Personalised Email Tools: A Solution to Email Overload?

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ABSTRACT
The stress resulting from the daily demands of email exchange and management has been labelled *email overload* [4, 13]. The extent to which individuals are affected by email overload has much to do with personal, cultural, and contextual differences. However, in general people are inefficient at dealing with email and could potentially reduce the stress associated with it if they changed their behaviour. In this paper, we review some of the strategies offered in the literature, as well as some email tools that have been developed to help people manage their inboxes. We point out the benefits and disadvantages of them, suggesting that adaptive approaches might be more effective at facilitating email behaviour changes than fixed one-size-fits-all solutions. We argue that the adaptation should be the result of personalisation (controlled by the system) *and* customisation (controlled by the user) because these processes support behaviour change in different ways.

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Email overload; email tools; behaviour-change technologies

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H.5.m. Information interfaces and presentation (e.g. HCI): Miscellaneous.

INTRODUCTION
The daily demands of email exchange in both a personal and professional environment can be overwhelming and can act as a stressor. Email overload was defined by Dabbish and Kraut [4, p.431] as "users' perceptions that their own email use has gotten out of control" and as a result causes them stress. How we react to and deal with email overload has much to do with our personal, cultural, and contextual differences. Researchers have proposed fixed, personalised and customised approaches to dealing with email overload. Fixed strategies, such as checking email once a day, do not require adaptation by the user or the system, whereas

personalised email tools automatically change in response to a user's action. These are distinguished from customised email tools, which are changed directly by the user based on their own needs. Building on a review of email strategies and tools, we argue there is no one-size-fits-all solution and that effective behaviour change will result from approaches that can change according to the user's idiosyncratic needs. Whether personalisation or customisation, or both should drive behaviour changes, is an open research question and an issue that could be discussed at the workshop.

EMAIL MANAGEMENT LITERATURE
In this section we present an overview of the literature, first establishing that the way people manage their email varies depending on personal, cultural and contextual factors. We do so to underline the importance of our conclusions, in which we state that these differences must be taken into account when considering the design of behaviour change tools. We then give an overview of the different types of strategies proposed to manage email overload, distinguishing between fixed, personalised and customised strategies. We argue that users can actually change their behaviour by using these strategies, but they might not always choose the best goal for themselves.

Differences in Email Management Strategies
As early as 1988, Mackay [9, p.383] reports that one of her participants complained she felt she was "*on the edge of losing control of her mail*". This feeling is unsurprisingly still common today, given that the number of emails sent has increased massively in the last 25 years. Mackay [9] studied email usage in an organization and found that email was being employed for time and task management as well as communication purposes. Her findings suggest that email usage is extremely diverse and two main groups of email handling strategies were identified: *prioritizers* and *archivers*. The former limited their time spent in the inbox and maximized efficiency by prioritizing; the latter monitored all incoming messages for fear of missing important information.

In 1996 Whittaker and Sidner [14] also investigated email management behaviour. They initially proposed a simple 'one-touch model' for email management, according to which emails are read, replied to (if required), and then either deleted or filed immediately. However, they noticed that this model did not meet the demands of white-collar workers who used email not only for asynchronous communication but also for task management and personal

archiving. Their study identified different email management strategies: *no filers* (who never cleared their inbox), *frequent filers* (who constantly cleaned their inbox) and *spring cleaners* (who cleaned their inbox every few months). Ten years later, in 2006, Fisher et al. [5] revisited Whittaker and Sidner's study to assess whether its findings were still valid. Their study suggested that there is a wide variety of email handling behaviours and that users adopt more than one email strategy depending on circumstances.

Research has also identified cultural differences in email management strategies. Tang et al. [11] conducted a study with the goal of exploring differences in email usage across the world. They noticed there are some tendencies that seem confined to geographical regions. For example, North American users tend to keep more messages in their inboxes compared to South American users; European users seem more inclined to be frequent filers or spring cleaners, compared to Asian users who are typically no filers.

These studies show that there is a range of personal, cultural and contextual factors that affect people's behaviour in how they process their email and that typically the processing strategies do not alleviate the effects of email overload. In the next section we consider the benefits of fixed and adaptive approaches to email management and their consideration of these differences.

Fixed or Adaptive Approaches to Email Management?

A study by Brumby, Cox and Bird [2] showed how the choice of email management strategies impacts the time one spends in their inbox. The authors investigated the effects of two fixed approaches to email management: a once-a-day checking strategy and a frequent checking strategy that aims to maintain 'inbox-zero'. They found that participants who adopted the once-a-day strategy made fewer visits to email applications and that there was some indication that the overall time spent in one's inbox was lower than when adopting a frequent checking strategy. The results provide evidence that people can adopt new email strategies. However a once-a-day strategy, might be considered too extreme and not suitable for many people: Brumby et al. note that a number of participants were unable to complete the study because they found the strategy too restrictive and worried they could not carry out their work.

Although fixed but less restrictive strategies might be effective, for example, checking email three times a day, a general concern is that they ignore personal, contextual and cultural differences, which, as indicated in the previous section, strongly influence email habits. On the basis of her pioneering research, Mackay [9, p.394] proposed that email tools should be developed to help people manage their email arguing that they should be customisable to meet personal usage preferences because "[…] *no single set of rules is likely to be useful for everyone, providing users with the ability to write their own personal rules should be an effective solution*". Mackay also emphasizes the fact that

circumstances may change so users should be aware that their set of rules within the tool can "*vary according to how busy the user is*" [9, p.395]. Based on their cultural differences research, Tang et al. [11] suggested, "*tailor*[ing] *user interfaces to account for those contextual differences.* […] *Default settings for certain email features may be set differently for different countries*" [11, p.192].

So although a fixed approach to managing email overload can be beneficial at reducing email overload, there is a concern that it is not flexible enough to accommodate individual differences and frequently changing contextual factors. Customised tools have the advantage that they can potentially take into account individual and contextual differences and support behavioural changes towards developing more effective email management strategies.

EMAIL TOOLS

In this section we present an overview of six tools that are available for free on the Internet and that were designed to help users better manage their inbox, for instance by helping people reflect on their behaviour, or by explicitly suggesting ways in which they can change their habits. We distinguish between tools that provide information on email usage but do not try to actively change behaviour and adaptive tools that do try to encourage behaviour change: personalised tools (system-controlled) and customised tools (user-controlled).

Information Tools

Many of the existing email tools offer metrics on email behaviours, most of which enable users to compare their behaviour within a community or through the most popular social networks. The types of metrics that are provided to users include: hourly/daily/weekly/monthly inbox volume; top senders and recipients; most active hours; average response time; word count; and attachments. The most complete in terms of how many metric features it offers is *Gmail Meter* (http://gmailmeter.com/), but it is limited to a weekly report for Gmail accounts. However, *Gmail Meter* does not allow comparisons between weeks, leaving users unable to spot possible behaviour patterns. Supporting data comparison across time could improve such tools, enabling users to better identify their behavioural patterns, which could then lead people to act upon them. An extension of Gmail Meter, for example, could be based on a tool developed by MIT Media Labs, called *Immersion* (https://immersion.media.mit.edu/), which provides a user-centric perspective of one's email history. It creates a social network analysis graphic representing one's email communications and how they change over time. Again, a tool like this helps users reflect on their behaviours and makes them aware of habits they might not be fully conscious of. Once self-knowledge is gained, people find it easier to change their habits [3].

Personalised Tools

An example of a personalised tool that changes in response to a user's action is the *Email Game* (http://emailga.me/). It

is designed to teach users how to save time while processing their inbox by giving a default time of 3 minutes to reply to each email. Being designed as a game, the more efficient one is, the more points one receives. Depending on the user's score, a smiley face changes its expression throughout the game. If a user replies to emails within the given time and reaches an empty inbox at the end, they receive more points and the face becomes happier. If a user does not reply within the predefined 3 minutes, or leaves emails in their inbox, then the face becomes sad. To the best of our knowledge, there has been no evaluation of the effectiveness of this tool for reducing email overload. Of course a pitfall of this tool is that it may not be possible to reply to some emails in 3 minutes. However, as for the once-a-day strategy, a study on the use of this tool could probably prove that a 3-minute strategy can be easily adopted for certain types of emails.

Tools that allow customisation

Boomerang (http://www.boomeranggmail.com/) is a tool that allows flexibility in sending and receiving email: users can decide to schedule a message to be sent at a point in the future or to have a received message returned to the inbox at a time and date of their choice. Users can select when to defer the inbox message, either before or after reading it. The advantage of this app is that it gives the user the ability to decide when it would be more appropriate to deal with an email. This is an example of a customisable tool because it allows users to take action on their inbox so that it meets their needs, e.g. receiving an email at a more suitable time. Other customisable tools include websites that give advice on how to actively change one's behaviour in order to better deal with emails, such as adopting a policy of replying to emails using between two to five sentences, regardless of the recipient or content (http://sentence.es). Calmbox.me recommends customising one's email signature with brief email tips (e.g. "This is a Calm Inbox: email is checked once in the AM and once in the PM"). Doing so could nudge whoever receives that email to change consequently their email behaviour accordingly.

DISCUSSION

In this paper we have described different types of Internet tools developed to aid users in their email processing. We have presented tools that return metrics and statistics on email usage, encourage healthier email behaviours, provide a visual insight on the user's inbox or that give advice. There has been very little academic research that has evaluated these tools and therefore currently it is difficult to assess how effective they are at reducing email overload.

Therefore, we now consider personalisation and customisation email management tools within a behavioural theory framework, to better understand their potential benefits. Behaviour change technologies can use behavioural theory in three ways: informing the design of systems; guiding evaluation strategies; and defining target users [6]. In this paper we focus only on how behavioural

theory could inform the design of effective email tools. We will consider three theoretical frameworks: the nudge theory; goal-setting theory; and the theory of planned behaviour.

According to the nudge framework of Thaler and Sunstein [12], behaviour can be changed by making changes in the environment. This framework is based on the idea developed by Tversky and Kahneman [7] that our cognitive system operates on two levels: automatic and reflective and nudging techniques target the automatic brain system. Personalised email systems could be effective by incorporating nudge techniques, for example, by limiting the time allowed to reply to an email. Personalised email tools can also use goal-setting theory, which is a psychological framework for understanding how to motivate behaviour change [8]. Specifically for emails, users can be guided towards more effective and efficient goal selection (e.g. checking email less frequently) through a personalised tool, if the goal setting is adopted. This can be especially beneficial, because, as Scott et al. [10] observed, people often set themselves easier goals in comparison to the goals they set for others. However, according to the goal-setting framework, challenging goals are more effective at bringing about behaviour change. For this reason it might be most effective if the email tool sets goals for the users.

In contrast to nudging, the theory of planned behaviour [1] is concerned with the reflective cognitive system. It proposes that intentions predict behaviour and these are influenced by: (i) the attitude towards a specific behaviour; (ii) subjective norms; and (iii) perceived behavioural control. This implies that the user has a more active role in changing their behaviour and would suggest that customisation is beneficial. One pitfall of this theory is that it does not consider behaviours which are not 100% voluntary or under the user's control. It is likely that, at least sometimes, people are not aware of their email behaviour. A customisable email system can be combined with information tools that quantify users' behaviours. These can facilitate self-reflection, which in turn can help change habits and the attitudes towards them [3]. For example, based on a study of social networking, Zhou et al. [15] suggest that estimating usage could reduce email related stress by reducing the tendency to overestimate time spent on the activity.

It is clear that both personalised and customised email management tools have the potential to support email behaviour change. An ideal system would incorporate both approaches in order to maximise the effectiveness of the tool in adapting changes in the personal, cultural, and contextual factors that affect the extent to which users experience overload.

CONCLUSION

In this paper we have presented the problem of email overload: stress caused by managing our ever-growing

inboxes. We highlighted that there are different ways of handling email, depending on personal, cultural and contextual influences. For this reason we argue that adaptive approaches might be more effective at facilitating email behaviour change than fixed one-size-fits-all solutions. We argue that the adaptation should be the result of both personalisation (controlled by the system) and customisation (controlled by the user) because these processes support behaviour change in different ways. Personalisation can potentially nudge changes in behaviour by altering the email management environment, for example limiting the time users have to reply to messages. Following goal setting theory, personalisation can also be used to set challenging goals. Information tools can provide users with insights into their behaviour and this can lead to active intentions to change habits that can be supported by customisation. Our future research will continue to investigate how behaviour theory can be incorporated into the design of effective email management tools that can lead to less email overload but still consider personal, cultural and contextual differences.

AIMS FOR WORKSHOP

We look forward to discussing whether combining system-controlled personalisation and user-controlled customisation with a single behaviour change technology offers a solution to the problem of matching a behaviour change technology to users.

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BIOS

Marta E. Cecchinato is a PhD candidate at UCL Interaction Centre, University College London, with a MSc in social psychology. She is interested in understanding how and to what extent new technologies can influence and change our everyday life by reducing stress and increasing wellbeing. In particular, her research focuses on work-life balance and how personal informatics tools can help regain control over digital habits.

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and engagement in digital hobbies, such as games and citizen science projects, and their influence on post-work recovery.

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