

Email Task Management Styles: The Cleaners and the Keepers

Jacek Gwizdka

Interactive Media Lab & Knowledge Media Design Institute

University of Toronto

Toronto, Ontario M5S 2E4, CANADA

chi2004@gwizdka.com

ABSTRACT

Email has become overloaded as users make use of email tools for performing a wide range of activities. Previous studies have demonstrated the different strategies employed by email users to manage messages. However, we have little information regarding how to explain those differences between users.

The research described in this paper seeks to gain understanding of individual differences in email behaviour. We present results from a questionnaire-based study, which focused on how email users dealt with messages that relate to future tasks or events. We identified two types of user, defined by how they dealt with such messages: *the cleaners* and *the keepers*. The difference between these two groups can be attributed to differences in email experience and requirements for flexibility of closure. The ultimate goal of such research is to be able to predict differences in email use and to inform email user interface design and we discuss possible ways in which this could be done.

Categories & Subject Descriptors: H.4.3 [Information Systems Applications]: Communications Applications — Electronic Mail; H.1.2 [Models and Principles]: User/Machine Systems — Human factors; Human information processing

Keywords: Email strategies; user interface; user profiling

INTRODUCTION

Email is a messaging system that has become overloaded with other uses, including project tracking and scheduling. As a result, email inboxes typically contain many messages which relate to future tasks (e.g. provide comments on a CHI paper by the next weekend) and events (e.g. a meeting to attend next Monday). These messages cannot be simply deleted, because they contain critical information relevant to current and future activities. These messages need either to be kept in email programs, or the information contained in them needs to be transferred to other places (e.g. other applications, post-it notes).

In a previous study [9] we learned that email users employ a range of strategies when dealing with task-related messages. However, we have little information on how to explain those differences between users. The study described in this paper presents findings that indicate the role of individual differences in email task management.

RELATED WORK

Previous studies of email use demonstrated that email programs are used for managing pending tasks. For example, Mackay [11] described how email supports a variety of time and task management activities. Whittaker & Sidner [12] observed how the inbox is used as a repository of information containing to-dos, to-reads and other messages that cannot be dealt with immediately upon reading. Ducheneaut & Bellotti [5] discussed how email becomes the central place where work is received, delegated, and managed.

Individual Differences in Email Strategies

Email users differ in how they manage email messages. Whittaker & Sidner [12] described three types of general email management strategies employed by users, and divided the users into the following groups:

- *No-filers* - users who do not make use of folders and keep majority of email messages in one incoming email folder;
- *Spring-cleaners* - users who made use of folders (and had even extensive folder structures), but who filed their email sporadically, about one to three months;
- *Frequent-filers* - users who made an attempt to file messages into folders daily.

No-filers and spring-cleaners had problems keeping up with task management in email, as well as with filing email messages. Frequent-filers encountered relatively few problems, but, as the authors observed, their relative success came at the cost of time regularly spent trimming their inboxes. But even this at-the-moment-successful situation may change with increased volume of email messages, when time required to read and respond to message, would not allow them to spend enough time on managing information in their inboxes.

In addition to the individual differences in general email management, previous research also showed differences in

strategies employed as a part of task management in email. For example, in our previous study [9], we examined how email users deal with messages that relate to future tasks and events. Four kinds of strategies were found: 1) Immediate processing; 2) Limiting (e.g., by ignoring messages that are beyond one screen); 3) Encoding additional information (e.g., by adding flags to messages); and 4) Accumulation.

At one end of the continuum of strategies is *immediate message processing*, where messages are replied to, filed, or deleted on their first reading. This is an “ideal” case in which email inbox is cleaned immediately. At the opposite end of the continuum, there is an *accumulation* strategy, where messages are accumulated in the inbox until they are not needed any more. Managing such an inbox becomes expensive in terms of cognitive effort and time. In reality, participants in that study represented various intermediate points on the continuum of strategies. Several participants consciously limited message review process to one screen full of messages. This approach depended on the user’s organizational role (e.g., one manager knew that if she missed an important email, the other party would remind her again). One participant employed the limiting strategy along with re-emailing himself messages requiring future action which were starting to disappear from screen.

Factors Affecting Email Strategies

As can be seen from the above presentation different strategies bring different advantages and disadvantages. In order to provide effective design solutions, designers need to know what the underlying factors of user strategies are. Ability to predict strategies used by different groups of people helps to design functionality of email programs.

Table 1 shows taxonomy of factors that may affect email strategies. We chose these two dimensions as being important for design. The distinction between *constant* and *changing* factors may influence creation of adaptable and adaptive user interfaces (we assumed, for simplicity, that cognitive abilities do not change). The distinction between *internal* vs. *external* factors informs us where the intervention may be more effective, that is, at the level of user interface or organizational processes.

Factors	Internal	External
Constant	<ul style="list-style-type: none"> cognitive abilities (e.g., memory) personality gender 	n/a
Changing	<ul style="list-style-type: none"> age email experience 	<ul style="list-style-type: none"> organizational factors (e.g., role: manager) cultural factors

Table 1. Taxonomy of factors affecting email behaviour.

Email program is another important factor affecting user behaviour. Depending on circumstances, email program can be in all four quadrants of the above taxonomy. For example, it can be internally as well as externally imposed

(e.g., some corporations provide their workers with no choice of email software).

In this study we examined how selected internal factors affect email task management strategies. We chose to focus on the following factors: email experience, gender, organizational habits and cognitive abilities. The novice-expert distinction is one of the basic groupings of people in human-computer interaction [6]. Previous research has shown differences in performance between genders [e.g. 3]. Cognitive ability has been recognized as an important predictor of computer-based performance [4, 6]. The reported differences in performance for computing tasks have been found to be quite large. For example, Egan [6] reported differences between users in the order of 20:1 for performance of common computing tasks. Egan suggested that these differences could be predicted as well as modified through appropriate design. Processing of the email inboxes is a cognitively demanding task, thus we expected that users with different levels of cognitive abilities perform email tasks differently.

USER STUDY

The study was motivated by the following research questions:

1. What are the basic groupings of email users with respect to email task management strategies?
2. What is the source of differences in email task management strategies?

Participants

24 subjects participated in the experiment. 19 participants were university students (4 undergraduate and 15 graduate students from engineering and science departments) and 5 participants were full-time employees in non-academic corporations. There were 9 females and 15 males. Participants were screened for at least moderate use of email. On average, participants had used email for seven and a half years.

Procedure

Each subject filled out an on-line questionnaire and four cognitive tests, which were administered in person by the experimenter. The questionnaire was used to collect demographics (e.g. gender), work habits (as represented by neatness/messiness of their office desks), and information about email experience and habits. Table 2 summarises the questions related to email habits.

Answers to the questions were used to construct nine *email habit variables*: 1) When email is read, 2) Email interrupts other tasks, 3) Uses search in email, 4) Transfers events from email, 5) Keeps events in email, 6) Transfers to-do’s from email, 7) Keeps to-do’s in email, 8) Uses emails as reminders, 9) Emails self-reminders. The first three variables describe general email habits, while the latter six describe email habits specifically related to management of pending tasks in email. The rationale for including the first

three items was that they may indirectly reflect activities related to managing future tasks in email. For example, email users may read email messages more frequently if they use it to monitor information about future events.

Question	Answer Choices ¹
When do you most frequently read email?	at specific times / random times / all the time
Do you let incoming email messages interrupt your other tasks?	always / sometimes / never
How often do you search for information in email?	once per session / occasionally / never
Do you transfer information related to events from email messages?	always / sometimes / never
Do you keep information related to events from email messages?	always / sometimes / never
Do you transfer to-do's from email to other places (e.g. programs, paper notes)?	always / sometimes / never
Do you keep to-do's from email to other places?	always / sometimes / never
Do you use email messages as reminders?	always / sometimes / never
Do you send email reminders to yourself?	always / sometimes / never

Table 2. Summary of Email Questionnaire.

We selected four cognitive abilities which we predicted may have a possible effect on email processing: flexibility of closure, speed of closure, visual memory, and working memory.

- *Working memory* (WM) is a temporary store for recently activated items of information that are currently occupying consciousness and that can be manipulated and moved in and out of WM. WM plays a critical role as an input buffer for all information incoming from human senses. The limited capacity of WM is a well known bottleneck in human information processing.
- *Visual memory* is the ability to remember the configuration, location, and orientation of figural material.
- *Flexibility of closure* (FC). Processing information in a graphical email user interface requires extracting email message or email message attributes from a distracting background of other messages, which requires an ability to extract parts from the whole. This ability is called *flexibility of closure* and is defined as the ability to hold a given visual percept in mind so as to disembed it from other well defined perceptual material [8].
- *Speed of closure* (SC). Email tasks that require re-creation of structure or relationships between a group of email messages, or email message attributes, requires an ability to create a whole from pieces. This ability is called *speed of closure* and is defined as the ability to unite an apparently disparate perceptual field into a single concept [8].

¹ All multiple choice questions included "Other" choice, where participants could describe a different situation.

The four cognitive abilities were measured using the Factor-Referenced Kit of Tests [8]. The scores obtain from these tests were split at the median into two groups (high vs. low levels of the ability).

METHOD

We carried out k-means cluster analysis to group subjects based on their self-reported approaches to email message reading and email-based task/event management. To identify subject groupings, we classified behaviour in terms of the nine *email habit variables* extracted from the questionnaire. After such a grouping was found, we used t-tests to examine whether the differences between participant groups could be attributed to differences in demographics, work habits, email experience and/or cognitive abilities.

RESULTS

A two cluster solution was chosen as giving the best grouping of participants (12 and 11 participants in two clusters). Analysis of variance was used to interpret the clustering results. As shown in Table 3, there were significant differences between the clusters in terms of five email habit variables (When email is read, Email interrupts other tasks, Keeps events in email, Keeps to-do's in email, Emails self-reminders), and a borderline significant difference for one variable (Uses search in email). No significant differences were found for the remaining three variables (Transfers events from email, Transfers to-do's from email, Uses emails as reminders).

Email Habit Variables	F	p
When email is read	7.261	0.014
Email interrupts other tasks	9.988	0.005
Uses search in email	4.097	0.056
Keeps events in email	19.478	0.000
Keeps to-do's in email	18.361	0.000
Emails self-reminders	6.947	0.015

Table 3. Results from cluster analysis – Email habit variables which were significantly different between the two clusters.

Table 4 shows a descriptive interpretation of the differences between the two clusters. People in cluster 1 transfer future task/event information from email programs. They seem to have more control over their email behaviour, by not letting incoming messages interrupt other activities and by setting specific times to read messages. They tend not to use email to handle messages related to tasks, to-do's or events. These people are *the cleaners*. In contrast, people in cluster 2 treat email as a habitat and keep future task/event in email programs. They let incoming interrupt other activities and reading messages all the time. They also tend to use email to keep and handle messages related to tasks, to-do's or future events. These people are *the keepers*.

Email Habit Variables	The Cleaners (Cluster 1)	The Keepers (Cluster 2)
When email is read	read email at specific times	read email all the time
Email interrupts other tasks	email does NOT interrupt other tasks	email interrupts other tasks
Uses search in email	do NOT search in email	search in email
Keeps events in email	do NOT keep events	keep events
Keeps to-do's in email	do NOT keep to-do's	keep to-do's
Emails self-reminders	send self-reminding email messages	do NOT send self-reminding email messages

Table 4. Description of differences between cluster members.

T-tests were then used to assess how demographic, work habits (office desk organization), email experience and cognitive ability measures varied between the clusters. Significant differences were found for two variables: flexibility of closure ($p=.001$) and email experience ($p=.011$). No differences were found for other cognitive abilities, for work habits, or for gender.

People grouped in cluster 1 tended to have less email experience and were *low* on flexibility of closure, while people grouped in cluster 2 tended to have more email experience and were *high* on flexibility of closure.

DISCUSSION

In this section we discuss possible reasons for significant differences in values of flexibility of closure and email experience between the two clusters. Since flexibility of closure and email experience were not correlated with each other, we discuss their effects separately.

Effects of Flexibility of closure

Extracting information from the variety of email messages may be more demanding on people who possess low flexibility of closure. Such users transfer information out of email programs to different applications designed to handle specific information types, and tend to avoid keeping different kinds of information in one place (in email). For example, they may transfer meeting and appointment information to a day timer. Thus, the two groups of users characterized by different levels of flexibility of closure may benefit from quite different approaches to integration of software tools.

Effects of Email experience

Why people with more email experience were found in cluster 2 (the keepers)? Plausibly, those using email for a longer time, may be receiving more email messages and a wider variety of messages types. Thus, there is a higher probability that they read email messages more often and keep the messages with future tasks/events in email programs.

CONCLUSIONS AND FUTURE WORK

We found two groups of email users, *the cleaners* and *the keepers*, who employ two distinct email task management styles, 1) transferring future task/event information from email, and 2) keeping future task/event information in email. We found that the differences between these two user groups could be attributed to differences in flexibility of closure and in email experience. We have not found any correlation between email behaviour and gender or office desk neatness/messiness.

Email behaviour is affected by diverse factors, such as prior experience, cognitive style, or organizational role. The research study reported in this paper is the beginning of our inquiry into factors underlying choice of email strategies. We plan to conduct further studies with different population groups (reaching beyond the graduate student pool) and field studies, in which we will examine effects of external factors (e.g. organizational role of email users) and assess the relative importance of internal vs. external factors in influencing email strategies.

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