six indicates that recommendations to turn off email interruptions (Jackson et al., 2003; Bailey et al., 2001) may be misplaced. Email interruptions appear to offer goal affordance properties in their own right (Walji et al., 2004). People who respond to email interruptions may find that current task activity is disrupted, but equally, if the email is more important to their goals (and even when it is not), attending to an email is as much a necessary task as attending to a current task. Therefore, it is not recommended that email interruptions be switched off at work. Rather, it is recommended that after checking an interruption, people adopt a strategy to deal with it that enables them to fulfil their most important goals (work or wellbeing).

It also appears from Study Six (in common with Study Four) that people with high scores on achievement-focused scales (serious, work-focused, selfish) appear to be more capable of balancing their wellbeing goals than others. As such, it may be that these people are less likely to suffer from the negative affects of dealing with email interruptions. Perhaps then, in multi-goal environments where interruptions and conflicting priorities regularly present, organisations would be better off recruiting more hard-nosed, goal-focused personnel. The people with fun-loving, or altruistic tendencies could be the people that tend to protect performance on a task at the expense of their wellbeing and other goals, which long term can have seriously negative implications for health and effectiveness (Hockey, 2000, 2002).

Conclusion

On the basis of these results, Figure Five can be amended further to incorporate the findings (as below). Adding to the 'shaded' variables confirmed in Chapter Six, variables confirmed in this final phase have now also been shaded. In sum then, email interruptions occur in multi-goal environments where people are concerned about balancing the achievement of current task goals against other task goals and wellbeing goals. Any investigation of work strategies in such an environment, would thus benefit from considering how these relative goals are balanced and compared against each other. For when people have control over their tasks and activity, the choices people make appear to involve balancing respective goals to ensure
that wellbeing is normally preserved, task switching is avoided, and strategy choice is goal-focused. Additionally, the goals that one will focus on in selecting action programs may in part be due to individual differences.

Figure Five (amended2): Antecedents and consequences to strategic action in a controllable email interruptions timeline

![Interruption timeline diagram]

- **Begin Primary Task**
- **Email Alert**
- **Check Email**
- **Begin Email Task**
- **End Email Task**
- **Resume Primary Task**

**Interruption Lag**
Prepare to resume primary task

**Negotiation Lag**
Decide whether to attend to email task

**Resumption Lag**
Re-orient back to primary task

**Time 1**
Strategic Control: can decide on length of pause between alert and checking

**Time 2**
Strategic Control: can decide on length of delay between checking and dealing with email

**Time 3**
Strategic Control: can decide on length of time spent in email system, dealing with email

**Box E**
- Personality
- Motivational style

**Wellbeing**
- Current task achievement
- Overall work task achievement
- Wellbeing goal achievement

**Box D**
- Personality
- Motivational style

**Box G**
- Current wellbeing
- Personality
- Demands of email task

**Box C**
- Current wellbeing
- Personality
- Demands of current task

**Box B**
- Current wellbeing
- Personality
- Activation of current task goal

**Box A**
- Current wellbeing
- Personality
- Task stage
- Motivational style

**Box F**
- Current wellbeing
- Personality
- Task stage
- Motivational style

**Box**
- Current wellbeing
- Personality
- Activation of current task goal
- Demands of current task
- Task stage
- Motivational style
Phase Three summary

In the final phase of this research program, a diary-study event-sampling technique was utilised to explore the role of multiple goals in affecting strategic behaviour when dealing with controllable email interruptions. Real email users, acting within their own work environments, were asked to record their responses immediately after having dealt with each email interruption within a half-day study period. This approach ensured that rating accuracy and ecological validity was maximised. The findings from this study phase revealed that people do consider multiple goals when acting in multi-goal environments, and that email interruptions are dealt with according to how they help or hinder the achievement of these goals. Goal achievement was also linked with subsequent wellbeing, and again, individual differences were found to influence strategic approach, and how people prioritise different goals.

The implications of these findings were discussed in reference to goal-directed theories. In Chapter Eight, the findings from Phase One and Two will now be integrated with this phase and linked back to how this affects our understanding of ART (Hacker, 1985, 1994; Frese & Zapf, 1994, Frese & Sabini, 1985; Frese et al., 1987), and the compensatory control cognitive-energetical framework (Hockey, 1997, 2000, 2002). In particular, the research questions posed in Chapter Four will be answered in Chapter Eight, and related to Figure Five – the model that has guided the direction taken in the empirical studies of this thesis. The final Figure Five will be presented. Recommendations to interruptions researchers will also be presented in Chapter Eight, as this study further confirms the importance of studying complete activity at work, if one wishes to fully appreciate how interruptions impact upon people's work experience.
Chapter Eight: 
Conclusions and Future Directions

Introduction

In this final chapter, the research questions generated in Chapter Four are revisited. Each question is answered in terms of how the empirical studies of this thesis contribute to understanding. In answering each question the theoretical perspectives of the goal-directed theorists are examined. Having dealt with each research question, recommended amendments to each theory are suggested. Figure Five is then presented again in its final form (Figure Thirteen).

In light of the theoretical conclusions made as a result of this thesis, implications for the study of email interruptions are outlined. Further, in order to ensure that theoretical conclusions are potentially generalisable beyond this domain, broader implications for workplace behaviour are discussed. Finally, in light of this discussion, suggested future directions for research are outlined.

Answering the research questions

1. Does wellbeing affect strategies chosen to deal with email interruptions at work?

Study One demonstrated that when people were bored they had a different strategy for dealing with incoming email; i.e., on alert they went straight into email and spent longer dealing with it. As such, this research question was generated and examined in Study Four. Results demonstrated that 'yes' wellbeing does affect the strategy chosen to deal with email interruptions at work. Replicating the findings of Study One, participants revealed that when they had low positive affectivity (bored and tired) they checked email more
speedily on alert (Time 1). In addition, when participants were operating at higher levels of activation (anxious, annoyed, or active and motivated) they spent longer dealing with an email interruption.

The finding that people appear to use email as a 'cognitive break' (Hockey, 1997, 2000, 2002) was discussed. Bored and tired people appear to respond quickly to an email interruption because they need variety and stimulation. Activated or aroused people may spend longer dealing with email as a means for calming down. Alternatively anxious and annoyed people may spend longer dealing with email interruptions as a means for avoiding the task or situation that caused the negative affect in the first instance. Active and motivated people may spend longer dealing with email because they are feeling enthused.

Theoretically these findings were interesting and significant. ART had indicated that people who need challenge and variety may be more prone to distraction by other goals (Hacker, 1985), and these findings supported this. Additionally, Hockey (1997) had indicated that when people engage in activity that increases energy and activation they may need to break into a lower level of processing occasionally to reboost energy. These findings would, again, support this. However, neither theory explicitly suggests that wellbeing levels actively influence the strategy people choose to deal with demands or conflicting goals.

In Chapter Four, an amalgamated approach was suggested, to bring together the perspectives of Hockey and ART, as informed by work from other theorists such as Schönpflug (1983, 1985, 1986, 1992) and Hancock & Warm (1989). Here it was suggested that wellbeing should be considered as one of the parameters in ART that influences the orientation towards, and selection of, an action program in goal-directed behaviour. Currently ART simply suggests that influential parameters include an assessment of external task or environmental factors and resources. In order to extend Hockey's approach, it can be clarified that people will adopt a different strategy, based on their current wellbeing, not only as a means for reducing activation, but as a means for enhancing it. I.e., when people feel underloaded or lacking in stimulation, this in itself appears to dictate strategy choice (Hancock & Warm, 1989; Scerbo, 2001).
2. Do strategies chosen to deal with email interruptions at work affect wellbeing?

This research question was examined in Study Four. It is differentiated from question 1, in that here wellbeing is considered as a consequence of strategic behaviour, rather than an antecedent. Again, the answer to this question is 'yes' based on the results of Study Four. People who adopt a strategy for spending a long time dealing with their email (Time 3) experience higher positive affectivity afterwards. Indeed, if people were active and motivated before dealing with the email, spending a long time in email resulted in an even greater increase in active and motivated feelings afterwards. Those who take a long time to respond to an email interruption (Time 2) experienced greater negative affectivity afterwards.

The theoretical implications of this finding are again interesting. Hockey and Schönpflug both assert that strategic behaviour can affect wellbeing. Schönpflug (1983) talks about how strain can result from active coping, whilst Hockey (1997) indicates that people may elect to move from Loop B to Loop A as a means of boosting wellbeing or relieving fatigue. In the findings from Study Four, the fact that avoidance of an email interruption resulted in greater negative affectivity especially supports Hockey. Hockey indicates that avoidance or attentional narrowing is a means of performance protection that necessarily can affect wellbeing goals. This is in common with findings from Elfering et al. (2005) who found that emotion-focused coping (e.g., avoidance) contrarily has the side effect of reducing emotional wellbeing, whereas actively dealing with a problem can enhance wellbeing (as in the Time 3 strategy).

From ART's perspective, the indication is that time spent away from the progression of a current action program is inefficient behaviour (Hacker, 1985, 1994). Efficient behaviour means fulfilling a current goal at the lowest level of regulation possible and in the fewest transformational steps (Hacker, 1985). The Time 2 strategy indicates that people are committed to the current task, which may be considered efficient behaviour by ART. The Time 3 strategy however could be considered inefficient as a long period of time is spent on the interruption, and not on the current task. However, when the current task takes priority it appears that wellbeing suffers, and when the current task takes a temporary back seat, wellbeing improves. In Schönpflug
and Hockey’s terms, efficiency cannot be rated simply on the basis of how well a task is achieved. Rather a consideration of the effect on wellbeing must also be included (Zijlstra, 1993). If people act in a way that enhances task performance to the detriment of wellbeing, this has negative implications for activity overall – especially if it means that strain or fatigue are side effects that potentially harm future activity (Schönpflug, 1983; Hockey, 2000, 2002).

In summary, finding support for this research question indicates that Hockey’s view is valid, in highlighting the fact that people’s activity has a direct effect on subsequent wellbeing. As such, ART would do well to extend its definition of efficiency and behavioural economy to incorporate the notion that balancing current task success against energy expended (Hacker, 1994) is not a broad enough definition. The benefits for the task need to be weighed against the long-term wellbeing implications. The most efficient people (the ‘superworkers’ in ART terms) are therefore likely to be the people who have the best strategies, but only if ‘best strategies’ includes an appraisal of how behaviour impacts on wellbeing as well as work goal attainment.

3. How do different strategies for dealing with email interruptions differentially affect wellbeing and task goal achievement outcomes?

And

5. Are some strategies for dealing with email interruptions associated with current task goal achievement, and other strategies associated with overall work goal achievement?

These research questions are dealt with together, as they both pick up on the relationship between strategies chosen and implications for multiple goals (the current task, other task and wellbeing goals). From Hockey’s perspective, protecting task performance (direct coping) appears to negatively impact on wellbeing, and protecting wellbeing (indirect coping) appears to negatively influence task success (Hockey, 2000). This was supported in Study Four, but extended in Study Six, as people were directly asked about whether their strategies for dealing with email interruptions helped or hindered the current task, other task or wellbeing goal achievement, and how wellbeing was affected afterwards.

The answer to these research questions is that, when people:
a) are quick to check an email interruption (Time 1) this is considered to hinder the achievement of other work goals.
b) are quick to check an email interruption (Time 1) this is considered to hinder the achievement of the current task goal.
c) take a long time to respond to email (Time 2) this is considered to help achieve current task goals.
d) spend a long time dealing with email (Time 3) this is considered to help other work goals.
e) feel that their wellbeing goals have been hindered, some people will have spent a long time dealing with email interruptions (Time 3) whereas others will have spent a short time dealing with email interruptions (Time 3).
f) believe their strategy helped the achievement of other work goals some people feel more anxious and annoyed afterwards (supporting Hockey), others feel more calm and at ease (supporting the amalgamation approach).
g) believe that their strategy neither helped nor hindered the achievement of wellbeing goals some people feel more anxious and annoyed afterwards, others feel more calm and at ease.
h) believe their strategy helped them achieve wellbeing goals they feel happier afterwards.
i) believe their strategy hindered their achievement of wellbeing goals they feel gloomier afterwards.
j) experience greater negative affect after dealing with an email interruption, they believe their strategy hindered their wellbeing goals.
k) experience lower levels of happiness after dealing with an email interruption they believe their strategy hindered achieving other work goals.

These findings clearly demonstrate that distraction by an email interruption is considered to be detrimental to the current task goal. This is in support of Hockey (2000), who argues that in multi-goal environments people need to resist temptation to deal with all of the conflicting goals that present if they wish to protect performance. However, distraction by an email is also considered to hinder other work goals, suggesting that people do not necessarily conceive of email as being another work goal in its own right.
When people avoid dealing with another goal (the email), this is considered to be helpful to the current task. We know from answering question 2 that avoidance at Time 2 is linked to negative affect. This firmly indicates that performance protection strategy can negatively affect wellbeing. This provides further support to Hockey, as above. However, when one has turned one's attention to dealing with the other goal (the email) those who spend a long time dealing with it believe this benefits the achievement of other work goals. This provides support for Walji et al. (2004), and indicates that people do conceive that dealing with an email involves achieving other work goals.

People differ in terms of their perception of how much time should be spent dealing with email to benefit wellbeing goals. This may reflect people's different perceptions about email. As found in Studies One and Four, some people like dealing with email, and others do not. Therefore, sensibly the people who like email may well feel that dealing with it helps them feel good, whereas those who dislike it would probably feel the opposite. This stance reflects differences in the interruptions literature too. Some researchers clearly characterise email interruptions as an annoyance or a hassle (McFarlane & Latorella, 2002; Zohar, 1999; Jackson et al., 2003) whereas others consider them to offer a useful addition to working life (Walji et al., 2004; O'Conaill & Frohlich, 1995).

The relationship between strategy choice and wellbeing afterwards is addressed in answering question 2. Study Six, however, also found that if people felt their strategy had either helped other goals (or at least was neutral – neither helping or hindering) then some would feel more annoyed and anxious afterwards, and others would feel more calm and at ease. If people believed other goals were actively hindered by their strategy choice, then they felt gloomier. So people clearly link feelings of wellbeing with strategies chosen to deal with other goals, but it is not clear whether satisfying other goals is construed as positive or not. It may be that dealing with multiple goals can be demanding and cause negative affect (Schönpflug, 1992; Hockey, 1997, 2000, 2002) for some people, whereas for other people, dealing with multiple goals is rewarding, which supports the amalgamated approach view. This view indicates that strategies to protect task performance can also protect wellbeing (Elfering et al., 2005), and that a strategy to promote one goal does not necessarily have to hinder another, as Hockey
supposes. The differences in wellbeing outcomes regarding 'other goal' achievement also potentially reflects differences between people, in terms of whether they are multi-taskers or not.

Sensibly, if people believe their strategy has hindered their wellbeing goals then this will make them feel worse, whereas if they feel their strategy has helped them achieve wellbeing goals they will feel happier. This has implications for ART. ART argues that the success of an action program is fed directly back into the OIS to inform about whether to use that action program again, in similar situations (Frese & Sabini, 1985; Frese & Zapf, 1994). Yet success is defined in terms of how efficient the action program was (and, as stated, ART efficiency does not look at wellbeing as a cost or benefit). However, if wellbeing is implied as a cost or benefit people may well decide to choose an action program in future based not only on how the strategy helped or hindered task goal achievement, but also on whether that program will make them feel worse or better (Daniels et al. 2004).

So, it seems important here to extend definitions of efficiency to include an appraisal of whether current task, other task or wellbeing goals were fulfilled, and indeed how one feels afterwards (consequential wellbeing). This is something that Hockey acknowledges, the amalgamated approach extends, and, on the basis of these results, ought now to be incorporated into ART. In Figure Five, it may be that an arrow should extend from Box D back round to Times 1-3, indicating how previous goal achievement and wellbeing consequences of acting could influence future action.

4. Are people distracted by email interruptions in multi-goal environments because of the email characteristics, the status of the current task, and/or the relative value or activation of the task goal versus the email goal?

Multi-goal activity was discussed further in addressing the above research question, which was examined in Study Six. The intention here was to appreciate what factors might distract someone away from a current task to attend to an email interruption. A range of factors was uncovered.

At Time 1, people were slow to check an email interruption if the current task was demanding (although only the content analysis supported this finding).
They were quick to check if they were interrupted at the start of the task. At Time 2, people were slow to respond to an email interruption if the task was more effortful than the email, or (according to the content analysis) if the task received higher importance priority than email. People were quick to respond if they had finished their task. At Time 3 people spent longer dealing with the email if it was long and effortful (similar to findings in Study Four), but spent less time dealing with email if the task was deemed to be more important to one's wellbeing goals.

These findings provided tentative support to Altmann & Trafton's (2002) Goal Activation Model. It seems that if a current task is highly activated (i.e., demanding of attention) then people may ignore an email interruption at Time 1, which content analysis reports indicated. Then, after checking if a task is more effortful than an email, people are slower to respond. This supports ART, and Hockey. ART indicates that when operating at high levels of regulation, people cannot deal with more than one action program (Zijlstra, 1993). Hockey (2000) says that when exerting high levels of effort to protect a task's performance (i.e., in Loop B), attentional narrowing may occur (i.e., avoidance of other tasks and distractions).

Email characteristics directly influence strategy at Time 3 (regardless of the task qualities), but the task only has a direct influence on strategy in terms of task stage. This is an area that has not been investigated by ART before. Yet it seems that appreciating what stages of an activity cycle are most at risk from disruption could be useful.

The fact that people appear to weigh up the relative importance/demands of alternative goals in deciding how to act, lends support for the negotiation lag in the interruptions timeline. Although people may not act as consciously as this implies, as this is likely to require time and effort (Lazarus, 1985; Emmons, 1997) these findings do reveal that dealing with multiple goals does occur in work activity. This refutes the position of ART. Whilst ART acknowledges that people may work on multiple action programs (though only when operating at low levels of regulation) they do not suggest that multiple activity strands (and goals) are interwoven. Hockey (2000) argues that dealing with multiple goals is a necessity in real world environments, and that working towards wellbeing goals would normally achieve priority over work
goals. The finding that people spend little time dealing with email if it is less important than the task to wellbeing, supports this finding.

6. Are strategies employed for dealing with email interruptions associated with individual differences in personality?
This research question was investigated in Studies Four and Six, and was borne from the results of Study One, which implied that different people responded to email in different ways. Personality was defined and structured in these studies according to the Five Factor Model (Costa & McCrae, 1997). In Study Six, motivational style (Hogan & Hogan, 1998) was added into the equation, to explore whether these constructs added predictive power above and beyond personality. Results were encouraging.

Individual differences in personality and motivational style were directly related to strategy choice in Study Six, but personality had an Indirect (acting as a moderator between strategy choice and wellbeing) role in Study Four. Additionally, in Study Six personality and motivational style were directly related to whether one perceived their strategy to have helped or hindered them in the achievement of current task, other task and wellbeing goals. Further, personality and motivational style were linked to consequential wellbeing after dealing with an email interruption, indicating (as suggested above) that there are differences between people in terms of whether they like dealing with email interruptions.

Key findings were that:

- People with impulsive or selfish tendencies were quicker to check email interruptions on alert (Time 1).
- People who had higher scores on openness to experience scales spent longer dealing with email (Time 3) – especially if they had high positive affect beforehand. They also felt happier after dealing with an email – but only if they were happy to begin with.
- People with higher scores on conscientiousness and emotional adjustment scales felt happier after dealing with an email, whereas people with tendencies towards neuroticism experienced greater negative affect afterwards, especially if they already felt annoyed or anxious beforehand.
• People with higher scores on 'achievement' related extraversion scales experienced greater happiness and positive affect after dealing with an email – especially if they had also spent a long time dealing with email (Time 3), or if they had been gloomy beforehand. Yet if people with higher scores on 'achievement focused' extraversion avoided responding to an email (Time 2) this made them annoyed and anxious.

• People who score higher on the 'pure' extraversion scale also experienced greater negative affect after dealing with an email interruptions (or conversely those with lower scores on 'pure' extraversion felt more calm and at ease).

In terms of perceptions of strategy achievement:

• People who would be described as 'selfish' from their scores on the motivational style scales believed their strategy helped them achieve their wellbeing goals but hindered their current task achievement.

• People who would be described as 'serious or restrained' on the motivational style scales felt their strategy helped them achieve other work goals.

• Both those scoring high and low on neuroticism scales believed their strategy helped the achievement of current task goals.

It is interesting that people with higher scores on openness, emotional adjustment, conscientiousness, and 'achievement-focused' extraversion scales appear to be the people that benefit most from their relationship with email interruptions. They appear to find dealing with the interruption to be satisfying, in that it makes them feel happier or more active and motivated. Indeed, when they don't deal with the interruption, this negatively affects them (as in the avoidance example above). ART indicated that 'neurotics' were rarely 'superworkers', as they didn't normally have the best strategies. These findings would support this premise, but more than that, it seems that people who have a balanced, goal-focused approach to work can deal with multiple demands and goals in an effective manner and in a way that benefits wellbeing.

The people who responded less favourably to email interruptions had higher scores on neuroticism and extraversion scales. In the case of extraversion, this is interesting as people with high scores on 'achievement focused'
extraversion dealt with email interruptions in a way that had positive effects overall, whereas people with high scores on 'pure' extraversion (those who are outgoing and like being the centre of attention) felt worse after an email interruption. Perhaps these people prefer to communicate directly with people on a one-to-one basis. As mentioned in Chapter Seven, the 'Introvert', who felt better after dealing with an email was also the 'type' who reported in Study One that they liked email – probably because it eliminated confusing social cues and the discomfort they experience in face-to-face or telephone contact.

For people who score higher on neuroticism scales, they experience negative wellbeing after dealing with an email, and if they were already anxious or annoyed, it makes them feel worse. Yet, people with neurotic tendencies also report that their strategy helps them achieve their task goal. This directly supports the work of Schönpflug (1986, 1992) and Connor & Abraham (2001). They say that worriers will expend extra effort to preserve task performance in the face of extra demands, but that this has negative effects on wellbeing.

So, in answering 'yes' to research question 6, a wealth of evidence has been accumulated that improves understanding of personality and motivational differences (although a discussion of this is beyond the scope of this thesis), as well as adding to the theoretical perspective of the thesis. The perspective here is that individual differences do matter when we attempt to understand strategy choice in goal-directed activity, in multi-goal environments. Both ART and Hockey conclude as much, but neither had specifically studied individual differences within a coherent and universal theoretical framework. The FFM provides a structure for investigation – being the dominant paradigm for explaining personality differences. In Chapter Seven, the addition of motivational style as a potential variable further confirmed the importance of exploring informed taxonomies of clearly defined constructs to understand individual differences better.

Arguably then, both Hockey and ART can be advised to extend their theories to explicitly indicate how individual differences affect responding. An acknowledgement from ART that personality and motivational style are parameters, along with those defined by the task and situation (and as
suggested above, wellbeing) that will influence the development and execution of action programs, is sensible in light of these findings. Indeed, as with wellbeing, individual differences will probably influence the storage and future extraction of action programs. Personality differences between people are associated with differential achievement of goals and the experience of improved wellbeing. This would have implications on whether an action program is looked on favourably for use in the future.

Theoretical overview

Figure Thirteen represents all of the amendments made to Figure Five, from its creation in Chapter Four and as a result of findings from Studies Four (Chapter Six) and Six (Chapter Seven). The Interruptions timeline builds on that presented by Trafton et al. (2003) in Chapter Two. It represents the life span of a task and interruption, when the interruption is delivered by negotiated method (McFarlane, 2002) – i.e, when it is controllable. Note the inclusion of the negotiation lag in this amended timeline – the period when people appear to weigh up which strategy to apply, having checked the interruption and compared it against the current task. Boxes A, B, C, and F indicate what factors are involved in predicting strategy choice at each stage in the timeline. Box D (including wellbeing) indicates the consequences of strategy choice, with personality and motivational style moderating the impact of strategy choice on wellbeing (Box E) and acting as a direct influence on whether multiple goals are perceived to have been achieved (Box G). Within Box D, perceptions of goal achievement are also related to wellbeing experienced after an email interruption (hence the split in the box). It is hypothesised that an arrow could now be added moving from Box D back round to the Time 1, 2, and 3 boxes. This would indicate how perceptions of goal achievement and consequential wellbeing affect future strategy choice.

22 Note that wellbeing experienced before the email interruption is a direct predictor of strategy, and that it also interacts with personality to affect wellbeing experienced afterwards. The role of personality as a moderator is represented by Box F, even though it may seem sensible to reflect this relationship by extending an arrow from Boxes A-C to Box D, and then inserting Box F as a moderator of the directional arrow. However, if this was applied, it wouldn’t indicate that people had actively dealt with the email – and that it is dealing with the email that changed wellbeing, with personality moderating the extent to which the change occurred.
Research is now encouraged that could confirm the presence of such an arrow.

**Figure Thirteen:** Antecedents and consequences to strategic action in a controllable email interruptions timeline

Although, Figure Thirteen presents a model of what influences, and is influenced by, strategic behaviour in dealing with an email interruption, many
of the variables highlighted in italics can be added to theories of goal-directed activity. This would extend the findings of this thesis more broadly, to indicate what factors influence, and are influenced by, strategic behaviour in general.

**Implications for the goal-directed theories**

Amalgamating the approaches of ART and Hockey is recommended in attempting to explain how goal-directed activity manifests at work.

ART’s grand theory provides a full and thorough breakdown of how one orients towards work goals, how one generates action programs (strategies) to meet those goals as efficiently as possible, and how one regulates the execution of these action programs until goal achievement is attained. It provides a complete view of activity, and indicates that when people have control over their work they aim to choose the most efficient strategy possible to attain goals (Hacker, 1985, 1994). Efficiency is defined as the successful achievement of a goal in the fewest transformational steps and at the lowest level of regulation, with minimal effort costs (Hacker, 1985, 1994). Efficient behaviour is concentrated around singular action programs, and ART asserts that only at very low levels of regulation can people engage in multiple action programs – doing so if they need variety or stimulation (Hacker, 1985; Zijlstra, 1993).

ART is to be congratulated for providing a view of action that considers the complete activity, and defines actors as ‘active’ rather than passive recipients in their environments. People shape and are shaped by their action, and people decide on activity according to their own subjective views, goals and experiences (Frese & Zapf, 1994; Zijlstra, 1993). However, because ART states that the selection of an action program is determined primarily by external parameters (e.g., the importance of the goal, the difficulty of the task) it is limited in its scope. Studying strategies for dealing with email interruptions revealed the extent of these limitations.

**The role of wellbeing**

It was found that although external parameters do influence choice of action program, current wellbeing is also involved. How one feels when a new goal is presented (such as an email interruption) will affect the action program chosen. For example, if one feels bored or tired one may elect to abandon an
existing action program (the current task) to deal with the new goal. Whilst ART acknowledges that people may be distracted by the goals of other action programs (Hacker, 1985, 1994; Frese & Zapf, 1994), they do not state that this is due to low levels of affective wellbeing.

The empirical studies of this thesis also found that when people experience higher levels of affective wellbeing, they may also engage in different strategic choices. For example, when people feel active and motivated they spend longer dealing with the new goal, whereas when they are bored or tired they spend less time with it. Wellbeing as an antecedent of strategy choice could now be incorporated into ART in acknowledgement of these findings.

**Attending to multiple goals**

Additionally, the finding that people choose to switch between action programs and goals in dealing with email interruptions reveals that ART's focus on singular goals is restricted. Indeed, defining efficiency as the successful achievement of a current goal in the fewest steps possible, would indicate that dealing with an email interruption when engaged with another task is inefficient behaviour. This thesis demonstrates that this need not be so (Lazarus, 1985). Whilst ignoring an interruption is conceived to be beneficial to the current task, it can cause negative wellbeing. Additionally, people perceive that dealing with an interruption is related to the achievement of other goals, and wellbeing goals. Whilst current task activity may suffer in attending to these goals, overall activity is perceived to benefit. Thus it is concluded that ART would benefit from extending their definition of efficiency to include the achievement of other goals and wellbeing goals too, with goal achievement success balanced against consequences for wellbeing. In Study One people agreed that they wish to optimise efficiency in using email, and the subsequent studies revealed that this is attained not just by concentrating energies on the current task.

**Individual differences**

Finally, having established that wellbeing and multi-goal achievement are considerations to integrate into ART, this thesis asserts that individual differences also matter. Individual differences were examined in terms of personality (as measured on the FFM) and motivational style (according to Hogan & Hogan's 1998 taxonomy). Personality and motivational style directly
influence strategy formation, and so, along with wellbeing, it is recommended that they be considered as parameters shaping the development of action programs in ART.

Additionally, people with different motivational and personality styles are differentially concerned with different goals. Some people direct their energies towards multi-tasking, which improves their wellbeing. Others prefer to focus on the current task, and are susceptible to negative wellbeing when interruptions demand their attention. Personality and motivational style also moderated the extent to which strategic behaviour improved wellbeing. ART’s focus on action styles may have been misplaced therefore. Whilst ART principally believed that individual differences mattered in strategic behaviour, their study of action styles failed to find a significant link (Frese et al., 1987), and any discussion of personality was underdeveloped and conceptually weak (Frese & Zapf, 1994). Applying a structured framework, and drawing from the individual differences domain, meant that personality and motivational style could be explored clearly, and with significant results.

**How Hockey helped**

Chapter Four outlined that, in light of the study findings, it would be appropriate to include wellbeing, multi-goal achievement, and individual differences in definitions of efficiency and effectiveness, if we are to understand strategic behaviour at work. Hockey’s model of compensatory control (his cognitive-energetic framework) provided many insights that extended such definitions. The empirical studies of this thesis contribute to the conclusion that such a stance is valid.

Hockey’s (1997) model is primarily focused upon how people respond to increased demands at work by moving from a lower loop (representing normal activity and energy expenditure) to a temporary upper loop, where extra resources of energy can be adopted. If one spends too long in the upper loop, fatigue or strain can ensue, as a result of the increase in energy expense. So, in acting in demanding situations, people need to balance out the need to fulfil task goals, with the need to preserve wellbeing (Hockey, 2000). Hockey purports that individual differences in coping style will influence who is likely to choose performance protection strategies (direct coping) over wellbeing protection strategies (indirect coping). He also links such coping behaviour
with short and long-term repercussions for task fulfilment, other goal fulfilment and health and wellbeing (Hockey, 2000).

Where Hockey was lacking
Clearly then, Hockey’s model provided an excellent source of insight into how strategic behaviour might be executed in light of increased demands (e.g., the emergence of an email interruption). However, Hockey’s model is not a grand theory of activity. He does not discuss how strategies are formed, or from where they are drawn. He does not discuss how past behaviour influences future behaviour, and nor does he discuss the lifecycle of activity and how this relates to goal parameters. Hockey concentrates his framework around short-term coping behaviour in the face of increased demands. Strategic behaviour either involves moving up a loop to protect performance, or down a loop to protect wellbeing and recharge. Nevertheless, he doesn’t indicate that people may be able to protect performance and wellbeing at the same time. This is likely to be because he does not discuss situations of underload.

Hancock & Warm (1989) demonstrate that when people are understimulated at work they will adopt strategies to increase energy and activity, which improves wellbeing and performance. In Hockey’s terms this means that people experiencing a deficit in demands may choose to operate at a higher level as a means of protecting performance and wellbeing. In Study Four, the finding that bored or tired people are quick to respond to an interruption supports the suggestion that underloaded people act to increase demands. It was also found that active and motivated people who spend a long time dealing with email feel even more active and motivated afterwards, indicating that it does not just have to be low wellbeing that prompts people to increase their demands.

An amalgamated approach
Hockey’s model substantially informed this thesis, with his focus on wellbeing, and multiple goal achievement, and his assertion (in common with ART) that individual differences matter. By combining Hockey’s model with ART’s grand theory, an amalgamated approach concludes that:
• Wellbeing is an antecedent of strategy formation. Feeling both underloaded (i.e., bored) or overloaded (i.e., fatigued or stressed) influences strategic action.
• People work towards multiple goals. Defining efficiency in activity involves appraising the extent to which current task, other task and wellbeing goals are satisfied.
• There are individual differences in strategic choice, and the prioritisation of different goals in acting.
• Strategic action affects wellbeing and perceptions of different goal attainment.
• The attainment of different goals influences wellbeing. Choosing a strategy to enhance one goal (e.g., the task) does not necessarily mean that other goals (e.g., wellbeing) will suffer.

In turn it is hypothesised that:
• The attainment of different goals affects the storage and retrieval of action programs for use in the future.
• The impact of strategic action on wellbeing affects the storage and retrieval of action programs for use in the future.

Future research angles

The findings from this thesis provide rich-pickings for directing future research agendas. Areas of particular interest are outlined below.

Individual differences

Studying individual differences by utilising a structured, universal paradigm (such as the Five Factor Model of personality) reaped strongly significant results. Motivational style was also investigated using a structured taxonomy. It is now recommended that research into goal-directed theories of work behaviour extend the study of individual differences. By using existing paradigms relating to the conceptualisation and measurement of factors such as ability and aptitude (including intelligence), cognitive capacity and resource, self-esteem and other domains, understanding is likely to be furthered. It is recommended that goal-directed theorists work closely with
researchers from the field of individual differences to ensure that characteristics are explored in a theoretically informed and balanced manner.

**Implications for OIS**

In ART, the success or failure of an action program affects how it is stored and retrieved in the Operative Image System (Frese & Zapf, 1994) for use in future. If an action program has proved to be successful and efficient it is likely to be retrieved and adopted (perhaps at a lower level of regulation) in the future. By extending definitions of efficiency to incorporate an assessment of subsequent wellbeing, and overall work goal achievement, it will now be interesting to ascertain whether these parameters influence the storage and retention of an action program. For example, if a strategy has improved wellbeing in the past, is it more likely to be selected in the future if wellbeing is low? If a strategy has been useful in helping people achieve multiple goals, will this be retrieved for use again? Seshadri & Shapira (2001) and Koole & van't Spijker (2000) found that effective workers were those who had strategies that expected and planned for interruptions to their work. They appeared to operate action programs that allowed for interruption by other goals. This indicates that success on multiple goals was fed back into the OIS so that the strategy that encouraged this could be used again.

A structured study of how strategies affect single, and multiple task achievement, along with wellbeing could now be adopted. By studying such strategies over a long time period, one can then assess which strategies tend to be used again, and how these continue to effect success at single, multiple and wellbeing goal levels. If it is confirmed that strategy success at each goal level are retrieved and used again, an arrow can lead from Box D in Figure Thirteen back round to the Time 1-3 strategy boxes, to indicate how past success of an action program influences future strategising.

**Email pathologies**

When email users in Study Six reported on whether their strategies had helped or hindered goal achievement for current, other or wellbeing goals, it was clear that people often chose strategies that were a hindrance. Sometimes a strategy that helps one goal necessarily hinders another. Participants in Study One reported that they had 'got into the habit' of checking email as soon as it arrived, even though they felt this was a
hindrance to their work. Although this might have incidentally 'helped' wellbeing goals, there is evidence emerging that suggests that email use may suffer from pathological strategising.

Frese et al. (1987) discuss the implications of habituality of action styles. Habituality involves the automatic application of an action style, and they suggest that such application could indicate a 'pathology'. In other words, the approach becomes almost a ballistic behaviour that is neither rational nor useful. Frese et al. (1987) call for more investigation into the application of habitual activity, to understand better how such pathologies might develop and what the implications of this are for activity.

Orlikowski (2006) has recently turned her attention to the use of 'blackberries'. These are mobile email devices that enable people to access and send email when away from the workplace. Orlikowski found that work-related email use was extended into various domains - at home, in leisure time, and when commuting or travelling. She also found that people used blackberries simultaneously when engaged in other activity. Several examples of potential pathological responding were recorded, including addictive checking, and 'absent presence' (being physically present in interactions with others, but engaged in email communication). This latter finding relates to Kraut, Patterson, Lundmark, Kiesler, Mukopadhyay & Scherlis's (1998) 'internet paradox' phenomenon. They comment that the explosion of new technology communication devices, such as email and the Internet has, in tandem, caused a decline in people's social skills. In particular, communication with family members, the size of one’s social circle, and overall wellbeing has declined relative to people’s use of the Internet.

Studies in the domain of email research still lack a theoretical approach (Whittaker, Bellotti & Moody, 2005). Integrating a study of email pathologies within the framework of goal-directed theories may assist in understanding better how and why people are adopting strategies that may hinder goal achievement. In particular with the extension of definitions of efficiency to include other goals and wellbeing goals, aside from the current task, it will be interesting to establish which strategies hinder some, all or none of these. Are some apparent 'pathologies' actually beneficial, or are they generally considered to hinder people across all of their goals (i.e., perhaps constituting
a 'true' pathology)? An amalgamation of Hockey and ART's approaches will be applied in a future study of pathological strategising in email behaviour.

Practical implications

A key aim of this thesis was to provide practical recommendations to email uses at work, to inform them how to manage their email systems if they wish to improve efficiency at work. Some suggestions are now outlined below. In light of the amendments made to the goal-directed theories, further recommendations are also made about how other workplace behaviours can be better understood and managed.

Implications for email use

This thesis has used controllable email interruptions as a study tool for comparing the theoretical position of the goal-directed theorists. Examining controllable interruptions also offered a novel perspective to the domain of interruptions research, which to date has focused attention on exploring how enforced interruptions, generated in lab-based environments, affect the execution of interrupted tasks. As such, interruptions have been construed as disruptive, and job designers have been encouraged to limit the extent to which interruptions are admitted into people's working life. Despite the fact that email interruptions are co-ordinated by the negotiated method (i.e., are controllable), some researchers have consequently also recommended that email interruptions to work be limited, on the same basis (Jackson et al., 2001).

This thesis indicates that when one can control one's interruptions, one takes a strategic approach to dealing with them. In studying email interruptions it is clear that people weigh up the demands of the email against the task, and adopt a strategy that balances the demands of multiple goals – from the current task, to other goals (e.g., as afforded by the email) and in terms of wellbeing goals. When email interruptions are viewed from this perspective, it is evident that a blanket recommendation to reduce email interruptions is not advisable (O'Conaill & Frohlich, 1995).
The overall recommendation here agrees with that made by McFarlane (2002). McFarlane indicates that people are naturally capable of organising and co-ordinating their interruptions. When given control over how to manage interruptions, people chose a range of different methods (from wanting immediate receipt to scheduling in ‘interruptions’ time). The method that worked best for people was the one that they had chosen. Thus McFarlane urges job designers to resist from dictating how people should receive interruptions, arguing that people will naturally choose the methods that suit them best.

Guidance to improve the management of email interruptions

Whilst in agreement with McFarlane, guidance can still be given here to assist people struggling to cope with email interruptions. On the basis of the empirical findings from this thesis one point is particularly clear – there are individual differences in terms of how people prefer to deal with email.

Multi-taskers

For people who have open, balanced, achievement-focused personality tendencies being connected to the email system at all times is considered to be a satisfactory approach. Such people (referred to now as multi-taskers) appear to prefer to be able to check an email on alert, in order to ascertain whether it contains a goal that requires attention. These multi-taskers probably consider email to be an integral part of their daily tasks, requiring attention and consideration in the same way as other work tasks. Indeed, such people find it intrinsically rewarding when they attend to an email interruption – perhaps because it affords short-term goal fulfilment opportunities, or perhaps because it offers variety and stimulation from other tasks. These people also appear to be able to decide when to ignore email (i.e., if current task demands are high), and are capable of balancing strategies to ensure that wellbeing does not suffer. As such, having the email system switched on at all times, is unlikely to cause problems to these people, who probably prefer to know what all their tasks are so that they can adopt the most appropriate strategy to balance these. In ART terms, these people may be considered to be email ‘superworkers’.
High scorers on neuroticism and extraversion scales

However, people who score higher on neuroticism scales (worriers) are less likely to respond well to such an approach. Indeed, this may also apply to people who score higher on 'pure' extraversion scales, on the basis of the last study. Such people tend to find that dealing with email interruptions reduces affective wellbeing, and can make them feel worse, if they were already anxious at work. Whilst worriers may ensure that the current task does not suffer when an email interrupts them, dealing with this additional demand disrupts their wellbeing. It is possible that worriers and people with extraverted tendencies do not consider email to be an integral part of their daily tasks. Rather email may be considered to be a separate 'job' that they are forced to attend to, and which simply increases demands over and above what they consider their work to involve. It is recommended then that people who score higher on neuroticism and extraversion scales do not have email switched on at all times, because this can be too demanding. In particular, if people with neurotic tendencies are feeling anxious or annoyed at work then email interruptions should be temporarily 'ignored' or closed off completely. A scheduled method of receipt (active and occasional downloading) might better suit such people.

In light of Walji et al.'s (2004) study, it may seem odd to recommend that people turn off their email systems, as email interruptions could contain vital information that a person needs to respond to immediately. However, ART indicates that when anyone considers which action program to select they must also consider the rules of transformation that apply to their activity partners (Hacker, 1985, 1994; Frese & Zapf, 1994). In other words, if someone selects to use email as an action program for transmitting vital information to a person that does not regularly check their email, they will soon learn that the recipient is an irregular checker (they will learn that these are their rules of transformation) and will amend the action program to account for this fact. In future, vital information will then be conveyed to the irregular checker by use of another communication medium.

This also has recruitment implications. As indicated in Chapter Six, when people need to work in environments peppered by frequent interruptions, it is therefore unlikely that people who score higher on neuroticism and extraversion scales are the best people to recruit.
Summary
So, for email users the recommendations from this thesis are:

1. To set up the email system so that you use whichever strategy appears to suit you best.
2. If you have tendencies towards being balanced, open, and achievement-focused as a person, you may find it more beneficial to overall effectiveness and wellbeing to have email switched on at all times, so that you can weigh up your demands continuously and respond accordingly.
3. If you tend towards neuroticism (a worrier), or if you tend towards extraversion, it may be beneficial to schedule in specific times to download email (removing its interrupting effect), ensuring that this is only done when current wellbeing is relatively high.

In addition, for employers:

1. Don't recruit people who score higher on neuroticism or extraversion scales into work environments that are characterised by having high levels of interruptions (e.g., call centres, stock market trading centres).
2. Show staff how to set up email systems so that the method of coordination can be manipulated to suit them best.

Implications for wider workplace activities
In Chapter Four it was implied that if goal-directed theories included a consideration of wellbeing and overall effectiveness in definitions of efficiency, this would have implications for a range of workplace behaviours. Activity that may normally be conceived as inefficient may actually be quite strategic, and be of benefit in the long term (Lazarus, 1985). So, in light of the finding from this thesis that removing attention from a current, 'live' action program need not be considered inefficient, many activities can be reconstrued.

Absenteeism
For example, absenteeism from work has long been considered a problem by industry (Le Blanc, de Jonge & Schaufeli, 2000). However, when looking at short-term absenteeism taking time off from work could be a strategic activity. Indeed, people who take advantage of the new style 'duvet days', tend to take time off from work when demands are too much for them, and they needed a short respite to recharge. They are then able to return to work
refreshed (*Can duvet days combat sickies?*, 2003). Whilst absenteeism is not to be encouraged, because in Schönpfug's (1983) terms it indicates that demands have exceeded capacity and stress has set in, it is suggested here that for some people it is more efficient to take a short break in order that they can fulfil their responsibilities more effectively in the long run.

Hacker (1985, 1994) indicates that when jobs are designed to include more control and more chances to operate at high levels of regulation, absenteeism becomes less of a problem. In the long run, applying such a design to jobs may reduce absenteeism without causing side effects of strain or inefficacy. However, until such jobs are redesigned, applying self-imposed and strategic short-term absences may be an efficient way of managing demands overall.

**Regular breaks**

In any job role, taking regular breaks to stave off stress might be recommended. Such breaks don't necessarily have to include absences from the workplace. They could involve having a quick coffee, or a chat with a colleague, or spending some time surfing the Internet, or phoning home. Modern workplaces have begun to adopt a range of formalised 'break' options to promote wellbeing for staff. Masseuses come to some workplaces to give computer operatives a soothing break (e.g., stressbusters.co.uk), other companies run lunchtime yoga classes (e.g., in2yoga.co.uk), whilst others have team-building away-breaks (Dyer, 1984). All such breaks involve taking time and attention away from work tasks. In ART terms this could be inefficient. However, if they give people a chance to boost depleting energy or wellbeing reserves, this is likely to be efficient in the long-term, as people then return to their tasks with renewed vigour. In light of this thesis, and the principles of the amalgamated approach, such strategies are likely to be effective.

**Call centre environments**

In some call centre environments unscheduled breaks are recorded and penalised (Greig, 1998). Operatives are expected to take 'comfort' breaks only at set times during the day, and must spend the rest of the time on the telephone answering calls and queries. In the call centre studied by Greig (1998) call centre employees were required to stick to a script when talking to customers and had very little control over their job. Absence and staff
turnover was very high. Such an example demonstrates how concentrating on the task is not always efficient in the long-term. Had these staff been given more freedom and autonomy, the chance to choose their own breaks, the chance to control their work, it is possible, according to ART and Hockey, that retention would have been better, and absences less. Schellekens et al. (2000) clearly demonstrated that working on boring tasks, that one has no control over, can result in people reaching 'satiation point'. If workers cannot stop activity once they have reached satiation the implications are that they will experience reduced wellbeing and strain. Long term this could result in people taking sick leave, or even quitting altogether.

Summary
People need control at work. This is a well-established perspective in occupational psychology (Karasek & Theorell, 1990). However, they also need to have the freedom to work in the way that suits them best, in order that current task priorities can be balanced against other work tasks and goals, and one's wellbeing goals. Limiting people from achieving such a balancing act (i.e., by banning unscheduled breaks, or preventing interruptions from other goals) is likely to be inefficient in the long run, based on the findings from this thesis. Job designers should take note.

Conclusion
This thesis has addressed the six research questions outlined in Chapter Four and made four key conclusions:

1. That work behaviour can be studied in its natural environment without compromising robust and quantifiable methodology or analysis. Use of the diary method for studying email interruptions achieved accurate results and enabled participants to directly record their work experiences close in time to their occurrence.

2. The domain of interruptions research has been furthered by applying a study of 'controllable' interruptions. By examining controllable interruptions, the conclusion is that interruptions need not always be conceived of as disruptive, but as goals requiring satisfaction in their own right, and with the potential to enhance people's work activity.
3. From utilising principles of goal-directed behaviour taken from Action Regulation Theory, and Hockey's compensatory control cognitive-energetical model, definitions of efficiency in acting were extended, in an amalgamated approach. As such, the empirical studies of this thesis have found that when people have control over their action they attempt to work efficiently towards current task, other task and wellbeing goals. Costs and benefits in acting need necessarily to account for success at a multi-goal level therefore, with wellbeing consequences included in the equation.

4. To fully understand why people adopt the strategies that they do at work, an appraisal of internal, personal factors is recommended. Current wellbeing, and individual differences in personality and motivational style have been found to influence strategy choice. It would be sensible to incorporate such findings into theories of goal directed behaviour, as a result.

In light of the above findings, this thesis therefore supports a future research agenda that will concentrate on how people's strategic behaviour is related to wellbeing, single, and multiple goal achievement, as moderated by individual differences, across a range of domains and workplace behaviours.
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Appendices
Appendix 1: Study One interview guide
Standard Instructions

Thank you for agreeing to participate in this interview, the results of which will be used as part of my doctoral project. My research is investigating the phenomenon of email communication, and how email affects people’s work experience. Whilst I have spent a lot of time reading about this, the sessions I am holding with you and your colleagues are essentially designed to be a ‘real world’ exploration, to help me identify what the actual issues are for people at work. The Economic and Social Research Council and the University of Surrey are sponsoring this research. Eventually we hope that our findings will influence recommendations and policy generation on the use of email, for organisations.

Although I have prepared a list of specific questions that I would like to ask you, please feel free to deviate from these if you feel it is appropriate. For example, if I have a misconception about your work, or if, by the end of the interview, you feel I have not asked about something important to your use of email.

It is important that your answers to these questions reflect your own experiences of email, at work. So, please try not to think about how you use email at home, for example.

Finally, the information gleaned from this interview will be kept completely confidential, with no identifying information connected to your responses. No one but me will be privy to our chat here today. However, all of my interview results will be summarised later and written up (preserving your anonymity) as part of my doctoral work. Should you be interested in receiving feedback about my project, do let me know and I will be happy to arrange to send you a copy of my results.

Before we begin, do you have any questions?

First I would like to ask you about your “Characteristics of Use”

1. How many emails do you send in an average day?
2. How many emails do you receive in an average day?
3. What sorts of emails do you tend to send?
4. What sorts of emails do you tend to receive?
5. Why would you choose to send an email?
6. Why would you choose not to send an email (i.e. use another method)?
7. What sort of emails do you like to receive?
APPENDIX 1

8. What sort of email do you dislike receiving?

9. How do you know when you have new email?
   a. Does this suit you?
   b. How often do you check your inbox (if appropriate)?
   c. Do you respond straight away?

10. When are you glad to have new email?

11. When are you annoyed to have new email?

I would now like to ask about how you deal with your email (Strategies)

12. Do you have any strategies that you use to deal with the email you send and receive at work?

Thinking especially about how you deal with incoming email interruptions...

13. Do these strategies differ when you are under a deadline?

14. Do these strategies differ when you are working on an important task?

15. Do these strategies differ when you are working on a boring task?

16. Do these strategies differ when you are working on a difficult task?

17. Do these strategies differ when email being sent or received is central to you completing an important work task?

18. Have you ever felt overloaded by your incoming email?

If yes:
   19. Why or when do you feel overloaded?

   20. What do you do at such times to relieve the overload?

If no:
   21. Why do you think you don’t feel overloaded?

   22. Do you ever wish you had more email to deal with?

Both:
   23. Compared to your colleagues, do you think you have a better or worse understanding of how to deal with your work and your workload?

I would now like to ask you how your approach to work differentiates you from your colleagues

24. Compared to your colleagues, do you think you have better or worse strategies for dealing with your email?

25. Compared to your colleagues, do you think you have a better or worse understanding of how to use computers?

26. Compared to your colleagues, do you think you are more likely to welcome interruptions to your work, or reduce interruptions to your work?

27. Compared to your colleagues, do you think you get bored easily at work?

28. Compared to your colleagues, do you think you get stressed easily at work?
29. Compared to your colleagues, do you think you are energised easily by your work?

30. How ambitious do you think you are in your work?

31. How do you feel when there are a lot of changes going on around you or in your work?

**Overall Impressions**

32. Given the option, would you rather be with or without email at work?

33. What do you think are the good things about having email at work?

34. What do you think are the bad things about having email at work?

35. If you had to set a policy for the use of email in your organisation, is there anything you would recommend?

36. Is there anything else that you would like to say about your use of email?

Thanks very much for taking the time to answer these questions – your responses have been invaluable. Now the interview proper is over, is there anything else you would like to say/ask?

Debrief accordingly.
Appendix 2: Coding results and frequency percentages from interview transcript (relevant questions only)
<table>
<thead>
<tr>
<th>Question</th>
<th>Code Description</th>
<th>Code Reference</th>
<th>Percentage reported (Integers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 No. of email sent per day</td>
<td>1-10</td>
<td>1.1</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>11-30</td>
<td>1.2</td>
<td>54</td>
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<tr>
<td></td>
<td>31-50</td>
<td>1.3</td>
<td>32</td>
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<tr>
<td></td>
<td>51-70</td>
<td>1.4</td>
<td>0</td>
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<td></td>
<td>71-90</td>
<td>1.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>91+</td>
<td>1.6</td>
<td>0</td>
</tr>
<tr>
<td>2 No. of email received per day</td>
<td>1-10</td>
<td>2.1</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>11-30</td>
<td>2.2</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>31-50</td>
<td>2.3</td>
<td>29</td>
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<tr>
<td></td>
<td>51-70</td>
<td>2.4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>71-90</td>
<td>2.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>91+</td>
<td>2.6</td>
<td>4</td>
</tr>
<tr>
<td>3 Type of email sent</td>
<td>replies</td>
<td>3.1</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>job/project related</td>
<td>3.2</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>action</td>
<td>3.3</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>information</td>
<td>3.4</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>personal and social</td>
<td>3.5</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>queries and enquiries</td>
<td>3.6</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>back-up</td>
<td>3.7</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>quick/immediate responses and notes</td>
<td>3.8</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>forwarding misdirected</td>
<td>3.9</td>
<td>11</td>
</tr>
<tr>
<td>4 Type of email received</td>
<td>junk distribution</td>
<td>4.1</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>impersonal relevant</td>
<td>4.2</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>acknowledgements and receipts</td>
<td>4.3</td>
<td>7</td>
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<td></td>
<td>meeting related</td>
<td>4.4</td>
<td>18</td>
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<tr>
<td></td>
<td>job/project related</td>
<td>4.5</td>
<td>79</td>
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<tr>
<td></td>
<td>queries and enquiries</td>
<td>4.6</td>
<td>61</td>
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<td></td>
<td>misdirected</td>
<td>4.7</td>
<td>11</td>
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<td></td>
<td>personal and social</td>
<td>4.8</td>
<td>64</td>
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<tr>
<td></td>
<td>quick/immediate responses and notes</td>
<td>4.9</td>
<td>21</td>
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<tr>
<td>5 Why choose email?</td>
<td>Convenience</td>
<td>5.1</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>clarity and exactness</td>
<td>5.2</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>removes personal cues/avoids social interaction</td>
<td>5.3</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>not working hours dependent</td>
<td>5.4</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>cost</td>
<td>5.5</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>ease of dispersion</td>
<td>5.6</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>monitoring and recording</td>
<td>5.7</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>integration and multi-tasking with tasks/system</td>
<td>5.8</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>habit/expectation</td>
<td>5.9</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>consideration of recipient workload</td>
<td>5.10</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>loose/informal style</td>
<td>5.11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>privacy of conversations</td>
<td>5.13</td>
<td>43</td>
</tr>
<tr>
<td>6 Why choose another method?</td>
<td>Serious: letter/memo</td>
<td>6.1</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>social/personal interaction: phone/facetoface</td>
<td>6.2</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>hardcopy: fax/letter</td>
<td>6.3</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>timeliness and accessibility: phone</td>
<td>6.4</td>
<td>32</td>
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<tr>
<td></td>
<td>expectation and choice: recipient preference</td>
<td>6.5</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>non-urgent: memo/phone</td>
<td>6.6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>passing actions upwards: phone/facetoface</td>
<td>6.7</td>
<td>4</td>
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<tr>
<td></td>
<td>avoid being deskbound: face-to-face</td>
<td>6.8</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>complexity and subtext: verbal</td>
<td>6.9</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>email ignorers: verbal</td>
<td>6.10</td>
<td>29</td>
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<tr>
<td></td>
<td>sensitive or delicate topic: verbal</td>
<td>6.11</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td><strong>What email do you like to receive?</strong></td>
<td></td>
<td></td>
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<td>---</td>
<td>-------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>personal and social</td>
<td>7.1</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>alerts</td>
<td>7.2</td>
<td>4</td>
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<td></td>
<td>positive email</td>
<td>7.3</td>
<td>31</td>
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<td></td>
<td>confirmation emails</td>
<td>7.4</td>
<td>12</td>
</tr>
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<td></td>
<td>knowledge and information sharing</td>
<td>7.5</td>
<td>39</td>
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<tr>
<td></td>
<td>clarity of purpose, intent and action (structure)</td>
<td>7.6</td>
<td>27</td>
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<tr>
<td></td>
<td>requiring quick and easy response</td>
<td>7.7</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>don't like anything</td>
<td>7.8</td>
<td>4</td>
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<td></td>
<td>work provision carriers</td>
<td>7.9</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>friendly, relaxed, informal tone</td>
<td>7.10</td>
<td>8</td>
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<td></td>
<td>courteous tone</td>
<td>7.11</td>
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<tr>
<td></td>
<td>short and concise</td>
<td>7.12</td>
<td>27</td>
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<td></td>
<td>replies to own email</td>
<td>7.13</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td><strong>What email do you dislike receiving?</strong></td>
<td></td>
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<td></td>
<td>technical</td>
<td>8.1</td>
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<td></td>
<td>group conversations</td>
<td>8.2</td>
<td>14</td>
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<td></td>
<td>non-work email</td>
<td>8.3</td>
<td>14</td>
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<td></td>
<td>inappropriate/unchecked tone or style</td>
<td>8.4</td>
<td>18</td>
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<tr>
<td></td>
<td>intrusive/non-agreed workload</td>
<td>8.5</td>
<td>21</td>
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<tr>
<td></td>
<td>failure to convey purpose, intent and action</td>
<td>8.6</td>
<td>14</td>
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<tr>
<td></td>
<td>negative email (news, problems, complaints)</td>
<td>8.7</td>
<td>14</td>
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<td></td>
<td>long and un-summarised</td>
<td>8.8</td>
<td>25</td>
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<td></td>
<td>pointless quickies</td>
<td>8.9</td>
<td>7</td>
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<td></td>
<td>don't dislike anything</td>
<td>8.10</td>
<td>4</td>
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<tr>
<td></td>
<td>irrelevant, unsolicited emails and circulars</td>
<td>8.11</td>
<td>57</td>
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<tr>
<td></td>
<td>other</td>
<td>8.12</td>
<td>4</td>
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<tr>
<td>9</td>
<td><strong>How do you know a new email has arrived?</strong></td>
<td></td>
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<td></td>
<td>audible alert</td>
<td>9.1</td>
<td>79</td>
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<tr>
<td></td>
<td>icon appears</td>
<td>9.2</td>
<td>57</td>
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<tr>
<td></td>
<td>cursor changes</td>
<td>9.3</td>
<td>4</td>
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<tr>
<td></td>
<td>message box appears</td>
<td>9.4</td>
<td>18</td>
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<tr>
<td></td>
<td>sees email arrive in inbox</td>
<td>9.5</td>
<td>14</td>
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<tr>
<td>9A</td>
<td><strong>Does this suit you?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>yes</td>
<td>9.6</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>no</td>
<td>9.7</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>has deliberately set this up</td>
<td>9.8</td>
<td>33</td>
</tr>
<tr>
<td>9B</td>
<td><strong>How often do you check email?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>always on-line (continuously/checks on alert)</td>
<td>9.9</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>infrequently (e.g. every 1-2 hours)</td>
<td>9.10</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>frequently (e.g. every 10-15 minutes)</td>
<td>9.11</td>
<td>25</td>
</tr>
<tr>
<td>9C</td>
<td><strong>Do you respond immediately?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>previews email immediately</td>
<td>9.12</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>reads and responds on cue/immediately</td>
<td>9.13</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>opens and reads on cue/immediately</td>
<td>9.14</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>response depends on email</td>
<td>9.15</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>response depends on current task</td>
<td>9.16</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>no - won't check until set time</td>
<td>9.17</td>
<td>7</td>
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<tr>
<td>10</td>
<td><strong>When are you glad to have new email?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>when feel out of touch</td>
<td>10.1</td>
<td>11</td>
</tr>
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<td></td>
<td>when awaiting necessary information</td>
<td>10.2</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>when need stimulation (bored/slow/quiet)</td>
<td>10.3</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>when need a break (intense/difficult)</td>
<td>10.4</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>when good news</td>
<td>10.5</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>generally glad</td>
<td>10.6</td>
<td>14</td>
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<tr>
<td></td>
<td>not generally glad</td>
<td>10.7</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>no feeling either way</td>
<td>10.8</td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td><strong>When are you annoyed to have new email?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>when backlog build-up</td>
<td>11.1</td>
<td>14</td>
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<tr>
<td></td>
<td>when focus is elsewhere (busy/need to concentrate)</td>
<td>11.2</td>
<td>36</td>
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<tr>
<td></td>
<td>not annoyed</td>
<td>11.3</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>when personal ones come in</td>
<td>11.4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>when sperry/unsolicited email</td>
<td>11.5</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>when unnecessary/poindless</td>
<td>11.6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>when email is accidentally opened and wastes/interrupts task</td>
<td>11.7</td>
<td>7</td>
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<tr>
<td>12</td>
<td>What strategies do you use to deal with email?</td>
<td>12.1 preview on cue/immediately but respond depending on task</td>
<td>36</td>
</tr>
<tr>
<td>----</td>
<td>------------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>allocate diary time to deal with email</td>
<td>12.2</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>storage in folders and sub-folders in system</td>
<td>12.3</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>monitors inbox size</td>
<td>12.4</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>uses standardised templates and language</td>
<td>12.5</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>hoards emails (rarely deletes)</td>
<td>12.6</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>uses signature</td>
<td>12.7</td>
<td>11</td>
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<tr>
<td></td>
<td>uses informal style</td>
<td>12.8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>provides alternative contact details</td>
<td>12.9</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>no firm strategies</td>
<td>12.10</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>keeps inbox clear</td>
<td>12.11</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>prints emails (to action/file)</td>
<td>12.12</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>storage in folders and sub-folders outside system</td>
<td>12.13</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>uses 'priority' appropriately</td>
<td>12.14</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>uses 'to' line sparingly, 'cc' non-actionees</td>
<td>12.15</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>tracks receipts and actioning of email</td>
<td>12.16</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>live inbox until issues closed (for access anywhere)</td>
<td>12.17</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>flag/mark/code email to follow up</td>
<td>12.18</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>sends shortcut links, not attachments</td>
<td>12.19</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>provides action deadlines for response</td>
<td>12.20</td>
<td>7</td>
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<tr>
<td></td>
<td>absence contingencies (out-of-office or redirection)</td>
<td>12.21</td>
<td>18</td>
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<tr>
<td></td>
<td>Avoids use of preview screen</td>
<td>12.22</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>uses draft email</td>
<td>12.23</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>on reading - clears to folders or bin</td>
<td>12.24</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>prioritisation of email actions</td>
<td>12.25</td>
<td>7</td>
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<tr>
<td></td>
<td>deals with in order of receipt (non-prioritisation)</td>
<td>12.26</td>
<td>50</td>
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<tr>
<td></td>
<td>fosters all business communication via email</td>
<td>12.27</td>
<td>7</td>
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<tr>
<td></td>
<td>emails unsolicited senders to remove from list</td>
<td>12.28</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>sets own time limit by which to respond</td>
<td>12.29</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>conducts periodic housekeeping</td>
<td>12.30</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>keeps email short</td>
<td>12.31</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>always checks before sending</td>
<td>12.32</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>deals with according to tiredness</td>
<td>12.33</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>avoids immediate/cued checking</td>
<td>12.34</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>uses integrated system tools (calendars/tasks)</td>
<td>12.35</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>forward or cc when email of interest to others</td>
<td>12.36</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>delete unrecognisable subject or sender</td>
<td>12.37</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>(without opening)</td>
<td>12.38</td>
<td>18</td>
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<table>
<thead>
<tr>
<th>13</th>
<th>How do your strategies change when you are under a deadline?</th>
<th>13.1 checks inbox but may not deal with it</th>
<th>43</th>
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<tbody>
<tr>
<td></td>
<td>deletes or ignores irrelevant/unimportant email</td>
<td>13.2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>no change</td>
<td>13.3</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>use out-of-office to warn of delay</td>
<td>13.4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>checks email priority against task and responds accordingly</td>
<td>13.5</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>ignores email completely</td>
<td>13.6</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>informs recipient of need for timely response</td>
<td>13.7</td>
<td>7</td>
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</table>

<table>
<thead>
<tr>
<th>14</th>
<th>How do your strategies change when you are working on important or difficult tasks?</th>
<th>14.1 ignores email completely</th>
<th>56</th>
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<tbody>
<tr>
<td></td>
<td>no change</td>
<td>14.2</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>responds with brevity</td>
<td>14.3</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>leaves housekeeping</td>
<td>14.4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>appreciates distraction - reads and responds</td>
<td>14.5</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>checks inbox but may not deal with it</td>
<td>14.6</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>checks email priority against task and responds accordingly</td>
<td>14.7</td>
<td>15</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>15</th>
<th>How do your strategies change when you are working on boring tasks?</th>
<th>15.1 read and respond on cue/immediately</th>
<th>46</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dragging out</td>
<td>15.2</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>ignore then apologise later</td>
<td>15.3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>check more frequently</td>
<td>15.4</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>no change</td>
<td>15.5</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>more housekeeping</td>
<td>15.6</td>
<td>29</td>
</tr>
<tr>
<td>17</td>
<td>How do your strategies change when email is central to your work task?</td>
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<tr>
<td>----</td>
<td>---------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.1</td>
<td>check immediately against task and priority responding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.2</td>
<td>keeps inbox on screen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.3</td>
<td>email isn’t central to completing tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.4</td>
<td>organise email rules to only show relevant files and emails</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.5</td>
<td>no change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.6</td>
<td>danger of distraction due to increased checks</td>
<td></td>
<td></td>
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<tr>
<td>17.7</td>
<td>responds to all, even to warn of delay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.8</td>
<td>more stringent enforcement of strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.9</td>
<td>print off to check details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.10</td>
<td>encourages timely response in sending</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.11</td>
<td>checks even without cue</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>18</th>
<th>Do you ever feel overloaded by email?</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1</td>
<td>yes</td>
</tr>
<tr>
<td>18.2</td>
<td>no</td>
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</table>

<table>
<thead>
<tr>
<th>19</th>
<th>If yes, why/when?</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.1</td>
<td>overload backlog in absence</td>
</tr>
<tr>
<td>19.2</td>
<td>all the time</td>
</tr>
<tr>
<td>19.3</td>
<td>physical presence in inbox</td>
</tr>
<tr>
<td>19.4</td>
<td>busy/pressured and emails keep coming in</td>
</tr>
<tr>
<td>19.5</td>
<td>feels others’ expectation to respond quickly</td>
</tr>
<tr>
<td>19.6</td>
<td>when email is creating unanticipated work</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>20</th>
<th>If yes, how do you relieve the sense of load?</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.1</td>
<td>stays late</td>
</tr>
<tr>
<td>20.2</td>
<td>prior warning of absence</td>
</tr>
<tr>
<td>20.3</td>
<td>organises system to file incoming email</td>
</tr>
<tr>
<td>20.4</td>
<td>creates prioritisation system</td>
</tr>
<tr>
<td>20.5</td>
<td>makes a to-do list</td>
</tr>
<tr>
<td>20.6</td>
<td>deletes general/irrelevant email without reading</td>
</tr>
<tr>
<td>20.7</td>
<td>breaks inbox into manageable chunks (deals with a chunk each day until caught up)</td>
</tr>
<tr>
<td>20.8</td>
<td>seeks help</td>
</tr>
<tr>
<td>20.9</td>
<td>delegates</td>
</tr>
<tr>
<td>20.10</td>
<td>reviews/scans total inbox to get flavour</td>
</tr>
<tr>
<td>20.11</td>
<td>self re-appraisal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>21</th>
<th>If no, why not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>21.1</td>
<td>absence contingency set-up</td>
</tr>
<tr>
<td>21.2</td>
<td>email holds no surprises</td>
</tr>
<tr>
<td>21.3</td>
<td>allocates time to deal with email</td>
</tr>
<tr>
<td>21.4</td>
<td>email has improved life</td>
</tr>
<tr>
<td>21.5</td>
<td>prioritises and controls email</td>
</tr>
<tr>
<td>21.6</td>
<td>emails are wanted and contain important information</td>
</tr>
<tr>
<td>21.7</td>
<td>low volume</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>22</th>
<th>If no, do you want more email?</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.1</td>
<td>acceptable volume</td>
</tr>
<tr>
<td>22.2</td>
<td>would like more email</td>
</tr>
<tr>
<td>22.3</td>
<td>volume irrelevant – consequential tasks/actions matter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>23</th>
<th>Compared to colleagues are you better or worse at dealing with workload?</th>
</tr>
</thead>
<tbody>
<tr>
<td>23.1</td>
<td>better</td>
</tr>
<tr>
<td>23.2</td>
<td>worse</td>
</tr>
<tr>
<td>23.3</td>
<td>same/neither</td>
</tr>
<tr>
<td>23.4</td>
<td>don’t know/can’t compare</td>
</tr>
<tr>
<td>23.5</td>
<td>good: time management and planning</td>
</tr>
<tr>
<td>23.6</td>
<td>good: reacts flexibly to changing demands</td>
</tr>
<tr>
<td>23.7</td>
<td>good: warns colleagues if unable to meet demands</td>
</tr>
<tr>
<td>23.8</td>
<td>good: doesn’t hoard, let’s things go</td>
</tr>
<tr>
<td>23.9</td>
<td>good: awareness of work/colleagues/resources</td>
</tr>
<tr>
<td>23.10</td>
<td>good: use of work systems</td>
</tr>
<tr>
<td>23.11</td>
<td>good: follows procedures and templates</td>
</tr>
<tr>
<td>23.12</td>
<td>good: experience</td>
</tr>
<tr>
<td>23.13</td>
<td>good: prioritisation skills</td>
</tr>
<tr>
<td>23.14</td>
<td>bad: time management</td>
</tr>
<tr>
<td>23.15</td>
<td>bad: sorting and managing email</td>
</tr>
<tr>
<td>23.16</td>
<td>email system integral to sense of load</td>
</tr>
</tbody>
</table>
### APPENDIX 2

#### 24
**Compared to colleagues are you better or worse at dealing with email?**

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>better</td>
<td>24.1</td>
</tr>
<tr>
<td>worse</td>
<td>24.2</td>
</tr>
<tr>
<td>don’t know/can't compare</td>
<td>24.3</td>
</tr>
<tr>
<td>works for self</td>
<td>24.4</td>
</tr>
<tr>
<td>better: others bogged down</td>
<td>24.5</td>
</tr>
<tr>
<td>better: others can’t organise system</td>
<td>24.6</td>
</tr>
<tr>
<td>better: others delete too quickly</td>
<td>24.7</td>
</tr>
<tr>
<td>better: others must stay late to cope</td>
<td>24.8</td>
</tr>
<tr>
<td>good: awareness of work</td>
<td>24.9</td>
</tr>
<tr>
<td>good: has had computer training</td>
<td>24.10</td>
</tr>
<tr>
<td>good: managing email system</td>
<td>24.11</td>
</tr>
<tr>
<td>good: can find what is needed</td>
<td>24.12</td>
</tr>
<tr>
<td>good: conscientious responder</td>
<td>24.13</td>
</tr>
<tr>
<td>good: task-oriented</td>
<td>24.14</td>
</tr>
<tr>
<td>good: not a slave to the email alert</td>
<td>24.15</td>
</tr>
<tr>
<td>good: will work late</td>
<td>24.16</td>
</tr>
<tr>
<td>good: flexible to changing demands</td>
<td>24.17</td>
</tr>
<tr>
<td>good: prioritisation skills</td>
<td>24.18</td>
</tr>
<tr>
<td>worse: others deal with things quickly</td>
<td>24.19</td>
</tr>
<tr>
<td>worse: less capable at written communication</td>
<td>24.20</td>
</tr>
<tr>
<td>worse: storage and time management</td>
<td>24.21</td>
</tr>
<tr>
<td>volume of email dictates competence</td>
<td>24.22</td>
</tr>
<tr>
<td>more</td>
<td>24.23</td>
</tr>
</tbody>
</table>

#### 26
**Compared to colleagues are you more or less likely to welcome email interruptions?**

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>more likely</td>
<td>26.1</td>
</tr>
<tr>
<td>less likely</td>
<td>26.2</td>
</tr>
<tr>
<td>same</td>
<td>26.3</td>
</tr>
<tr>
<td>depends</td>
<td>26.4</td>
</tr>
<tr>
<td>interruptions are annoying</td>
<td>26.5</td>
</tr>
<tr>
<td>being open creates a climate of openness/accessibility</td>
<td>26.6</td>
</tr>
<tr>
<td>by nature doesn’t mind interruptions</td>
<td>26.7</td>
</tr>
<tr>
<td>they provide a welcome distraction</td>
<td>26.8</td>
</tr>
<tr>
<td>enjoys social side of interruptions</td>
<td>26.9</td>
</tr>
<tr>
<td>tries to plan for them</td>
<td>26.10</td>
</tr>
<tr>
<td>it's expected, it's a job requirement</td>
<td>26.11</td>
</tr>
<tr>
<td>by nature dislikes interruptions</td>
<td>26.12</td>
</tr>
<tr>
<td>tit for tat</td>
<td>26.13</td>
</tr>
<tr>
<td>they are an unwelcome distraction</td>
<td>26.14</td>
</tr>
<tr>
<td>more</td>
<td>26.15</td>
</tr>
</tbody>
</table>

#### 32
**Would you rather be with or without email at work?**

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>with</td>
<td>32.1</td>
</tr>
<tr>
<td>without</td>
<td>32.2</td>
</tr>
</tbody>
</table>

#### 33
**What are the good things about having email at work?**

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>ease of communication</td>
<td>33.1</td>
</tr>
<tr>
<td>efficient</td>
<td>33.2</td>
</tr>
<tr>
<td>clears desk</td>
<td>33.3</td>
</tr>
<tr>
<td>reflection time</td>
<td>33.4</td>
</tr>
<tr>
<td>is a work/project reminder system</td>
<td>33.5</td>
</tr>
<tr>
<td>chat and humour in private</td>
<td>33.6</td>
</tr>
<tr>
<td>better informed</td>
<td>33.7</td>
</tr>
<tr>
<td>real time speed</td>
<td>33.8</td>
</tr>
<tr>
<td>social relationships</td>
<td>33.9</td>
</tr>
<tr>
<td>track and record</td>
<td>33.10</td>
</tr>
<tr>
<td>recipient choice to respond</td>
<td>33.11</td>
</tr>
<tr>
<td>certainty of delivery</td>
<td>33.12</td>
</tr>
<tr>
<td>integration with work systems</td>
<td>33.13</td>
</tr>
<tr>
<td>dissemination of documentation</td>
<td>33.14</td>
</tr>
<tr>
<td>low cost</td>
<td>33.15</td>
</tr>
<tr>
<td>reduced paperwork</td>
<td>33.16</td>
</tr>
<tr>
<td>stimulating/welcome distraction</td>
<td>33.17</td>
</tr>
<tr>
<td>can be informal</td>
<td>33.18</td>
</tr>
<tr>
<td>accessible communication reference</td>
<td>33.19</td>
</tr>
<tr>
<td>professional/impersonal/unemotional way of contacting people</td>
<td>33.20</td>
</tr>
</tbody>
</table>
### APPENDIX 2

<table>
<thead>
<tr>
<th>34</th>
<th>What are the bad things about having email at work?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Information overload and overuse</td>
</tr>
<tr>
<td></td>
<td>Unwanted/unsolicited email</td>
</tr>
<tr>
<td></td>
<td>No drawbacks</td>
</tr>
<tr>
<td></td>
<td>Delays because recipients control response time</td>
</tr>
<tr>
<td></td>
<td>Lack of personal/cultural cues (for tone, style, subtext, trust and rapport)</td>
</tr>
<tr>
<td></td>
<td>Big brother</td>
</tr>
<tr>
<td></td>
<td>Blurs chains of command and processes</td>
</tr>
<tr>
<td></td>
<td>No standard email etiquette</td>
</tr>
<tr>
<td></td>
<td>Too much time checking and editing</td>
</tr>
<tr>
<td></td>
<td>Expectation of immediate response</td>
</tr>
<tr>
<td></td>
<td>Always accessible - can’t avoid people</td>
</tr>
<tr>
<td></td>
<td>Creates excessive communication</td>
</tr>
<tr>
<td></td>
<td>Doesn’t suit poor written communicators</td>
</tr>
<tr>
<td></td>
<td>Electronic clutter</td>
</tr>
<tr>
<td></td>
<td>Creates unanticipated/un-agreed work</td>
</tr>
<tr>
<td></td>
<td>Over-dependence - the easy/lazy route</td>
</tr>
<tr>
<td></td>
<td>Isolates people</td>
</tr>
<tr>
<td></td>
<td>Automation errors</td>
</tr>
<tr>
<td></td>
<td>They are intrusive</td>
</tr>
<tr>
<td></td>
<td>Writing errors and carelessness</td>
</tr>
<tr>
<td></td>
<td>People forget the email content (not filed/recorded as letters etc are)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>35</th>
<th>What email policies would you recommend?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Writing guidelines</td>
</tr>
<tr>
<td></td>
<td>Use system functions better</td>
</tr>
<tr>
<td></td>
<td>Individuals – can’t give guidelines</td>
</tr>
<tr>
<td></td>
<td>Disciplined ‘to’ use</td>
</tr>
<tr>
<td></td>
<td>System management guidelines</td>
</tr>
<tr>
<td></td>
<td>Encourage use of other communication</td>
</tr>
<tr>
<td></td>
<td>Filter out offensive/chain mail</td>
</tr>
<tr>
<td></td>
<td>Give response time recommendations</td>
</tr>
<tr>
<td></td>
<td>Use out-of-office when away</td>
</tr>
<tr>
<td></td>
<td>Improve security and confidentiality</td>
</tr>
<tr>
<td></td>
<td>Set limits on no. of emails to send</td>
</tr>
<tr>
<td></td>
<td>Inform of social/psychological implications of email use</td>
</tr>
<tr>
<td></td>
<td>Stricter group email rules</td>
</tr>
<tr>
<td></td>
<td>Keep and print important email</td>
</tr>
<tr>
<td></td>
<td>Tolerate personal email</td>
</tr>
<tr>
<td></td>
<td>Check before sending</td>
</tr>
<tr>
<td></td>
<td>Convey email content and purpose clearly</td>
</tr>
</tbody>
</table>
Appendix 3: Wellbeing forms
A Measure of Wellbeing

There are two sections to complete below. Please ensure that you complete BOTH sections three times a day for five days. Instructions are included at the head of each section.

The current date is: 
The current time is: 
Personal ID Number: 

Section A
This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale to record your answers.

1 2 3 4 5

very slightly a little moderately quite a bit extremely or not at all

_______ Interested _______ Irritable
_______ Distressed _______ Alert
_______ Excited _______ Ashamed
_______ Upset _______ Inspired
_______ Strong _______ Nervous
_______ Guilty _______ Determined
_______ Scared _______ Attentive
_______ Hostile _______ Jittery
_______ Enthusiastic _______ Active
_______ Proud _______ Afraid

Section B
In the section below, please indicate how you feel right now, that is, at the present moment. Please circle the most appropriate number on the 6 point scale where 1 = not at all, to 6 = very much.

1 2 3 4 5 6

Happy
At ease
Anxious
Annoyed
Motivated
Calm
Tired
Bored
Gloomy
Active
Thank you. Now please keep this form safe before returning it with the others to Sarah Griffin.

©Watson, D., Clark, L.A., & Tellegen, A., 1988;

©Daniels, 2002
Appendix 4: Graphical Presentation of distributions for Daniels and PANAS
Mean = 2.5632
Std. Dev. = 0.96524
N = 570

Mean = 3.7608
Std. Dev. = 1.0622
N = 573

Mean = 4.3121
Std. Dev. = 0.97477
N = 572
Appendix 5: Study Four thank-you acknowledgement email
Dear Joanne

Thank you for registering your participation in the forthcoming email survey. This is a four-year project being funded by the Economic and Social Research Council and the University of Surrey. Participating organisations to date include VSO, Siemens, Flagship Training (at the Royal Navy) and IBM. It is anticipated that results from the project will be used to inform policy on how people at work can get the best out of their email usage. Thus we are very grateful for your valuable contribution to this.

In approximately one month I will email you again to explain the procedure of the study, and will then mail you the survey pack. At that point you simply need to choose one day when you believe you are likely to be working at your computer terminal for the majority of the time, and then complete a short form after you have finished dealing with each email interruption to your work. This should take approximately 30 seconds. In addition you will also be asked to complete a personality questionnaire (takes about 20 minutes). As a thank you for participating you will be invited to phone for feedback on your profile, which you may find helpful for your own personal development.

If you have any questions or comments before I contact you again, then please do not hesitate to phone or email me. Again, many thanks for your participation.

Best regards

Emma Russell BSc MSc CPsychol
University of Surrey
Appendix 6: Study Four participant pack
Thank you for agreeing to participate in this study of how people deal with incoming email interruptions over the course of their working day. Please read the following information and instructions carefully before you begin.

**Study requirements**
- The study requires you to remain on-line and connected to your email system at all times. It is important that you are aware that you have an email to attend to as soon as it arrives, so please do not turn off your email alert system.
- Although you are likely to be receiving email throughout your working day, you are asked to complete a short survey form only after you have exited your email system, having actually actioned or processed each email you receive. In other words, please do not complete the survey if you have simply checked your inbox but not done anything in response to the email.
- If you deal with several emails in one burst of activity, please complete a separate survey for each email attended to.
- If you are away from your computer and then return to find an email waiting, you do not need to complete a survey form. Only complete a survey form for email that interrupts your activity when you are at your desk or computer terminal.

**Completing the surveys**
A batch of surveys are enclosed for you to complete during one, full working day. If you require more survey forms, please either photocopy a blank one, or drop me a line and I will email across some more. It would be very helpful if you could indicate on each form (where it asks for Email Number) the order of the forms. I.e. please enter number ‘1’ for the first form you complete, ‘2’ for the second form completed, and so on.

The survey forms ask you a series of questions that require you to be alert to the time you take in dealing with email. Firstly you are asked to estimate how long it took you to check the email after you noticed/heard the alert. You are then asked if you decided to deal with the email immediately. If you didn’t, you are asked to note how long you waited before returning to process the email. You are then asked to record how long you spent in the email system dealing with that email, and anything else, before exiting to complete the survey form. Please try to record your answers to these questions as accurately as possible, in minutes and seconds. However, do not feel that you have to use a stopwatch or any other timing device. You are simply making an estimate of time, and recording it should not intrude in any way.

Please note that Question Four on the Survey form asks you to rate how you felt before the email interrupted you, even though you don’t complete the form until you exit the email system later. You may find it helpful to think about your feelings as soon as you hear/see the email alert, so that you find it easier to make a record of them later.

Each survey form should take you no longer than 1 minute to complete (less time as you get used to it). Inevitably, although the survey is quick to complete, it may add workload to your working day. However, it is imperative that you complete one survey for every ‘dealt with’ email that interrupts you. It is also important that you try to deal with your email in exactly the same way as you normally would. Indeed, if you feel that completing the surveys is influencing your normal approach it would be extremely helpful if you indicate when and how this occurs.
How to get started

• Before beginning your working day, please complete the single well-being questionnaire. This will get you used to what you need to do when completing the email survey forms.

• Then log onto your email system and download your first batch of email for the day. You do not need to fill out survey forms for the first batch of email received. Only fill in a survey form for the incoming email that interrupts you after your initial batch.

• Then, send an email to me at e.greig@surrey.ac.uk to let me know that you are on-line and that you have started the email study as planned.

• Next, carry on with your work as normal, remembering to fill out an email survey each time you finish responding to an email interruption.

Personality questionnaires
When you have time over the next two days please log onto ‘www.psykey.net’ to complete the HPI and MVPI personality questionnaires. Full instructions are provided in the attached ‘Psykey’ form.

Personal information
In order to monitor how closely participants in this study match the make up of people in the general population it would be most helpful if you could fill in the Personal Information form.

How to get the information back to me
Once your chosen study day is over, please compile all of the surveys you have completed, along with the Personal Information form. Place everything in the envelope provided, clearly labelled to Emma Russell. Seal it and return to me.

Confidentiality and Right to Withdraw
All information provided by you will be kept completely confidential and cannot be traced back to you by anyone other than myself. If at any point during the study you decide you no longer wish to continue, you may withdraw your participation with no questions asked.

Many thanks for your invaluable participation in this important study. If you have any questions or concerns over the next few days please do not hesitate to contact me at e.greig@surrey.ac.uk and I will endeavour to get back to you as soon as possible.

Emma Russell BSc MSc CPsychol
Chartered Occupational Psychologist
University of Surrey
# Personal Information

Please tick the relevant boxes below to indicate your status in each area

<table>
<thead>
<tr>
<th>Id Number</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Age range</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20</td>
</tr>
<tr>
<td>21-30</td>
</tr>
<tr>
<td>31-40</td>
</tr>
<tr>
<td>41-50</td>
</tr>
<tr>
<td>51-60</td>
</tr>
<tr>
<td>61+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of years using email</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 years</td>
</tr>
<tr>
<td>4-7 years</td>
</tr>
<tr>
<td>8-11 years</td>
</tr>
<tr>
<td>12-15 years</td>
</tr>
<tr>
<td>16+ years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Job level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative</td>
</tr>
<tr>
<td>Administrative - project/middle management</td>
</tr>
<tr>
<td>Project/middle management</td>
</tr>
<tr>
<td>Senior management</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of years in current organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 years</td>
</tr>
<tr>
<td>4-7 years</td>
</tr>
<tr>
<td>8-11 years</td>
</tr>
<tr>
<td>12-15 years</td>
</tr>
<tr>
<td>16+ years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Email operating system that you are constantly on-line to at work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lotus notes</td>
</tr>
<tr>
<td>Microsoft outlook /outlook express</td>
</tr>
<tr>
<td>Other (please state)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Email alert system</th>
<th>Used by you (please tick)</th>
<th>Set up by you? (Y or N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message box appears (e.g. &quot;You have new email&quot;)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audible ping/beep/other noise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Envelope icon appears</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inbox always open (see new email arrive)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cursor changes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (please state)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Individual Email Survey

You've just finished dealing with an incoming email. Please fill in...

- Which of the following categories best describes the type of email you just dealt with (circle or tick):
  a. Job/Project related
  b. Meeting/diary/calendar information
  c. Acknowledgement or receipt
  d. Personal or social related
  e. Junk/SPAM
  f. Misdirected (intended for someone else)
  g. Company administration/information
  h. Other (please state)

- Would you describe the content of the email you just dealt with to be (circle or tick):
  a. Positive
  b. Negative
  c. Neither/Neutral

- Using the 6-point scale below, where "1 = not at all and 6 = very much" please also indicate whether the email you just dealt with was:
  1 2 3 4 5 6 Lengthy
  1 2 3 4 5 6 Difficult
  1 2 3 4 5 6 Clear and specific
  1 2 3 4 5 6 Important to you

1. How long did it take you to check your inbox after receiving the email alert for this email (estimate to the nearest minute or second)? _______________

2. Did you then deal with (e.g. open, delete, etc.) the email immediately after checking it (please circle or tick)? Yes or No
   a. If 'No', how long did you wait before going back to deal with the email (estimate to the nearest minute or second)? _______________

3. How long did you spend in your email system - dealing with this email, and with any other business (estimate to the nearest minute or second)? _______________

4. In the section below, please indicate how you felt right before being interrupted by the email alert, according to each of the following adjectives. Please circle the most appropriate number on the 6 point scales, where 1 = not at all, to 6 = very much.

   1 2 3 4 5 6 Happy
   1 2 3 4 5 6 At ease
   1 2 3 4 5 6 Anxious
   1 2 3 4 5 6 Annoyed
   1 2 3 4 5 6 Motivated

   1 2 3 4 5 6 Calm
   1 2 3 4 5 6 Tired
   1 2 3 4 5 6 Bored
   1 2 3 4 5 6 Gloomy
   1 2 3 4 5 6 Active

5. In the section below, please indicate how you feel right now, that is, at the present moment, according to each of the following adjectives. Please circle the most appropriate number on the 6 point scales, where 1 = not at all, to 6 = very much.

   1 2 3 4 5 6 Happy
   1 2 3 4 5 6 At ease
   1 2 3 4 5 6 Anxious
   1 2 3 4 5 6 Annoyed
   1 2 3 4 5 6 Motivated

   1 2 3 4 5 6 Calm
   1 2 3 4 5 6 Tired
   1 2 3 4 5 6 Bored
   1 2 3 4 5 6 Gloomy
   1 2 3 4 5 6 Active

6. If you dealt with more than one email interruption during this session within the email system, please indicate how many: _______________

Further Comments: _____________________________

Thank you. Please keep this safely and fill in another survey for any other email you have just dealt with.
Please fill this in at the start of your working day, before you begin the email survey.

In the section below, please indicate how you feel right now, that is, at the present moment, according to each of the following adjectives. Please circle the most appropriate number on the 6 point scales, where 1 = not at all, to 6 = very much.

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</tbody>
</table>

Thank you. Now please keep this safe and continue with the email study.
How to use the PsyKey Online Assessment Centre

Arrangements have been made to allow you to complete the Hogan Personality Inventory (HPI) and the Motives, Values, Preferences Inventory (MVPI) online. All the instructions that you will need to deal with this procedure are provided below, or on-screen at the beginning of the assessment process. You should have this document with you when you log on to the PsyKey Assessment Centre site so that you have all the necessary information to hand.

Locating the PsyKey Assessment Centre
You will first need to log on to the PsyKey Assessment Centre web site at:

www.PsyKey.net

Back-up site
If you have any difficulty in accessing the site, first check the address carefully. At times web services are slowed by volume of traffic, so it may be worth trying again after a few minutes if you still have difficulty.
Finally, there is an emergency back-up PsyKey web site at a different location if the access problem persists. This is located at www.Psy-Key.co.uk. The code numbers below will also work on the PsyKey back-up site.

Accessing the questionnaires
At the PsyKey site you will be asked for three codes; an Organisation Code, a Password and an Access Code.
To gain access use:

Organisation Code: erussell
Password: assess
Access Code: phd

Registration
You will be asked to provide some personal details before continuing to the questionnaires. You will need to enter your personal E-mail address. If you don't have an E-mail address, please enter:

none@psykey.ltd.uk

Completing the questionnaires
All further instructions will be provided on-screen. Some practice items are provided at the beginning of the questionnaire. You will use the mouse to click on your preferred response to each question. You can move through the items by operating the scroll bar to the right of the screen. Alternatively, you can use the Page Down key on your keyboard to view questions page by page.

There are no right and wrong answers but it is important that you should answer in a way that is accurate for you. Completed carefully, this process gives you the opportunity to convey your personality in a more comprehensive and balanced way than would typically be available at interview. The best approach is to read each statement carefully, but not to deliberate too long over any one item. Just answer in an open and straightforward way.

Try to respond to all the items. Remember, there is no time limit and you will be able to scroll back to check or change any of your responses.

When you have completed the first questionnaire (the HPI), CLICK ONCE on the SUBMIT button at the foot of the page (Please ensure you are connected to the internet BEFORE you click the Submit button) and allow time for the internet to respond. If clicking the SUBMIT button triggers an 'error page' stating that the web page is unavailable, click the BACK button to return to the questionnaire, then try to submit again. Then choose to continue and complete the MVPI.

Lost connection
Don't panic, a lost internet connection should not affect your completed questionnaire. If you have lost your internet connection, reconnect before clicking the BACK button, then try to submit again.

Confidentiality
Every possible step has been taken to protect the confidentiality of PsyKey data in transmission. The encryption of responses ensures that results cannot be scored or interpreted except by trained professional staff. No personal data is kept on the PsyKey web site.

Contact
If you need further assistance please phone: 01892 559540
Appendix 7: Debrief email (Study Four and Five)
Dear Name

Many thanks for participating in this University of Surrey study on email interruptions. Shortly after receiving your ‘Individual Email Survey’ forms, personality results and Personal Information Forms back, I will write to you again to more fully explain how your results have helped. I will also give you details at that stage about how to call me for free feedback on your personality profile.

However, while the study is still fresh in your mind I have just two more questions to ask:

1. Did you feel that taking part in this study affected the way you would normally deal with email interruptions (if yes, please indicate in what way)?
2. Did the process of rating your emotional response affect the way that you felt (if yes, please indicate in what way)?

I would be extremely grateful to receive your feedback on these or any other points that you feel are relevant to this study. Again, please be assured that any correspondence engaged in with me will remain strictly confidential.

Again, many thanks for your time today, and if this study has raised any issues for you that you would like to discuss in more detail, then please do not hesitate to contact me.

Kind regards

Emma Russell BSc MSc CPsychol
Department of Psychology
University of Surrey
Appendix 8: Debrief and thank-you letter (Study Four)
Dear Colleague
Re: Email Study: What happens now?

You recently participated in a study of email interruptions conducted at the University of Surrey. Thank you very much for your contribution to this project - I hope that you found it to be an interesting experience.

What the study was trying to measure
This study used a 'diary' method to explore whether people's mood or well-being, at the point where they are interrupted by an email, can influence their strategic response. For example, it is hypothesised that when people feel bored or stressed at work, they are quicker to respond to an email interruption, and will spend more time dealing with it. In addition, the study also sought to measure well-being following attendance to an email interruption. This was to see whether strategic response to an email affects mood. For example, people who spend longer dealing with an email interruption may improve their levels of fatigue or energy, compared to those who do not. These elements were explored in this study because it has previously been documented that people can be energised and enthused when they take a cognitive break from intensive or boring work. And the natural occurrence of email interruptions to working life appears to provide the opportunity for people to do this.

The HPI and MVPI questionnaires provided us with measures of personality and motivational style. It is hypothesised that different types of people demonstrate different strategic responses to an email interruption, and are more or less susceptible to well-being change. For example, an extraverted person (as measured by the HPI) may be more quickly distracted by an email interruption, especially when bored or lacking in energy. This is because these people need a lot of variety and stimulation in their work.

The content of the email interruption (e.g. how complex or difficult the email), the type of email (e.g. whether it was job-related/personal, etc.) and the general nature of the email (how positive or negative it was) also needed to be controlled for, as influences on strategic or emotional response.

Our expectation therefore is that the strategic response to an email interruption is influenced by current well-being and personality/motivational style. Having responded to an interruption, one's well-being rating is also likely to be dependent upon the strategy chosen, the nature/content of the email, and again, one's personality/motivational style.

If we do find that certain strategies for dealing with email interruptions can relieve stress, boredom or fatigue, or promote energy and enthusiasm, then this can be made public to organisations. As such, people can be informed about the best way to deal with email interruptions. Also, if certain personality/motivational characteristics are negatively affected by email interruptions at work, then it may be recommended that such people are not recruited into job roles that involve processing large volumes of email interrupts.
The release of results
There is a large volume of data to process for this study and it is not anticipated that statistical results will be available before May 2005. However, once the statistics have been analysed, and theoretical implications considered, I will send you an executive summary of the key findings. Depending on the findings, a series of best practice recommendations will also be made.

HPI and MVPI Feedback arrangements
As a thank you for participating in the research project, you are invited to call me to receive a 15-minute oral feedback on your HPI and MVPI questionnaires. Obviously this is not obligatory, and if you choose not to receive feedback your results will be destroyed 6 months after the statistics have been analysed. If you would like feedback however, then the following information may be of interest.

The HPI and MVPI are well-respected psychometric measures with a robust history of validity and application to the UK workplace. The HPI looks at your 'public' personality – the you that you present to the world. In an occupational environment it is the HPI profile that best predicts how well you fit with the demands of your job role. The MVPI looks at your 'private' personality – the you that you know, as it comprises your values, beliefs and personal viewpoint on the world. In an occupational environment it is your MVPI profile that best predicts with whom you will gel, which work environments suit you best, and what job role elements will motivate you.

Feedback slots have been arranged for April 13th and April 19th. If you would like feedback then please email me with your preference (and any time restrictions) for either day, and I will book you in. You will then be asked to call me on 01444 456653. The feedback session will be completely confidential, and your results will not be disclosed to anybody outside of the research team here at Surrey. If you have a specific angle that you would like me to take in interpreting your profile, then please indicate this in your email and I will be happy to accommodate this. Finally, you may find it useful to take notes or even tape record the feedback session, as there are no written reports available.

Prize Draw
The winner of the £50 prize draw has now been announced. Details are with your contact person at your organisation.

So, thank you again for taking the time to contribute to this research project. Your input has been extremely valuable to us. If you have any concerns or questions that you would like to discuss further, as a result of your participation in this project, then please do not hesitate to contact me.

Yours sincerely

Emma Russell

Emma Russell BSc MSc CPsychol
Chartered Occupational Psychologist
Appendix 9: Adverts and fliers for Study Six
How do you deal with email interruptions?

Tell us and you could win £50!

- What do you think about email at work?
- Do you love it or loathe it?
- Is email something that helps you to work more effectively, or simply causes you stress?

The final phase of a major ESRC and UniS funded research project is being conducted at the University of Surrey this November, and we are looking for the answers to the above questions. **Volunteers are needed to tell us about their email use, the strategies they use, and how this affects their wellbeing at work.** The study is completely confidential and the identity of all participants will remain anonymous.

To volunteer, all you have to do is:
- Choose half a day when you will mainly be desk-based, to allocate as your study period.
- Simply get on with your work as normal, dealing with your email and work tasks in your usual, typical fashion, during the study period.
- Fill out a short survey each time you finish dealing with an incoming email interruption (each form takes about 30 seconds to complete), during the study period.
- Complete two on-line personality questionnaires (takes about 30 minutes) at a time convenient to you.

And that’s it! The content of your email is not being monitored. All we want to know is what you do with it, and how this makes you feel. And during the study period, you simply get on with your work as normal. By participating, you will have made a valuable contribution to our understanding of how email is affecting people’s working lives, and how its use can be improved.

As a thank you for your help, you are invited to receive confidential feedback about your personality profile with a Chartered Psychologist, for your own **personal development.** You will also be provided with a summary of the research findings, which can be used to help you improve your own email strategies. Additionally, all participants will be entered into a prize draw to win one of **three prizes of £50.**

The study is being conducted by Emma Russell, Lynne Millward Purvis and Adrian Banks, from the Department of Psychology at the University of Surrey, UK. For further information, or to **register your participation,** please contact Emma Russell, by emailing e.greig@surrey.ac.uk.
Email recruitment:

Dear all in Staff Development,

I am a PhD researcher in the department of Psychology, about to embark on my final study in a major research programme looking at how people deal with email interruptions at work. Sorry to interrupt you (!), but I was hoping you would be willing to participate in a short study about how you deal with email interruptions. I have received full ethical permission from the UniS ethics committee to run this study, which is sponsored by UniS and the ESRC.

The attached advert explains more about what is required, and what you will get out of participating.

Many thanks for your time, and do contact me if you have any queries.
Kind regards,
Emma

Emma Russell
Chartered Occupational Psychologist
Department of Psychology
Sample recruitment letter to organisations

Mr Daniel McCormick
Rentokil

Tuesday, 04 July 2006

Dear Daniel
Re: Email and employee wellbeing – a major research project.

Did you know that:
- In the last 5 years email has become the fastest growing communication technology?
- Email traffic now exceeds voice traffic across the BT network?
- The average user receives between 11-150 email per day?
- SPAM is thought to make up 60% of email traffic?
- Your colleagues may be struggling under the weight of all this?

The email explosion
Since the 1990s we have witnessed the explosion of electronic mail systems (email) into the workplace to the point where email is now the communication medium of choice. Estimates suggest that people are sending and receiving an average of 11 – 150 email per day, with 2.7 email received to every one sent.

This extra information traffic is entering people's workday, even though the workday on average has not changed in length. As such, employees are having to cram the use of email into their already crowded day, causing an escalation of demands. Research has found that these demands can result in stress and overload; it seems that the new technology revolution may be stretching not only the functionality of email systems but also the functionality of its users.

The benefits of email to worker productivity
However, this situation may not be all bad. When email exists as an 'interruption' to one's working day (for organisations that operate on broadband, with employees online at all times) it appears that many employees may become more efficient at their work. Being interrupted can be stimulating when working on mundane tasks, relieving when working on difficult tasks, and can hone people's attention to the point where peripheral, time-wasting activities are eliminated. Email provides variety and change in the working day, which many employees find satisfying.

The research
This research project is designed to examine how email interruptions are currently affecting the work and wellbeing of individuals within organisations. It intends to answer the following questions:
What strategies for dealing with email are linked to goal fulfilment? Does one’s mood affect how one deals with an email interruption? How do strategies for dealing with an email differ depending on the task the individual was working on when interrupted? Do different types of people deal with email in different ways? How do the happiest, most fulfilled and most effective people deal with email interruptions?

The purpose of this research is to establish a range of guidelines and principles that organisations can roll out to their employees, informing them how best to use email if they want to reduce their stress, enhance their satisfaction and work more effectively.

Who is involved in the research?
This is the third and final phase of a major research programme looking at how email interruptions affect working life. Conducted by Emma Russell BSc MSc CPsychol (from the University of Surrey) and funded by the Economic and Social Research Council (ESRC) and the University of Surrey, participating organisations already include Siemens, the BBC, Aon, IBM, Voluntary Service Overseas (VSO) and Flagship Training (at the Royal Navy).

What do I get out of it?
The opportunity to be involved in a major study into email use that may shape the formation of policy in organisations across the UK. Participation is free, and all organisations will receive a free summary of the research on completion, outlining both the research findings and how these can be interpreted to improve the use of email within your workplace. Your colleagues will also be given the opportunity to receive free feedback on their personality profiles as a gratuity for their participation, and will be entered into a prize draw to win one of three £50 prizes.

How can my organisation take part?
If your organisation is using broadband (i.e. staff are connected to the email system at all times) then we would like to hear from you. The research will involve monitoring your colleagues’ email use for half a day in a non-obtrusive and confidential manner. Staff will also be required to complete 2 on-line personality questionnaires (provided by PCL). We would be delighted to work with as many participants as you can provide.

What do I do now?
- Phone 07906 188645, or email e.greig@surrey.ac.uk to register your participation, express an interest in the research, or find out more.
- Be assured that all participating organisations will be treated with anonymity and confidentiality.

We look forward to working with you.

Yours sincerely

Emma Russell BSc MSc CPsychol
Department of Psychology
University of Surrey

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1 Emma Russell is a Chartered Occupational Psychologist, which means that she is bound to work according to the rules and guidelines of the British Psychological Society (BPS), the governing body for professional psychologists working in the UK. She has worked as a consultant to industry for eight years, counting Skandia, Siemens, Iceland, Vosper Thornycroft, the Army, Privilege Insurance, and B&Q amongst her research partners and clients. Emma is currently conducting full-time research into email interruptions at the University of Surrey as part of her PhD work, alongside Dr Lynne Millward Purvis and Dr Adrian Banks.
Appendix 10: Acknowledgement of participation email
Dear Participant

Thank you very much for registering your participation in the forthcoming email survey. This study is the final phase of a four-year project being funded by the Economic and Social Research Council and the University of Surrey. Participating organisations to date include VSO, Siemens, Flagship Training (at the Royal Navy), AON, the BBC and IBM. It is anticipated that results from the project will be used to inform policy on how people at work can get the best out of their email usage. Thus we are very grateful for your valuable contribution to this.

In approximately one week I will mail you the study pack, which sets out the procedure of the study, and contains all of the survey materials needed to take part. At that point you simply need to choose one half-day (of up to four hours) when you believe you are likely to be working at your computer terminal for the majority of the time. This half-day will then be allocated as your study period. During your study period you are asked to complete a short form after you have finished dealing with each email interruption to your work. Each form should take about 30 seconds to complete. In addition you will also be asked to complete two personality questionnaires (takes about half an hour). As a thank you for participating you will be invited to phone for feedback on your personality profile, which you may find helpful for your own personal development. I will also be pleased to send you a summary of the research findings, which you may find helpful in organising your future response to email interruptions. Additionally you will be entered into a prize draw to win one of three £50 prizes.

If you have any questions or comments before I contact you again, then please do not hesitate to phone or email me.

Again, many thanks for your participation.

Best regards

Emma

Emma Russell BSc MSc CPsychol
Department of Psychology
University of Surrey
Appendix 11: Study Six participant pack
Dear

Re: Studying the strategies for dealing with email interruptions

Thank you for agreeing to participate in our study of email interruptions to work. This is phase three in a major study being funded by the University of Surrey and the Economic and Social Research Council. It is hoped that the results from this study will be used to assist organisations and employees in learning how to deal with email effectively.

In this pack, you should find included:
1. An ‘Instructions and Information’ document
2. A ‘Personal Information’ form
3. A ‘Current Well-being’ form
4. Ten ‘Individual Email Survey’ forms
5. Instructions for completing the HPI and MVPI Psykey assessments on-line
6. Informed Consent Form to sign
7. A return addressed envelope (for returning all information to me)

Before beginning the email survey you need to read the Instructions and Information document. You also need to choose half a day (a block of up to four hours) on which you intend to take part in the study. Please choose any half-day up until the 7th December, when you anticipate that you will mainly be working at your desk and will have constant access to your email system. Once you have selected the best period for you, please ensure you have emailed me to let me know (e.greig@surrey.ac.uk). If none of the days is suitable, again, please let me know so that we can arrange an alternative.

You will note that there are two on-line personality questionnaires to complete as part of this study. As a thank-you for your participation, all participants are invited to receive free feedback on the results of the personality questionnaires that they complete as part of the study. You will also be entered into a prize draw to win one of three £50 prizes, once you have participated.

If at any point you wish to withdraw from this study then you can do so with no obligation. Please also note that any results received from you will be made anonymous and will be treated in confidence. Only I will be able to identify you from your allocated ID number. Finally, if this study raises any issues for you that you wish to discuss further, then please do not hesitate to contact me.

Again, very many thanks for your participation. I look forward to hearing from you soon.

Yours sincerely

Emma Russell  BSc  MSc  CPsychol
Chartered Occupational Psychologist
Department of Psychology
Instructions and Information

Thank you for agreeing to participate in this study of how people deal with incoming email interruptions. Please read the following information and instructions carefully before you begin the study.

Study requirements
- The study requires you to remain on-line and connected to your email system at all times. It is important that you are aware that you have an email to attend to as soon as it arrives, so please do not turn off your email alert system. If you are not sure how to remain on-line, or how to turn on your email alert, please let me know.
- Although you are likely to be receiving email throughout your working day, you are asked to complete a short survey form (the ‘Individual Email Survey’) only after you have exited your email system, having actually actioned or processed each email that interrupts your activities. In other words, please do not complete the survey if you have simply checked your inbox but not done anything in response to the email.
- If you deal with several email in one burst of activity, please complete a separate survey for each email attended to.
- If you are away from your computer and then return to find an email waiting, you do not need to complete a survey form. Only complete a survey form for email that interrupts your activity when you are at your desk or computer terminal.

Completing the surveys
A batch of surveys are enclosed for you to complete during your pre-selected half-day at work. Please indicate on each form (where it asks for Email Number) the order of the forms. I.e. please enter number ‘1’ for the first form you complete, ‘2’ for the second form completed, and so on.

Each survey form should take you no longer than 1 minute to complete (less time as you get used to it). Inevitably, although the survey is quick to complete, it may add workload to your working day. However, it is imperative that you complete one survey for every ‘dealt with’ email that interrupts you. It is also important that you try to deal with your email in exactly the same way as you normally would. Indeed, if you feel that completing the surveys is influencing your normal approach it would be extremely helpful if you indicate when and how this occurs.

Please ensure that you respond to every question on each form.

Estimating timings
The survey forms ask you a series of questions that require you to be alert to the time you take in dealing with email.
- Firstly you are asked to estimate how long it took you to check the email after you noticed/heard the alert. ‘Checking’ an email involves looking at who the message is from, what it is about, and what it might require of you.
- You are then asked if you decided to deal with the email immediately. ‘Dealing’ with an email involves deleting it, reading it, replying to it, filing it, or actioning it in some other way. If you didn’t deal with the email immediately, you are asked to note how long you waited before returning to process the email.
- You are then asked to record how long you spent in the email system dealing with that email, and anything else, before exiting to complete the survey form.
Please try to record your answers to these questions as accurately as possible, in minutes and seconds. However, do not feel that you have to use a stopwatch or any other timing device. You are simply making an estimate of time, and recording it should not intrude in any way.

Recording your feelings
Please note that Question One on the Survey form asks you to rate how you felt before the email interrupted you, even though you don’t complete the form until you exit the email system later. You may find it helpful to think about your feelings as soon as you hear/see the email alert, so that you find it easier to make a record of them later.

How to get started
- At the very beginning of the pre-selected study period, please complete the ‘Current Well-being’ questionnaire. This will get you used to what you need to do when completing the email survey forms.
- Then log onto your email system and download your first batch of email for the half-day. You do not need to fill out survey forms for the first batch of email received. Only fill in a survey form for the incoming email that interrupts you after your initial batch.
- Then, send an email to me at e.greig@surrey.ac.uk to let me know that you are on-line and that you have started the email study as planned.
- Next, carry on with your work as normal, remembering to fill out an email survey each time you finish responding to an email interruption.

Personality questionnaires
When you have time over the next two weeks please log onto ‘www.psykey.net’ to complete the HPI and MVPI personality questionnaires. Full instructions are provided in the attached ‘How to use Psykey on-line assessments’ form.

Personal information
In order to monitor how closely participants in this study match the make up of people in the general population it would be most helpful if you could fill in the Personal Information form.

Informed Consent form
Please read this carefully, and if you agree to the statements made on the form, please sign and date it, ask a witness to do the same, and return to me when you return your study pack.

How to get the information back to me
Once your chosen study half-day is over, please compile all of the surveys you have completed, along with the Personal Information form, Current Wellbeing form and signed Informed Consent form. Place everything in the envelope provided, clearly labelled to Emma Russell. Seal it and return to me.

Confidentiality and Right to Withdraw
All information provided by you will be kept completely confidential and cannot be traced back to you by anyone other than myself. If at any point during the study you decide you no longer wish to continue, you may withdraw your participation with no questions asked.

Many thanks for your invaluable participation in this important study. If you have any questions or concerns over the next few days please do not hesitate to contact me at e.greig@surrey.ac.uk and I will endeavour to get back to you as soon as possible.

Emma Russell BSc MSc CPsychol
Chartered Occupational Psychologist
University of Surrey
## Personal Information

Please tick the relevant boxes below to indicate your status in each area

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<tr>
<td>4-7 years</td>
<td></td>
</tr>
<tr>
<td>8-11 years</td>
<td></td>
</tr>
<tr>
<td>12-15 years</td>
<td></td>
</tr>
<tr>
<td>16+ years</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Job level</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative</td>
<td></td>
</tr>
<tr>
<td>Administrative - Project/middle management</td>
<td></td>
</tr>
<tr>
<td>Project/middle management</td>
<td></td>
</tr>
<tr>
<td>Senior management</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of years in current organisation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3 years</td>
<td></td>
</tr>
<tr>
<td>4-7 years</td>
<td></td>
</tr>
<tr>
<td>8-11 years</td>
<td></td>
</tr>
<tr>
<td>12-15 years</td>
<td></td>
</tr>
<tr>
<td>16+ years</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Email operating system that you are constantly on-line to at work</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lotus notes</td>
<td></td>
</tr>
<tr>
<td>Microsoft outlook /outlook express</td>
<td></td>
</tr>
<tr>
<td>Other (please state)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Email alert system</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate below how your email system alerts you to the presence of a new email by ticking as many of the notifications that apply.</td>
<td></td>
</tr>
<tr>
<td>Message box appears (e.g. &quot;You have new email&quot; or summary of new email)</td>
<td></td>
</tr>
<tr>
<td>Audible ping/beep/other noise</td>
<td></td>
</tr>
<tr>
<td>Envelope icon appears</td>
<td></td>
</tr>
<tr>
<td>Inbox always open (see new email arrive)</td>
<td></td>
</tr>
<tr>
<td>Cursor changes</td>
<td></td>
</tr>
<tr>
<td>Other (please state)</td>
<td></td>
</tr>
</tbody>
</table>
Individual Email Survey

You’ve just finished dealing with an incoming email. Please fill this in...

1. In the section below, please indicate how you felt right before being interrupted by the email alert, according to each of the following adjectives. Please circle the most appropriate number on the 6 point scales, where 1 = not at all, to 6 = very much so.

   1 2 3 4 5 6 Happy
   1 2 3 4 5 6 At ease
   1 2 3 4 5 6 Anxious
   1 2 3 4 5 6 Annoyed
   1 2 3 4 5 6 Motivated

2. In the section below, please indicate how you feel right now, that is, at the present moment, according to each of the following adjectives. Please circle the most appropriate number on the 6 point scales, where 1 = not at all, to 6 = very much so.

   1 2 3 4 5 6 Happy
   1 2 3 4 5 6 At ease
   1 2 3 4 5 6 Anxious
   1 2 3 4 5 6 Annoyed
   1 2 3 4 5 6 Motivated

3. When you were interrupted by the email, please indicate what you were doing (please tick):

   I was just starting a work task
   I was in the middle of a work task
   I was nearing the end of a work task
   I had just finished a work task
   I was doing something else (please state below)

4. Please indicate (using the 6-point scale below, where "1 = not at all and 6 = very much so") whether the TASK you were working on when interrupted was:

   1 2 3 4 5 6 Lengthy
   1 2 3 4 5 6 Difficult
   1 2 3 4 5 6 Clear and specific
   1 2 3 4 5 6 Effortful

5. Now think about the email that interrupted you. Please indicate (using the 6-point scale below, where "1 = not at all and 6 = very much so") whether the EMAIL was:

   1 2 3 4 5 6 Lengthy
   1 2 3 4 5 6 Difficult
   1 2 3 4 5 6 Clear and specific
   1 2 3 4 5 6 Effortful

6. How important was the email compared to the task you were already working on (please tick one column per statement)?

   - In fulfilling my work goals and obligations
   - In fulfilling my need to feel well and satisfied

   The email was more important  |  The task was more important  |  Neither was more important than the other

Please turn over and complete the last set of questions.
7. Did you check the email message (e.g. subject/sender/content) immediately after receiving the alert (please circle or tick)? **Yes** or **No**
   
   a. If ‘No’, how long did it take you to check the message after receiving the alert (estimate to the nearest minute or second)?

   b. If ‘No’, why didn’t you check the email immediately after receiving the alert?

8. Did you then deal with (e.g. open, delete, etc.) the email immediately after checking it (please circle or tick)? **Yes** or **No**
   
   c. If ‘No’, how long did you wait before going back to deal with the email (estimate to the nearest minute or second)?

   d. If ‘No’ why didn’t you go straight into email after checking it?

9. How long did you spend in your email system – dealing with this email, and with any other business (estimate to the nearest minute or second)?

10. Did your way of dealing with the email interruption help or hinder you:

    | Helped | Hindered | Neither |
    |--------|----------|---------|
    |        |          |         |

...in achieving your current task’s goal
...in achieving another work goal
...in achieving a sense of personal well-being
...in achieving a general life goal

Thank you. Please keep this safely to return to Emma Russell at the end of the study period.
Current Wellbeing

Please complete this form at the beginning of your study period, before participating in the study proper.

In the section below, please indicate how you feel right now, that is, at the present moment, according to each of the following adjectives. Please circle the most appropriate number on the 6 point scales, where 1 = not at all, to 6 = very much so.

<table>
<thead>
<tr>
<th>Happy</th>
<th>Calm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>At ease</th>
<th>Tired</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anxious</th>
<th>Bored</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Annoyed</th>
<th>Gloomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Motivated</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>
Informed Consent Form
Re: Study of strategies used to deal with email interruptions

I ___________________________ (participant's name) acknowledge that:

- Instructions and information about the above project have been received, read and understood by me.
- Any questions I have had about the above project have been properly answered by the research team.
- I have agreed to voluntarily participate in the study.
- I will endeavour to participate in accordance with the instructions contained in the Instructions and Information document.
- I understand that all personal data relating to volunteers is held and processed in the strictest confidence, and in accordance with the Data Protection Act (1998). I agree that I will not seek to restrict the use of the results of the study on the understanding that my anonymity is preserved.
- I understand that I am free to withdraw from the study at any time without needing to justify my decision and without prejudice.

Signed ____________________________ Dated __________

In the presence of _______________________(please enter name of witness)

Witness signature ____________________________ Dated __________

Received by Emma Russell, Lead Researcher, Department of Psychology.

Signed ____________________________ Dated __________
How to use PsyKey Online Assessments

Arrangements have been made to allow you to complete the following assessments online:
- Hogan Personality Inventory (HPI)
- Motives, Values, Preferences Inventory (MVPI)

Quick Guide to PsyKey Online Assessments
- Go to www.psy-key.com
- At the PsyKey site, click on the Online Assessments link, then key in the Access Code: ERUpd

Registration
On your first visit, you will be asked to provide some personal details before continuing to the questionnaire. You will be asked to enter your personal e-mail address (please enter none@psykey.co.uk). Then you will be asked to create your own personal password. Make a note of this password and the email address you have used in case you need to revisit the site to complete the questionnaire later (see below).

Completing the questionnaire
All further instructions will be provided on-screen. Some practice items are provided at the beginning of the questionnaire. You can use the mouse to click on your preferred response to each question or, alternatively, you can use the TAB key to manoeuvre through the questionnaire and the ENTER key to make your selection.

There are no right and wrong answers but it is important that you should answer in a way that is accurate for you. Completed carefully, this process gives you the opportunity to convey your personality in a comprehensive and balanced way. The best approach is to read each statement carefully, but not to deliberate too long over any one item. Try to answer in an open and straightforward way.

You must respond to all the items before proceeding to the next page. Remember, there is no time limit and you will be able to go back to check or change any of your responses. When you have answered all the questions, click the COMPLETE ASSESSMENT button and allow time for the Internet to respond. Once you have submitted your questionnaire responses, you will be redirected back to the home page where you can log out or, if required, take another questionnaire. Please ensure you complete all the questionnaires listed at the top of this e-mail.

Submission difficulties
If clicking the COMPLETE ASSESSMENT button triggers an "error page", don't panic, this should not affect your completed questionnaire. First quit your web browser (e.g. Internet Explorer or Netscape Navigator), then re-launch it and log back into PsyKey following the instructions below.

Returning to complete a questionnaire
If for any reason you need to return to the questionnaire (to complete an unfinished administration or because of a lost connection or submission difficulties), simply return to the PsyKey site following the original directions but, when you get to the PsyKey Registration page, choose to bypass registration and use your personal password and email address to log in. You may then wish to use the sample questions to re-familiarise yourself with the procedures, or you can simply bypass these to pick up the questionnaire where you left off.

Kind Regards,
PsyKey Administration
01892 559540
Appendix 12: Debrief email (Study Six)
Re: Strategies for dealing with email interruptions

Dear Colleague

Many thanks for participating in this University of Surrey study on email interruptions. I hope that you found it interesting.

Please could you now collect up all of the Individual Email Survey forms, your ‘Current Wellbeing’ form, and ‘Personal Information’ form to return to me in the return address envelope. Additionally, please ensure that you complete the on-line personality questionnaires within the next five days.

Once I have received your study pack back, I will write to you again to more fully explain how your results have helped in this research project. I will also enter your name into the prize draw to win one of 3 £50 prizes. I will also give you details at that stage about how to call me for free feedback on your personality profile.

However, while the study is still fresh in your mind I have just three more questions to ask:

1. Did you feel that taking part in this study affected the way you would normally deal with email interruptions (if yes, please indicate in what way)?
2. Are you normally on-line and connected to your email system at work (i.e. do you tend to allow the system to interrupt you at work, or do you normally actively go and download new email periodically)?
3. Did the process of rating your emotional response affect the way that you felt (if yes, please indicate in what way)?

I would be extremely grateful to receive your feedback on these or any other points that you feel are relevant to this study. Again, please be assured that any correspondence engaged in with me will remain strictly confidential.

Many thanks for your time, and if this study has raised any issues for you that you would like to discuss in more detail, then please do not hesitate to contact me.

Kind regards
Emma Russell
Department of Psychology
Appendix 13: Debrief and thank-you letter (Study Six)
Dear Colleague
Re: Email Study: What happens now?

You recently participated in the third phase study of email interruptions conducted at the University of Surrey. Thank you very much for your contribution to this project – I hope that you found it to be an interesting experience.

What the study was trying to measure
This study used a ‘diary’ method to explore whether people’s mood or well-being, at the point where they are interrupted by an email, can influence their strategic response. For example, the second phase of this research project found that when people feel bored or tired at work, they are quicker to respond to an email interruption. In this final study we wanted to try and understand what people are doing at the point where they are interrupted, to establish how this might impact on mood and strategic responding. This is why we asked questions about your current task and what it involved. In addition, this study sought to measure well-being following attendance to an email interruption. This was to see whether strategic response to an email affects mood. The previous study found that people who spent longer dealing with an email interruption improved their levels of happiness, motivation and activity, especially if they were ‘ambitious’ personalities. This led us to hypothesise that dealing with email may offer people the opportunity to fulfil short, achievable goals, which in turn makes them feel positive. This is why in this study we asked questions about whether dealing with email helped you to achieve goals – either related to tasks, well-being, or general life goals.

The HPI and MVPI questionnaires provided us with measures of personality and motivational style. It is hypothesised that different types of people demonstrate different strategic responses to an email interruption, and are more or less susceptible to well-being change. In the last study we found that ambitious, goal-focused people can find dealing with email to be rewarding. However, tense and stress-prone people feel negatively about email, and dealing with an email makes tense people in a bad mood feel even worse. In this study, by finding out more about the task that was interrupted, and one’s sense of goal fulfilment, we hope to establish why different people feel differently about email interruptions.

Our expectation therefore is that the strategic response to an email interruption is influenced by current well-being, and personality/motivational style. It is also hypothesised that the demands of the current task, and the importance of the current task in comparison to the email, will affect people’s response. Having responded to an interruption, one’s well-being rating is also likely to be dependent upon the strategy chosen, the nature/content of the email, one’s personality/motivational style, along with the degree to which people feel the email enabled them to achieve some work goals.

Our last study found that:
• wellbeing before an email influences one’s strategy for dealing with an email
• One’s strategy for dealing with an email influences one’s well-being afterwards
• Different people (in terms of measurable personality characteristics) deal with email in different ways – some people find the experience more positive than others.

This study hopes to further develop this by establishing:
• How the demands of the task influence one’s strategic response to email
How the relative importance of the task to the email influences strategic response and wellbeing
- Whether email affords opportunities for short-term goal-fulfilment
- Whether the impact of email on goal fulfilment influences wellbeing, and whether this differs between people.

Together, all phases of this study programme will allow us to make recommendations about how best to deal with email interruptions, in order to promote positive well-being, goal fulfilment and effectiveness at work. In addition, it should help us to provide guidelines so that people can find strategies that work for them, as individuals, depending on the demands of their work, and their unique personalities.

The release of results
There is a large volume of data to process for this study and it is not anticipated that statistical results will be available before May 2006. However, once the statistics have been analysed, and theoretical implications considered, I will send you an executive summary of the key findings, if you are interested. Depending on the findings, a series of best practice recommendations will also be made.

HPI and MVPI Feedback arrangements
As a thank you for participating in the research project, you are invited to call me to receive a 15-minute oral feedback on your HPI and MVPI questionnaires. Obviously this is not obligatory, and whether or not you choose to receive feedback your results will be destroyed 6 months after the statistics have been analysed. If you would like feedback however, then the following information may be of interest.

The HPI and MVPI are well-respected psychometric measures with a robust history of validity and application to the UK workplace. The HPI looks at your ‘public’ personality – the you that you present to the world. In an occupational environment it is the HPI profile that best predicts how well you fit with the demands of your job role. The MVPI looks at your ‘private’ personality – the you that you know, as it comprises your values, beliefs and personal viewpoint on the world. In an occupational environment it is your MVPI profile that best predicts with whom you will gel, which work environments suit you best, and what job role elements will motivate you.

Feedback slots have been arranged for January 11th and 18th. If you would like feedback then please email me with your preference (and any time restrictions) for either day, and I will book you in. You will then be asked to call me on 01444 456653. The feedback session will be completely confidential. If you have a specific angle that you would like me to take in interpreting your profile, then please indicate this in your email and I will be happy to accommodate this. Finally, you may find it useful to take notes or even tape record the feedback session, as written reports cannot be generated.

Thank you
So, thank you again for taking the time to contribute to this research project. Your input has been extremely valuable to us. If you have any concerns or questions that you would like to discuss further, as a result of your participation in this project, then please do not hesitate to contact me.

Yours sincerely
Emma Russell

Emma Russell BSc MSc CPsychol
Chartered Occupational Psychologist
Department of Psychology