



## CSE 440 Spring 2011 Paper Prototype, Testing, and Refinement

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### **Problem and Solution Overview**

Money is stored and spent in a variety of ways: it is kept in wallets, stored in checking accounts, retrieved with debit cards or checks, and borrowed using credit cards. However, people are often limited to certain methods of payment at certain times. When individuals pay each other, they must either use cash (which many people do not carry) or checks (which must be deposited at a bank before the money can be accessed). Often, people do not have the right amount of cash or checks with them when they need to pay others, which results in tedious bookkeeping of debts and awkward social situations where people have to ask each other to be paid back. We propose a smartphone application called Kibisis, which addresses these problems by allowing users to 1) access all their methods of payment in one place and 2) make immediate and direct payments to other people. Additionally, Kibisis helps users keep track of their monetary transactions with others, so that they can make informed decisions about who to exchange money with.

### **Paper Prototype Description**

Kibisis is being designed to be an application for mobile phones with touch screens, so for our paper prototype, we drew each of Kibisis' "screens" on small, rectangular note cards. For now, our screen designs assume that Kibisis will be developed for the iPhone.

To operate the prototype, users simply touch the paper the same way they would a touch screen; if there is a button on the screen, the users can touch it to activate it. If users want to type, they can simply write on the screen using a pencil. Our prototype was fixed-path, so our screens (for the most part) only had a few possible states they could be in. To transition between these states, we cut out small rectangles from paper with text written on them and covered the parts of the screen we needed to change using masking tape (such as in the "Manage Debts" screen below).

← Back MARK: MANAGE DEBTS

---

You owe MARK

	Description	Amount
-	rent	\$ 200

ADD NEW

---

MARK OWES YOU

	Description	Amount
-	electric	\$33.47

ADD NEW

Kibisis first displays a log-in screen when it is started. Once the user logs in, a main screen with several menu options appears. These options reflect how our application is organized.

kibisis

Single Pay	Money Pool	Accounts
Contacts	Options	Log Out

NET AMNT YOU OWE OTHERS  
\$0

NET AMNT OTHERS OWE YOU  
\$0

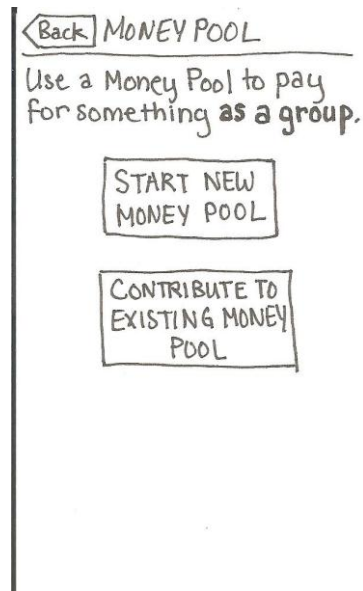
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○ Notifications

The major pieces of functionality for Kibisis are the “Single Pay,” “Money Pool,” and “Contacts” options. “Single Pay” allows a user to transfer monetary funds to another Kibisis user, and “Money Pool” allows Kibisis users to pay for something together. The “Contacts” option allows the user to keep track of debts and loans related to their contacts. A secondary but significant piece of functionality is the “Accounts” option. Here, a user can link their existing bank accounts and credit/debit cards to Kibisis. Though this would only ever be done a few times, the ability for a user to access all of their forms of payment in one place is critical to Kibisis’ utility.

We tried to make sure the method of interaction for each of Kibisis’ screens was as consistent as possible. For example, Kibisis mainly uses buttons to navigate between different menu options.

As seen in the main screen, there are many buttons that allow the user to reach different sections of Kibisis. After picking one of these options, the screens will continue allowing the user to make navigation choices using buttons (as in the “Money Pool” screen displayed below).



As part of this, we also made sure screens with similar functionality look and act similarly. For example, the process for “Single Pay” and the process for contributing to a “Money Pool” are very similar because they both involve transfer of money; therefore, we made the screens for both of these step-by-step processes basically identical.

## Testing Method

### Participants

We wanted our study participants to be representative of our target audience. Since college students are familiar with touch screen phones and exchange money with others often, we chose to approach students in various places around campus. We also made sure that our users were not engineering students.

Our participants were:

- a female student tabling for Taiwan Overseas Student Association at Red Square,
- a male student watching baseball videos in By George before class, and
- a male student eating a tuna lunch in By George.

### Environment

We did our first user test at a table outside in Red Square. Here, we had some trouble conducting our study due to the wind. The participant had to periodically replace fallen posters and flyers, as well as keep the canopy from blowing away. At one point, our prototype blew away in the wind, so that we had to pause to pick up our materials. Regardless of these distractions, however, the participant seemed to be able to return to the tasks with little difficulty.

We found our second and third participants in By George cafe. Our second participant was waiting to go to class, which began in 30 minutes. However, he did not rush through the study. Our third participant was eating lunch during the study but was not noticeably distracted by this.

## **Tasks**

### *Task 1 - Adding a debt to a friend*

Your roommate Mark just paid rent for the both of you. The total amount of rent was \$400, and you and Mark split rent evenly. However, Mark owes you \$33.47 for the electricity bill that you paid. Add two separate notes in Kibisis to record how much money Mark owes you, and how much money you owe Mark.

### *Task 2 - Settle the debts between you and a friend*

One of Kibisis' purposes is to allow users to directly exchange money with each other. As part of this, Kibisis is able to track any debts that come out of these transactions. Mark is at school, but you want to send him the money you owe him before you forget. Make a single payment that settles any past debts between you and Mark.

### *Task 3 - Pay for a restaurant bill with your friends*

You are at a restaurant with a few friends. When you finish your dinner, the waiter informs you that they do not split the tab; only one person can make a payment. Use Kibisis to pay for the bill together under one tab.

## **Procedure**

Because our group members had conflicting schedules, we had to rotate some roles for the studies. For the first two studies, we had one notetaker, one facilitator, and one computer; for the last study, the computer and facilitator role had to be played by the same person.

Upon approaching our subjects, we asked if they wished to participate in a 15-20 minute study. If they accepted, the facilitator would explain what the study was for, how to operate the paper prototype, and other details about their participation (see Appendix A). The facilitator then handed the participants each of the three tasks, written on separate pieces of paper, in sequence. As participants interacted with the prototype, the computer transitioned between the paper screens. In the end, we conducted a short exit interview asking the participant about their overall impressions of Kibisis and what they liked and didn't like about the interface.

## **Test Measures**

The data we recorded was qualitative rather than quantitative. While participants performed each task, we noted both the problems and the successes participants had while using our interface. We recorded their thoughts as their thought aloud, as well as their responses to questions during the task (i.e. "What did you expect to happen?"). Finally, we also recorded participants' overall impressions of Kibisis, and what they pointed out as the most liked and most disliked parts of the interface.

## Testing Results

Our three participants had similar problems and comments when working through the tasks. The following are our major observations (see Appendices B and C for the raw data).

### **It is difficult to figure out how to add records about debts**

The debt managing task (Task 1) took testers the longest to figure out. Participant 1 was the only tester who went straight to “Contacts” to view debt information about Mark; however, at this screen, she expected a button titled something like “Add a debt” but only found buttons titled “See details” and “Settle debt”. So, she ended up exploring the other options on the main menu screen, including “Accounts,” “Money Pool,” and “Single Payment,” and “Options.” After this first test, we changed the “See details” button to “Manage debts” in an attempt to make the function of the button more obvious; however, even after this change, our other participants had trouble completing Task 1, because it was not obvious that they had to go to “Contacts” to do the task.

*Severity: 4.* Our main menu and the layout of “Contacts” severely contradicted users’ preconceptions of what the debt managing task should look like in Kibisis.

### **The “Settle Debts” button is in the right place**

Perhaps because the users had already acquainted themselves with the “Contacts” interface and how to manage debts by the time they reached this task, participants were able to complete the debt settling task (Task 2) most quickly and with little confusion.

*Severity: 0.* In future iterations of the design, we should keep in mind that the placement and wording of this button was very successful.

### **Users easily understood the concept of a “Money Pool”**

Though we expected that the idea of visually combining a payment with people through a “Money Pool” would be a tough concept to understand, all of our participants understood the concept immediately and completed the combined payment task (Task 3) with little trouble. We then asked them what they would do after they had received the money from the Money Pool into their account, and they all understood that the next course of action would be to pay the restaurant bill (using their credit card or otherwise) because they had been paid in advance through Kibisis by their friends.

*Severity: 0.* Though we had our doubts about how intuitive the Money Pool concept would be, as it was something that we had not seen in other technologies, participants did not find the “Money Pool” feature confusing and actually tended to point it out as a feature they liked.

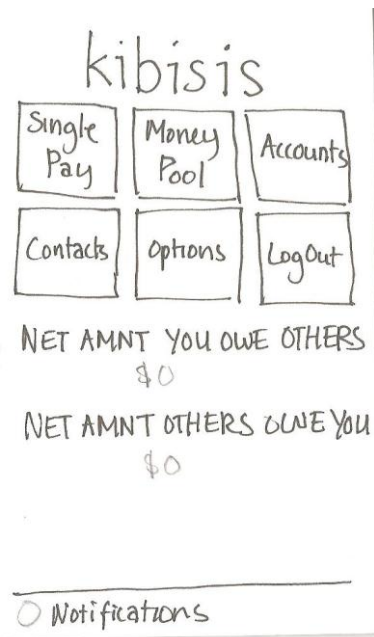
Overall, participants told us that they thought Kibisis’ interface made sense after they had tried doing the tasks once; they mentioned that “after you use [Kibisis] a few times, you’d understand it.” In other words, participants understood the features Kibisis offered and were able to navigate the interface, but they were sometimes unable to find what they were looking for because of the wording and placement of buttons.

## Interface Revisions

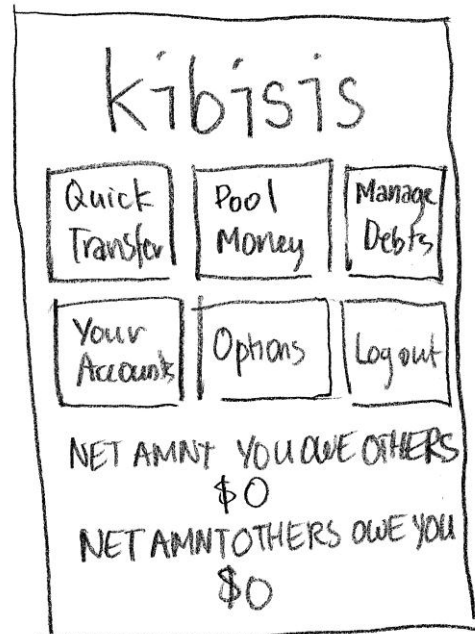
Based on the above findings, we made several changes to the design of our interface.

### Renamed Main Menu buttons

Users had a hard time understanding that they were supposed to use the “Contacts” menu to complete the debt recording task (Task 1). Therefore, we decided to relabel the “Contacts” button as “Manage Debts.” We also renamed the “Accounts” button to “Your Accounts” to be consistent with the wording on sites with financial data, such as Mint. Furthermore, we renamed “Single Pay” as “Quick Transfer,” and renamed “Money Pool” as “Pool Money.” The button labels should now better reflect the actual tasks users might want to do.



Old Main Menu



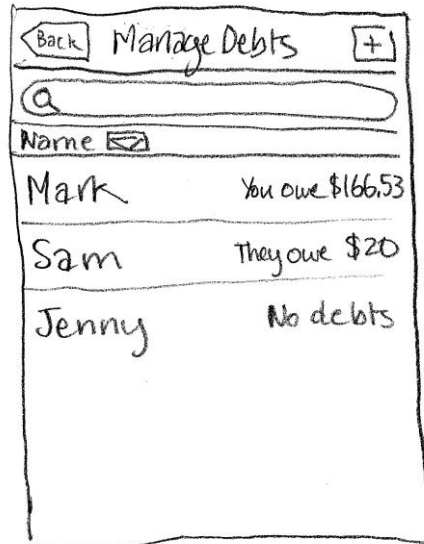
New Main Menu

### Reorganized Contacts screen (now called Manage Debts)

Our original interface design divided the “Contacts” list into two tabs: a tab containing the list of people that owed you money, and a tab containing the list of people that you owe money to. However, we realized that this would make it hard for users to find certain contacts because contact listings would move back and forth between the tabs; furthermore, it was not clear where contacts that had zero debt would be listed. So, we decided to list all contacts on one screen.



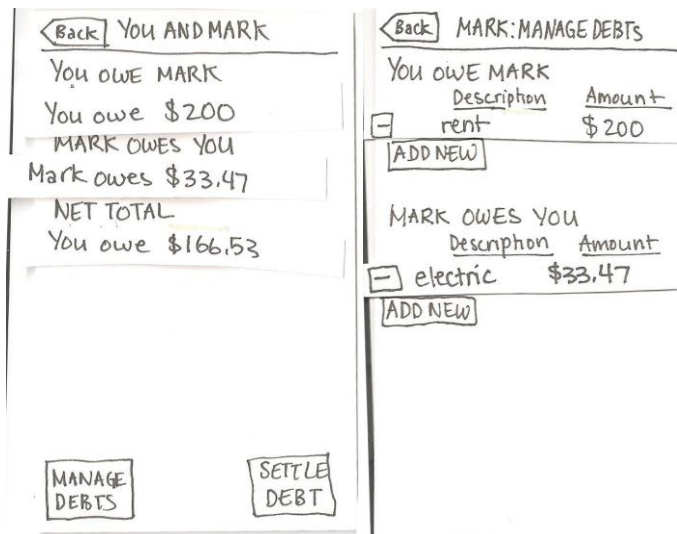
Old Contact List



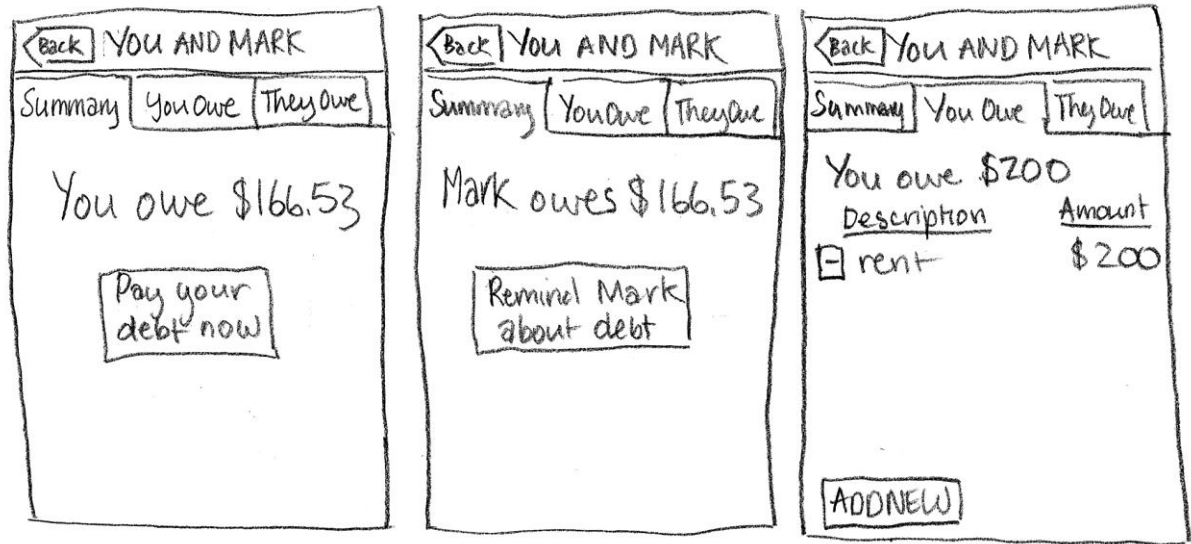
New Manage Debts screen

### Used tabs to organize contact details

To manage debts in our original design, the user first had to click on a name in the contact list and then, from the summary page that appears, click the "See Details" button to get to a screen where they can add entries about new debts related to that contact. For the new design, we combined the summary screen with the details screen to reduce the number of clicks needed to get to the debt managing function, thus increasing its visibility.



Old contact details and debt managing screens



New contact details and debt managing screens

## Summary Discussion and Lessons Learned

The goal of this phase of our project was to make educated and meaningful improvements to our initial user interface design. We created our prototype interface based on our previous exploration of designs and developed scenarios we felt reflected the most common and interesting tasks users would perform using Kibisis. We then used these to run user tests with three participants to find weaknesses in the interface.

The testing process revealed that though users were able to easily navigate through menus and understand the features Kibisis offered, the wordings and placement of some buttons contradicted users' preconceptions of how to perform certain tasks. We were able to identify which elements of the interface caused confusion and were able to ask users for ideas on how to make the function of those elements more clear.

There were several things we would have liked to learn more about during our tests. One thing we did not ask users about was how they felt about the privacy and security issues surrounding the idea of mobile money transfer, as we had a very task-oriented approach to our user studies. Furthermore, we did not test any payment tasks; though this would undoubtedly be a common class of tasks performed with Kibisis, we figured that it was something most people are already familiar with (as in when buying items online). Lastly, without any more user tests, we were unable to confirm if our design improvements actually solved the problems they were trying to address.

What we learned from the process of paper prototype testing will help us make Kibisis a superior product for our intended users. Understanding early in the design process how people expected Kibisis to work made a direct impact on our interface design and proved to be an essential step towards creating an effective and understandable interface.



# Appendices

## Appendix A: User Testing Script

Participant #:

Date:

### Introduction

Thank you for taking the time to participate in the Kibisis usability study. We're in the early phases of designing the interface for Kibisis. As you interact with it to perform the tasks we give you, we learn how you expect it to work, and which features are difficult to understand.

Remember that we are testing the interface on you, not testing you on the interface. If you can't figure something out, don't blame yourself. We are not testing your abilities and anything you do is never a mistake. The choices you make, the problems you encounter, and the things you say provide very valuable feedback to us and allow us to make recommendations that will improve the quality of our interface.

You are under no obligation to complete the session. If you feel uncomfortable in any way, please let us know. If you find any of the tasks in this study too difficult to complete, please feel free to tell us and we can move on to the next task. Additionally, please do not feel like you have to complete the task quickly – take all the time you need.

During this session you will be performing three short tasks using the prototype in front of you. This prototype is basically a simulation of how our project's interface will work. Since Kibisis will be an application for a mobile phone with a touchscreen, just touch on the paper the way you would touch a touchscreen. If you need to type anything, just use a pencil to write in what you would type. We will be manually changing the interface based on what you do, by acting as the "computer."

You might have questions from time to time and you should feel free to ask them. Because we don't want to guide you through using the interface, we may not always respond, but it is fine to ask. Please remember to **talk out loud** as you attempt each task. At the end of each task, I may ask you to answer a few questions. Feel free to add any comments and thoughts you have and please do not censor yourself. What you have to say is crucial so that we can improve the design of our interface.

### *Task 1 - Adding a debt to a friend*

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### *Task 2 - Settle the debts between you and a friend*

One of Kibisis' purposes is to allow users to directly exchange money with each other. As part of this, Kibisis is able to track any debts that come out of these transactions. Mark is at school, but

you want to send him the money you owe him before you forget. Make a single payment that settles any past debts between you and Mark.

*Task 3 - Pay for a restaurant bill with your friends*

You are at a restaurant with a few friends. When you finish your dinner, the waiter informs you that they do not split the tab; only one person can make a payment. Use Kibisis to pay for the bill together under one tab.

Thank you very much!

You have completed the three tasks. Again, we appreciate your contribution to our usability study and your information will be extremely helpful for our further improvements on the interface design.

The data we collect from you is completely confidential.

## Appendix B: Raw notes from user studies

user # 1

T1 stayed a bit on main screen  
went to contacts  
clicked Mark  
OMG WIND  
couldn't find a way to add debt from contact Mark  
clicked "Mark over you" instead of "see details"  
able to find "owe you"  
clicked accounts, then went back - knew was using  
closed money pool, then went back  
why is there a "minus" by debit card? deleted debit card  
trying to find place to add debit about notes about what  
I owe, not intuitive from going to contacts which is about  
other ppl.  
eventually went to see details on Mark contacts  
add new (but obvious from sticky notes? y/c we're moving it  
around)  
added amount & description well

T2

clicked contacts  
ppl paying around everywhere  
found single pay. from there it's easy

T3

found money pool immediately  
but found it searching for stuff earlier  
money pool in title, still! AAAAHHH  
"do I want new or contribute to existing?" tax under  
receive money entry  
finished  
ran one received money, with pay

\* found tapping thing is very convenient and  
cool  
working confusing, but easy to figure out after  
a couple times

ASK PPL WHAT THEY EXPECTED TO

# nadine

user #2

- T1
- clicked options
  - button for "notes" - % you're making two notes in kibiro, says  
extra
  - checked money pool
  - single pay

# nadine

- charlie suggested contacts
- tried to find easy way to just add notes
- couldn't see to click mark
- decided to just click to add mind-calculated net to mark
- went to settle debt - didn't see manage debt
- couldn't see where to enter information - clicked numbers rather than "manage debt"
- after add debt found, easy - to add for me and him

- T2
- went smoothly into settling debt, clicked through w/ no difficulties or questions

- T3
- clicked money pool immediately  
started new money pool on his own  
pp? understood money pool concept well

- T4
- takes a while to figure out - "same with anything new."

nadine  
unnatural to go to contacts - but does make sense after information or help button in corner to help get started

shortcut to manage debts  
likes the idea a lot, daisy has this problem too, with friends and managing debts



## MAKE NOTES

- net amount?
- what happens if someone doesn't owe you anything?
- Show up on both tabs? or on another one?
- changed "see details" to "manage debts"

## USER #3

- [1] • go to single pay - out of given options, the other menu options don't look like they speak to intention
    - money pool - might be it, still not sure - not sure what stuff meant so, canceled.
    - contacts, clicked mark. "manage debts would be paying them"?
    - was gonna put subtracted debt - "but maybe it will do that for me": filled in entries.
  - [2] • settle debt: easy, next, next, next
  - [3] • single pay - then money pool, start new
    - easily understood
  - [4] most confusing thing: 6 options, named different things. contacts too close to phone contacts, more about "settling debts between people"
- after you use it a couple times, you'd understand it
- not so many confirmation notes

HAPPEN

## Transcript of notes

*User 1*

Task 1

- stayed a bit on the first screen, reading
- went to contacts
- clicked Mark's name
- OMG WIND
- couldn't find a way to add debt from looking at Mark's contact page
- clicked "Mark owes you" instead of "See details" button at the bottom
- eventually went back to main screen, then clicked "Accounts," immediately knew what was wrong, went back
- clicked "Money Pool," then went back
- "Why is there a minus sign by the debit card?" she clicked it and deleted her debit card information from Kibisis
- "I'm trying to find a place to add detail about myself about what I owe" -- for her, not intuitive to go first to Contacts, which is about other people
- eventually went to "See Details" on Mark's contact page
- eventually went to "Add new." But was it obvious that this was the right direction now because we were scrambling around for the sticky notes?
- Added amount and description easily -- knew what those fields were for

Task 2

- started from the main page. clicked "Contacts."
- was able to "Settle Debt" using the button, and clicked through easily

Task 3

- found Money Pool immediately and knew what it was for -- probably because she had already seen it earlier?
- "Should I start a new pool or contribute to one?" an unclear task? how can we make it clearer without calling it "Money Pool"?
- money pool was still in the title of the task! AAHHH
- understood the concept of retrieving money from her friends, so that she could pay for the bill all by herself

General Notes

- friend tapping thing is very convenient and cool
- wording was confusing, but easy to figure out after a couple times -- "it just takes a little time to learn"

*Revisions/Thoughts*

"Net amount" on the Contacts page? Is it the net amount someone owes you after all your debts between you are settled, or is it the net amount that they owe you, and the net amount

that you owe them? What happens when you don't owe anyone anything -- do they show up on both tabs as "\$0", or on another tab for people you are "balanced" with? Also, we changed "See details" on individual contacts page to "Manage Debt"

### *User 2*

#### Task 1

- clicked "options," which we have no screen for
- was trying to look for a button to "make notes," since this is what our task asked him to do. "make 2 notes." he was looking for some sort of "notes" button
- checked Money Pool
- checked Single Pay
- Charlie suggested Contacts
- didn't realize that he could click Mark's name to view details about him, just like in iPhone interface
- went to settle debt -- didn't see "Manage Debt" button
- couldn't see where to enter information -- clicked numbers, rather than "Manage Debt"
- after "add debt" found, was easy -- he added only one note (right? ugh suddenly I don't remember) rather than making 2 separate notes and letting Kibisis calculate the difference for him

#### Task 2

- went smoothly into settling debt, clicked through without any difficulties or questions.

#### Task 3

- clicked Money Pool immediately
- started new Money Pool on his own
- understood money pool concept well

#### General Notes

- takes a while to figure out -- "it's like with anything really, but once you've used it it's easy"
- thought at first that it was unnatural to go through contacts to find your debts with people, but then decided that it does make sense, once you know it's there
- suggested an information or "help" button in the corner to help people get started
- wanted a shortcut to manage debts, instead of having to go through to contacts, and then finding someone, and then clicking "Manage Debts" there
- likes the general idea a lot, always has a problem with friends and managing debts

### *User 3*

#### Task 1

- went to single pay -- out of the given menu options, nothing else looks like they speak to his intention of making a new note

- went to money pool -- but was unsure about what it was -- kept clicking through until the "waiting to receive money screen," then went back
- found contacts. clicked Mark. "I don't know what to do here. Would 'Manage Debts' be actually paying it?"
- was gonna put in the net debt after calculating it in his mind -- "But maybe this will do it for me."
- successfully added two entries

#### Task 2

- settled debt: easy. just kept clicking next, next, next

#### Task 3

- went to single pay
- then went to money pool, started a new one easily understood the concept of receiving money from people

#### General notes

- most confusing thing: 6 options on the main screen, named things that the guy doesn't really understand. maybe rephrase them? i.e. instead of Contacts being "Contacts," make it more specific to the idea that it's "people that owe you something, people that you owe," or more specific to "settling debts between people"
- "after you use it a couple times, you'd understand it"
- maybe not so many confirmation menus for when you're paying someone?



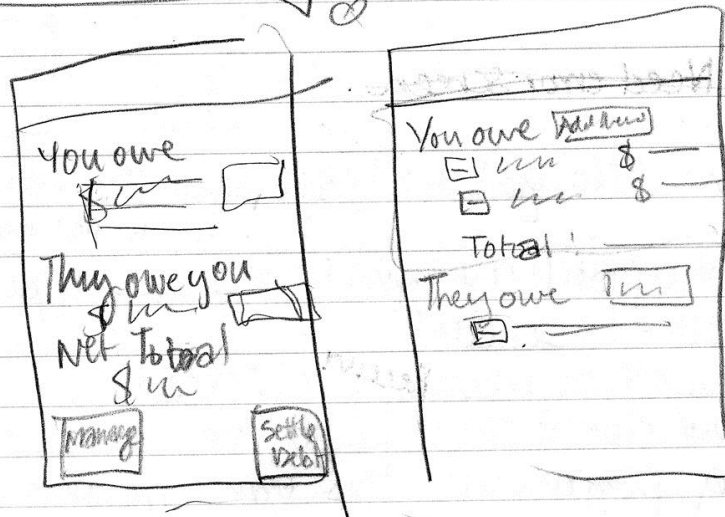
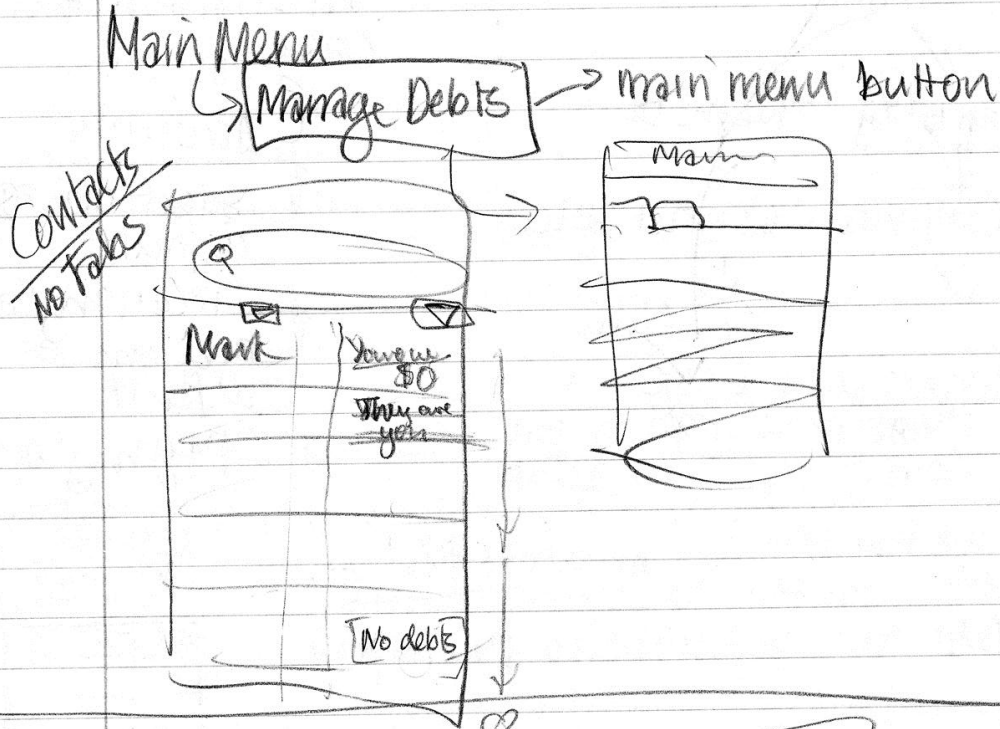
## Appendix C: Log of critical incidents during user studies

Incident	Description	Severity
Was unable to add debt through contacts list	<p>User 1: user found details about Mark's debt by using the "Contacts" page like they were supposed to, but didn't know that by clicking "See Details" they were able to manage debt details. They went back to the main screen looking for something else.</p> <p>User 2: We changed the Contacts page so the "See details" button became the "Manage debts" button, but user was still having trouble completing the task. The user was trying to look for a button to "make notes," since this is what our task asked him to do specifically. He was looking for some sort of "notes" button. Also, user didn't realize that clicking the name of a contact would load information about that contact</p> <p>User 3: first went to "Single Pay" because "out of the given menu options, nothing else looks like it will do what I want it to do," which is make a new note. Once the user reached contacts, he was able to see details about Mark, but then said, "I don't know what to do here. Would 'Manage Debts' be actually paying it?"</p>	4
Was able to easily settle debt between them and a contact	Users were able to figure out that the "Settle Debt" button would transfer money to the intended recipient, and had no questions	0
Was able to easily create and use a Money Pool	Users found "Money Pool" immediately and knew what it was for -- probably because they had all already seen it earlier when searching for how to do Task 1?	0
Thought that the level of difficulty they had solving the tasks was acceptable	<p>User 1: wording was confusing, but easy to figure out after a couple times -- "it just takes a little time to learn"</p> <p>User 2: thought at first that it was unnatural to go through contacts to find your debts with people, but then decided that it does make sense, once you know it's there. Suggested a help or "How to get started" button visible on the main screen</p> <p>User 3: "after you use it a couple times, you'd understand it"</p>	1

Appendix D: Notes from interface revision meeting

5/13 User Study  
Contacts

- what to do when Mark Net Amt \$0
  - ↳ They show on both?
  - ↳ Separate Tab.



You owe \$0  
• 5 for food   
• 5 for stuff

You owe  
\$166.38  
~~Settle debt~~

Pay off that debt

Remind this person about their debt

You owe \$0

You owe

You owe  
You owe \$33.67  
Electron \$3  
Address

tabs

Your Account

Quickly Transfer

Pool Money

Pay someone  
Receive