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**Visualisation of Entrenched User
Preferences**

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Visualisation of Entrenched User Preferences

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ABSTRACT

A group of 63 students has been studied during three years of editor use. We have examined their long term evolution and here report the variation with accumulated experience in preference between two file-write commands. It is clear that while about 75% of students fixed their preferences early, about 25% did not. We present a clear example of spontaneous, long-term changes by individuals which collectively fit a pattern.

Keywords

editors, long term field studies, temporal aspects of usability, visualisation of behaviour.

INTRODUCTION

It is commonly believed that users learn most of what they know and use in an interface early on, and that thereafter little adjustment takes place [1]. Furthermore, it is believed that any change is difficult to find and often subtle.

There are many reasons for change when it does occur, for instance changes in task, new training or knowledge, new releases of software. Recent research [7, 5] has investigated the possibility that temporal considerations may play a part. There has been very little work on the timing of long term change. We show graphically that the timings of individual user variations appear to fit a clear overall pattern. The results are believed to be the first of their type, and will help in the formulation of an agenda for research into temporal aspects of usability.

THE EXPERIMENT

The users were Computer Science undergraduates at Sydney University, enrolled for at least three consecutive years. In their first semester they were given some

instruction on the use of the sam [6] text editor in the Unix and Xwindows environment, thereafter they used sam on a discretionary basis.

All use was monitored at the command level, and summary invocation statistics were used in this paper. A previous article [4] details the methodology and the cohort of 63 users.

Throughout, the major tasks were the editing of program texts and documents. Program sizes increased over semesters, and the main programming language moved from Pascal to C. The detail of editing tasks was therefore probably shifting over time. Further, most users were under tight deadlines, so we do not expect too much playing [2].

The local version of sam had a menu on which there were two mouse commands to write out a file. Another (keyboard) method was taught but rarely used by students [3]. The students were free to select their own preferred method.

The first method, the Walk Through Menu Command (WT), involved clicking the file name displayed in the menu associated with button three of the mouse. This action generated a walk through menu to the right, from which the user selected "write".

The second method, the Click and Point Menu Command (CP), was invoked by selecting "write" from the same button three menu and then clicking in the window of the required file - not obvious without instruction.

THE VISUALISATION TECHNIQUE

Measurement of Time

The entire command log was taken to represent 100% of a person's experience with sam. The log was broken into 50 equal buckets of contiguous commands, the first corresponding to very early work, the last nearly three years later. So bucket 20 could have been at any time depending on individual work patterns. Thus the mark on the axis representing 50% of Accumulated Experience corresponds to bucket 25. The command count per bucket varies with user.

Preferences

The total use of CP and WT commands in each bucket was computed. The preference is calculated as:

$$P_{ub} = \frac{c_{ub} - w_{ub}}{c_{ub} + w_{ub}} * 100$$

where P_{ub} = the command preference by user u in bucket b . A value of 100 corresponds to exclusive use of CP, and likewise -100 for WT.

For each user the P_{ub} were smoothed using a three point moving average, with zero file-write buckets ignored.

User Numbers

To create an effective visualisation of activity over many users, it is critical to rank or order them in some way. For each user a Change Angle, ϕ_u is calculated, and the User Number is simply the ranking of each person by ϕ . Two quantities are computed: the mean of the P_{ub} for each u over all buckets, P_u ; and the Direction of Change, dc_u - the ratio of the mean preferences in buckets 26-50 and 1-25 respectively. Now we compute ϕ_u , an angular quantity in the interval $-\pi$ to $+\pi$, from $\phi_u = \arctan(\frac{P_u}{dc_u})$

RESULTS

The Figure shows a trench with two walls on either side. The near side of the picture is the most recent experience. Most users were stuck in the trench with WT preference - fitting perceived wisdom. Some users may have experimented with both methods for a time, but use decayed into almost total WT work. Arrow A indicates an example.

The right hand wall corresponds to some very high CP preference initially, but the decay into WT is inevitable, B. Some persisted with CP for about 80% of the time, C. A single user stayed exclusively with CP, D.

Arrow E shows a user mainly using WT until a dramatic conversion to CP after 15% of accumulated experience. At F other users switched later from WT to CP. The users at G may eventually lock onto CP - they appear to have become more unsettled with experience. (Space prohibits a better figure.)

Some users stayed with WT throughout, H.

CONCLUSIONS

The methods presented here do not predict what users do, they merely show what happened *post hoc*. In summary, E F and G switched from WT to CP with experience, B and C did the opposite. Thus complimentary behaviours are seen.

The underlying dynamics of why users changed need to be investigated. This could lead to methods to predict which users will adopt patterns E, F, G and C.

One important point does stand out. No user changed behaviours without having first experienced the new command, see E, F and G who changed and D and H who did not. If users are to be adaptive long term,

they may need to experience more than they can use immediately, presenting a paradox. We have short term utility of training versus long term self adaption.

Mixed preferences were not stable, all behaviour tending to one extreme or the other. However about 25% of the population did make binary switches mid-term.

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Preferred File-Write method over 3 years

