HCI Project report
on
Keep it real
(a online banking interface that mimics real life bill payment and transfers)

By
Vinayaka CA
UFID: 89179112
**INTRODUCTION:**

Studies have shown that people spend differently based on their payment channel. Particularly people usually overspend if the payment is through a credit card. This usually results in them paying too much in terms of interest and can eventually lead to greater financial problems too. Mental accounting is a method of people calculating their expenses and budgeting. Remembering their previous expenses plays an important role in the process of mental accounting.

Studies have also shown that many people are now using online banking solutions for their daily banking needs rather than visiting a banking hall [2]. Thus activities like bill payment, transfers among their accounts, transfers to friends etc are now being done online.

There is a major difference in the way people pay bills in real life and the way bill payment is made online in the current systems. In real life, people do count the money to get the correct amount and pay the bill. If the amount is large then the counting takes more time. Also people would make sure that they are not making any mistake when paying huge sums of money so they would count repeatedly just to be sure.

However when paying the bills online people usually just enter the amount in a text box and hit a button to pay the bills. This is usually very fast compared to the real life. Also the amount of time taken doesn't increase with the amount of bill and the errors due to counting are avoided. Although people would argue that this is convenient and fast, it is not really a good thing for their finances if they are not able to remember how much they are spending. The bill payment process in the online banking systems take so less time that there is not enough time for them to remember the bill amounts.

When people count and re-count the money, there is a greater chance that people remember those bill amounts. Through this project I try to develop an online banking interface where people would count the money like they do in real life to pay the bills. Thus the main focus of this interface is user satisfaction and to promote remembering of the bill amounts by users and not execution speed.

**BACKGROUND:**

For past expenses to systematically influence future spending, it requires a consumer to (a) pro-actively set budgets in different spending categories, (b) keep track of expenses and assign them to the relevant categories, and (c) maintain a running total of cumulative spending and hence available income in each category.

Four streams of literature suggest that consumers do not accurately recall past expenses. First, a considerable body of evidence shows that while consumers might be able to recall items they recently purchased, many consumers are unable to correctly recall the price paid (e.g., Dickson and Sawyer 1990; Helgeson and Beatty 1987). Second, work in the area of family budgeting and finances (e.g., Pankow 1991; Zelizer 1994) suggests that a typical consumer has a clear idea of how much money she has in her bank accounts (as well as available resources for discretionary spending) usually at only one time in the month, typically around payday. As she incurs a number of expenses over the coming days and uses a variety of payment mechanisms, it becomes relatively difficult for her to maintain an updated total of cumulative spending and available money. Third, some expenses might be small enough that the consumer does not even notice them and is simply not motivated to keep track of them (Gourville 1998; Thaler 1999). Fourth, research in the area of dynamic decision making shows that
individuals are not very sensitive to changes in quantities unless those changes alter the level of some salient variable (Sterman 1989).

In his paper [1] the author shows that the Past expenses have been shown to influence future spending behavior by depleting available budgets. However, a prerequisite for this relationship is the accurate recall of past payments and the experiencing of the full aversive impact associated with them. The use of different payment mechanisms influences both these factors and hence moderates the effects of past payments on future spending. Specifically, past payments strongly reduce purchase intention when the payment mechanism requires the consumer to write down the amount paid (rehearsal) and when the consumer’s wealth is depleted immediately rather than with a delay (immediacy). He also shows that the rehearsal of the final price will improve the memory for past expenses. Consequently, past expenses will play a greater role in influencing future purchase decisions when paid for by payment mechanisms that require consumers to write down (and rehearse) the final price paid.

This project tries to extend the basic idea presented in [1] to the online banking channel by requiring the user to count the money he is spending before actually paying the bill. Thus as seen in [1] the user should be able to remember the amount of money he spent and consequently be able to make future purchase decisions according to his financial plans.

**INTERFACE DESIGN:**

The interface was developed using the adobe CS3 suite. It used the actionscript 3.0 code. The interface is supposed to aid people remember their expenses and it achieves this by forcing the users to count the currency notes before paying the bill.

A number of guidelines were followed for designing the interface:

1. Use bigger fonts for clearer display of information.
2. Use good contrast in the display of elements in the interface for clearer display of information.
3. Every use action results in some change in the interface - color change of buttons when the mouse hovers on it, the note gets enlarged when the user tries to drag it.
4. Audio feedback for all the user actions – button clicks, transfer done, error in counting etc.
5. Consistent grammar and layout for all the text displayed.
6. All the real life currency notes are used in the interface to give a real life feeling to the user.

One deficiency in the interface currently developed is that it doesn't take care of the decimal part of the bills. However the solution to this problem is trivial – adding support to the coins in the interface and code can be done easily. Since the aim of this study is only to prove a concept, this part was left out in the interface, also the study didn't involve any such decimal amounts so it didn't affect the study.

Another problem with the interface developed is that for large amounts of money it takes a lot of time to count and can frustrate the user. However the solution to this problem is trivial – if the interface provides a grouping of currency denominations (like grouping 10 100s to make up 1000, 100 100s to make up a 10,000 etc). Since the aim of this study is only to prove a concept, this part was left out in the interface, also the study didn't involve any such large amounts so it didn't affect the study.
Another banking application was developed that mimics the exact interface of the Bank of America online banking interface for bill payment. This application was used in the Task 2 of the study.

For the purpose of the study a “create scenario” button is placed at the top. Users are expected to use this button to create a new scenario.

**User Study Design:**

**Hypothesis:** With a banking interface that mimics real life interaction for bill payments, account transfers etc. people remember the bill amounts better.

Having this hypothesis, the study is conducted among 30 participants. The participants in the study are in the age group 20 – 45. Hypothesis guessing is eliminated by diverting the user’s attention to the images of the currency notes and their animation. All the users had used Internet banking and in-fact for 65% of people it was the primary banking channel.

**Study Procedure:** The study was conducted at the CIRCA lab. The participants for the study were the students of UF who came to the computer lab for using Internet. The ones who participated in the study volunteered for it out of their own willingness. The participants were made to sign a Informed consent before they started the study. A general overview of the study is given to the user including information like there are 2 tasks in the study - one uses a drag and drop approach for bill payment, one uses a normal banking application for bill payment, there would be a video demonstration about how to perform the task before each task.

Before each task detailed information about the task were presented to the user and also a link to the video demonstration is provided. It was also noted that most people watched the video demonstration.

In the task 1, the users had to do 4 simple subtasks, the “create scenario” button had to be used to create these scenarios. The scenarios included paying 2 credit card bills and to do 2 money transfers. To avoid drawing wrong conclusions, the bill amounts were chosen purposely so that they are not that easy to remember. The numbers chosen were – 539, 473, 128, 251. It could be noted that although it took a longer than usual time to pay the bills in this task, the participants felt it was a fun interface, some even felt like it was a card game like solitaire. Some users also expressed that they felt like they were really spending money. Once the user finished the task 1, a link to the instructions page to task 2 is provided.

In the task 2, the users had to do 4 simple subtasks, the “create scenario” button had to be used to create these scenarios. The scenarios included paying 2 credit card bills and to do 2 money transfers. To avoid drawing wrong conclusions, the bill amounts were chosen purposely so that they are not that easy to remember. The numbers chosen were – 391, 731, 253, 171.

Once the participant has finished the task 2, he is directed to the page with survey link. The survey asks the participant about the bill amounts in each tasks. Also a survey about the user's banking habits is taken.
DATA ANALYSIS:
Null hypothesis: Assume that people remember the bill amounts better if they used the normal banking interface rather than when they used the drag-drop interface.

A graph of all the user's performances in drag-drop versus normal banking interface is presented below:

Here is the data for exact match among the 4 bill amounts for both tasks

<table>
<thead>
<tr>
<th>Participants</th>
<th>P1</th>
<th>P2</th>
<th>P3</th>
<th>P4</th>
<th>P5</th>
<th>P6</th>
<th>P7</th>
<th>P8</th>
<th>P9</th>
<th>P10</th>
<th>P11</th>
<th>P12</th>
<th>P13</th>
<th>P14</th>
<th>P15</th>
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<tbody>
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<td>2</td>
<td>0</td>
<td>0</td>
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<td>2</td>
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<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
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<tr>
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<tbody>
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<td>Drag-Drop</td>
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<td>1</td>
<td>1</td>
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<tr>
<td>Normal</td>
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<thead>
<tr>
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<th>MEAN</th>
<th>VARP</th>
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<td>Drag-Drop</td>
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<tr>
<td>Normal</td>
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<td>0.2</td>
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</table>

T-Value = 3.22
Since the The P-value related to this is close to 98% I say that the t-value is large enough to be significant, i can conclude that the difference between the means for the two tests is significant and also that this data proves the hypothesis - With a banking interface that mimics real life interaction for bill payments, account transfers etc. people remember the bill amounts better.

A closer look at the wrong bill amounts entered by users reveals that users remembered the numbers partially like if the number is 539 they would have entered 500 (this is probably due to the reason that user remembers counting 5 100$ notes) Thus it will be interesting to look at a graph of the numbers considered correct if only the first digit matches. Following is a graph of the same.
It could also be noted that some users did remember the correct bill amount, but entered it with wrong bill.

**Conclusions:**

From the study and analysis of data it can be seen that people can remember the bill amounts better when they use an interface that mimics a real life counting of cash to pay the bills rather than the current systems of entering a number in a text box. However the interface developed was not able to make the user remember all the bill amounts, thus there is an opportunity for such an interface. In the survey about the participant's banking habits, when asked what were their mostly used banking services, the results showed that balance inquiry was their highest (84%) followed by funds transfer (77%) followed by bill payment (75%). This re-confirms the assumptions made and also underscores the importance of this project.

**Future Work:**

In the usability survey when the users were asked to rate both the interfaces based on how much they felt like they were spending real money, 70% of people rated the drag-drop interface to be close to real-life. Thus it would be a good future study to conduct whether people would spend less if they had to use the drag-drop interface described here for their banking for some time.

Now that a lot of commercial multi-touch interfaces are available, soon it will be available to the general public at affordable prices. A drag-drop interface described here could be the closest to reality banking application.

**References:**

The Drag and Drop interface for bill pay and account transfers.

The Normal Banking Interface for bill payment and transfers.
A snap of a user trying out Task 1 drag and drop interface @ CIRCA lab