Money Talks: Tracking Personal Finances

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ABSTRACT

How do people keep track of their money? In this paper we present a preliminary scoping study of how 14 individuals in the San Francisco Bay Area earn, save, spend and understand money and their personal and family finances. We describe the practices we developed for exploring the sensitive topic of money, and then discuss three sets of findings. The first is the emotional component of the relationship people have with their finances. Second, we discuss the tools and processes people used to keep track of their financial situation. Finally we discuss how people account for the unknown and unpredictable nature of the future through their financial decisions. We conclude by discussing the future of studies of money and finance in HCI, and reflect on the opportunities for improving tools to aid people in managing and planning their finances.

Author Keywords

Finance; money; banking; interviews

ACM Classification Keywords

Human-centered computing~Field studies

INTRODUCTION

In her CHI 2010 keynote address, Genevieve Bell tasked the research community to attend more to the important and messy domains that drive technology use: politics, religion, sex and sports [1]. With this paper, we add finances to that critical list of domains, where real people use a wide array of real technologies with real opportunities for HCI. Our personal finances — how much money we have, how much money we owe, and our expectations about how those two values will change over time — affect the vast majority of decisions we make on a daily basis. From day to day purchases, to larger milestones such as planning for buying a house, retiring, death, or having a baby, questions of personal finance loom large. As such, our money and finances, and how we manage them, are often a reflection of broader concepts such as our predictions about the future, our understanding of money and financial systems, and our relationships with others. There are a wide variety of tools, online and off, to help people manage their finances: credit cards, wallets, pension plans, financial advisors, bank statements, and piggy banks, not to mention websites and software like Mint.com, Manilla, and Quicken. Our personal finances are above all complicated, heterogeneous, and individually and culturally specific.

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PREVIOUS WORK

Collins et al. [3] performed an in-depth study of the finances of slum-dwellers and impoverished villagers in Bangladesh, India and South Africa. They describe the wide variety of financial tools the global poor use to manage their money, including financial instruments that those of us in the affluent West might expect — savings accounts, formal and informal loans — but also practices like leaving cash with friends for safekeeping and to reduce the temptation to spend it. We weren't able to replicate their multi-visit method, but we were inspired by their thoroughness to ensure, for example, we asked about the full range of sources of income, not just formal jobs. By contrast, Stocks et al. looked at middle-class couples in three countries (the US, Spain and Sweden) to compare different attitudes to sharing finances, and differing prevalence of approaches to sharing incomes and expenses, demonstrating the importance of cultural factors in financial decisions [11]. They included their interviewing protocol in their book which was an excellent resource for developing our own, and something we deliberately replicated in [5]. Perhaps the closest work to our own came from Vines et al. [12,13] who studied the financial practices of the 'older old', those aged over 80. Vines et al. took a longitudinal look at finances, asking older adults about their financial history throughout their entire lives. By contrast, our study looked at a wider range of ages, 26-69, and concentrated on capturing a snapshot of their current practices and understanding of their money and finances. As well as these contemporary accounts, we also looked at historical and sociological studies, such as Zelizer's studies of how people divide their money into different 'buckets' for different purposes [14]. In addition to academic literature, we personally used tools like Mint, FinanceWorks and Quicken, and read popular press books on financial management [6, 10], as well as a myriad of popular press articles and magazines. This helped us develop an understanding of existing assumptions, systems and practices around personal finance in the United States.

STUDY & PARTICIPANTS

This is a preliminary study to explore and scope how people understand their personal finances. We sent a screener

Age	Pseudonym (Number of Children)
60-69	Doug+ (4), Anthony (0)
50-59	Joelle+ (2), Bonnie (2)
40-49	Jane+ (3), Zoe+ (2), Ragnar+ (0)
30-39	Charlotte (3), Veronica+ (2), Arturo+ (0), Olivia (0), Rachel (0)
20-29	Steve+ (1), Allen+ (0)

survey to potential participants in the San Francisco Bay Area through a distribution list from a previous study of Internet usage, initially recruited through Craigslist.

Table 1: Participants. A + indicates finances shared with a partner; numbers in parentheses are numbers of children.

he survey asked for some demographic information, location, and a number of questions about finance practices: whether they had stocks, bonds, a pension plan, and so on; the number of stock trades they initiated a year (for primary screening); and whether they had a professional financial advisor. We were not interested in financial professionals or people who had made a systematic study of finances, but rather everyday individuals and consumers. As such, we deliberately excluded people who made more than fifteen stock trades a year from our study. We did not aim for statistical representation for the sake of generalizability, but we did strive for general diversity, particularly around age, income and assets, job, and the presence of children and partners. Incomes ranged from approximately $18,000 a year (Steve, an unemployed cashier) to $150,000 a year, (Ragnar, an IT manager); for comparison, median household income in the Bay Area is $80,000[1]. Our participants' investable assets ranged from less than $1000 (Steve) to over $1M (Doug, Joelle, Anthony). Doug and Anthony were retired; Bonnie was anticipating retiring this year. Joelle, Zoe and Veronica worked part time, relying mainly on their husbands' income. All others were in full-time employment; Charlotte was working four jobs, and Olivia and Rachel were both successfully self-employed. Most of our participants lived in San Francisco, Oakland, Richmond and other areas in the immediate Bay Area; Charlotte lived in a more rural area, approximately two hours drive from the Bay Area.

METHOD

The in-home interviews were conducted during February and March of 2013 by two of the authors. The primary interviewer ran the interviews, while the secondary interviewer took notes on a laptop with an external microphone running Pearnote, a note-taking program that ties written notes to audio recordings. All interviews were also additionally audio recorded for backup. We had "ride-alongs" for three interviews: two program managers from Yahoo Finance and another author.

Interviews were semi-structured and averaged 110 minutes. We began by asking the names, ages, jobs, and financial relationships of all the people in the household. We then asked the participant to draw a map of their finances, a technique often used in cultural probes [4]. Participants were also asked to draw a calendar of their monthly financial events (bill paying, pay days, etc.). We then asked how they learned about finances, how they know who to trust, and what they learned about finances from their parents. Next, participants were asked to look at a group of sixteen index cards with words representing life events on them: college, debt/bankruptcy, unexpected windfall, unexpected expense, employment, move, family change, retire, travel, birth, divorce, marriage, death, medical bills, buy/sell home, graduate. We asked them to select an event that they were currently experiencing and discuss the financial impact. They were then invited to pick a second card representing an event that might be looming in the future and tell us about its effect. Some participants proceeded to work through every card that had relevance to them, although this was not required. We asked for the last time the participant made a significant purchase and then something they considered an investment, and the tools they used to make those decisions. We then asked "What's the one thing you'd least like someone to learn about your personal finances?"

We asked each participant to remove all the financial items from their purse or wallet and to tell us about each item, a practice we drew from previous wallet studies [8]. We anonymized these items with strategically located post-its, and then photographed the results. From there, we asked for a guided tour of the areas of their house where they conducted any financial management tasks, inquired about any resources outside the home (tax preparer, safe deposit box), and ended with looking at the tools they used on their computer and mobile devices to help them manage their money, a variant of the Technology Tour method [1].

In the wrap-up section, we asked participants to imagine an unexpected windfall. We first asked about a modest but significant amount, $20,000: enough to likely be an exception from their everyday finances, but not enough to make a major life change. We then asked the question again, changing the amount to their annual income. This pair of questions was taken from Stocks et al.'s [11] interview protocol. We built on Stocks' protocol by also asking a second set of questions that were the inverse of the first set: how would they react to a) an unexpected expense of $20,000 and b) an expense equal to their annual income? We then asked what three wishes they had about their financial management tools. We ended with the wrap up questions of "What else should we have asked you about

1. PK. Bay Area Income Calculator. (Accessed 9/2013). http://dqydj.net/revised-bay-area-income-and-home-calculator/

your financial management?" and "Is there anything else you'd like to ask us or tell us?" Each participant was given a $150 gift card for his or her time.

Transcripts were externally transcribed, and photographs were further anonymized where necessary. We took raw transcripts of interviews, and multiple authors tagged and highlighted potential themes in each transcript. We extracted those themes, represented as approximately 500+ post-its, supported by sketches and printed and annotated photographs. We then performed a process of iterative aggregation, permutation and summarization to extract a list of 14 meta-themes and opportunities for design, which we focused and summarized as we wrote iterations of the paper. Throughout the process, we repeatedly returned to the raw data in the form of the transcripts, field notes, photographs and audio recordings.

In the next section of this paper, we will present three sets of results from our fieldwork: not orthogonal categories, but intersecting characterizations of experiences. First, we discuss the emotional components of financial decision-making. We then discuss the digital and physical tools used by our participants to track their finances, and then show the ways our participants plan for the unknown.

EMOTIONAL REASONS FOR FINANCIAL DECISIONS

People make decisions about their finances that do not necessarily appear rational *when evaluated from a purely financial viewpoint*. People make financial decisions based on their emotional, historical, familial and personal backgrounds in addition to financial considerations. *Homo economicus* — the notion that people make choices based on rational economic self-interest has long been declared dead [9]; our point in this section is to recognize the enormous number of factors our interviewees are juggling when they make financial decisions. They take into account their knowledge and experiences, the assets and options available to them, the things they have learned from their families or from classes or from the press, their hopes and worries and dreams about the future. In this section, we hope to explicate some of these decisions and the ways in which financial matters are omnipresent in everyday life.

Finances & Worries

Allen was 27 years old and had recently graduated from law school. He had been offered a full scholarship at a medium-ranked law school, but instead had chosen to enroll at a highly ranked law school in the Bay Area. To pay for his law degree, he had taken on roughly $125,000 in debt. He and his wife had decided to live off her salary as an educator and put all of his salary from his job as an attorney towards paying off his student debt as fast as possible. When we asked him to draw a map of his finances, this debt loomed large (Figure 1). His financial life was dominated by this debt, and it was a source of ongoing worry for him that shaped his perception of himself and the role he played in social relationships:

> *It is dominating, and it becomes sort of annoying. I think it annoys my wife because she wants to sort of be able to live and celebrate, enjoy, and it is sort of always looming, and she gets a little worried. She is like, "Is this how it's going to be when you get a house and we have a mortgage? Are you always going to be thinking about that?" I tell her, of course, no way, but I don't know. I don't know.*

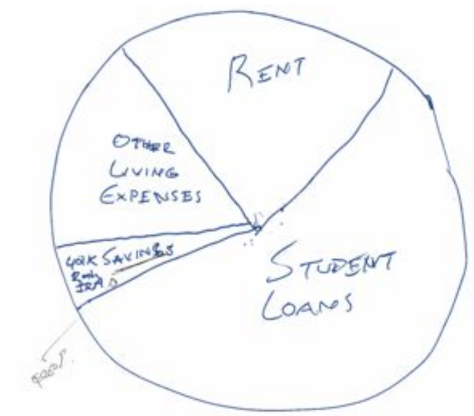

Figure 1: When asked to draw a map of his finances, Allen drew a pie chart of his expenses, dominated by his student loans.

Charlotte, 34 years old, was living with her three children, and was also uncomfortable about her financial situation. The map she drew (Figure 2) and the language she used reflected her discomfort in her financial situation:

> *Honestly since I lost my job last year, I would have to say it feels like a big giant storm cloud. It's always hovering there. It's angry all the time. And the jobs…would be kinda like stick figures that are holding an umbrella. Sometimes the umbrella is like really flimsy because the job is not so great or it doesn't pay so great.*

Figure 2: Charlotte's map of her finances. This map depicts Charlotte's financial situation as a storm from which her jobs and future plans offer protection.

Charlotte lost a job working at a hotel last June, and since then has been scraping to make ends meet. She now holds four jobs: a security guard at a department store, stocking shelves at Walmart, a night auditor at a hotel, and delivering a weekly newspaper. Three months before our interview, she was driving her car to deliver newspapers with her fiancée sitting in the passenger seat when he was shot and killed. This clearly emotionally devastating event made even harder for her to continue to return to this job to make ends meet. For Charlotte, financial decisions are very clearly related to her emotional situation. In the wake of her fiancee's death she is experiencing both financial and emotional stresses.

Families, Coupons and Personal Practices

Much like Charlotte, Bonnie's experiences were also strongly shaped by her personal history. However, Bonnie's experiences reflected a relational and multigenerational emphasis on the value of money and possessions. Bonnie was a 57 year old government employee, living alone. Her parents had both survived the Holocaust and immigrated to the United States with no money. Her father eventually became a shoe repairman with a "tiny little shop". She described herself as a thrifty person.

> *What I learned is to be thrifty. I don't know, I always was a good saver…I'm just a saver because you never know. There's not going to be anybody to take care of me in my old age. That's the reality.*

Influenced, in part, by experiences with her family, she took pride in her frugality and ability to save money:

> *I don't spend. During the day at work, it has to be really serious that I will go and buy a cup of coffee, spend $1.25...I was one of those serial coupon shoppers: my bill…was $126, and after coupons it was $24.*

Figure 3: Bonnie's wallet showed evidence of her frugality. The wallet contained a number of rain checks for low cost items, some of which were about a year old.

Bonnie's wallet contained several rain checks: coupons from stores issued when advertised specials are unavailable (Figure 3). One was for 4 packs of corned beef at $1.98/lb, issued 11 months ago; another was for 5 lbs. of apples at $0.39/lb. She took pride and delight in these opportunities for frugality. But Bonnie's choices about car ownership gave us the deepest insights into her finances.

When her mother died in 1991, Bonnie found $15,000 in an envelope in her mother's house, which she used to buy a sports car, a 1985 Nissan 300ZX. (We note similarities here to practices noted in a similar generation interviewed in [12]). When we interviewed her in early 2013, she told us she was going to buy a Corvette when she retired, and when we asked what she would do if a genie gave her $70,000 she replied, without hesitation, that she'd buy a Corvette. At the end of the interview, we asked why she hadn't already bought a Corvette, as she clearly had enough money to do so in the bank.

> *Because I have a [Nissan] Z in the garage and I'm not going to put a Corvette on the street. A Corvette is always going to be garaged. I have already two cars; I can't have a third car. I don't want to get rid of the Z right now, because I like it so much, and it needs a paint job because it was totaled, almost totaled and they put a cheap paint job on…my dilemma is, do I want to put a good paint job and spend $3000 of what the car is worth or go to Miracle and put like a $1500 paint job on it and then get rid of it. That's why. I don't have the room.*

A 1985 Nissan 300ZX usually sells for around $5000, which suggests that a decision to spend $3000 — or even $1500 — giving it a new paint job is based on some factor other than optimizing financial gain. It seems clear this car has emotional value that exceeds its financial value.

Joelle, a 54-year-old ex-flight attendant, was relying primarily on her husband's income at a startup, with additional income from renting real estate and occasional side jobs. Like Bonnie, she used coupons extensively, but her self-characterization and experiences with coupons were very different to Bonnie.

Figure 4: Contents of Joelle's coupon wallet. Coupons in her wallet were primarily geared towards discretionary purchases.

Joelle had two wallets: one for her everyday financial objects, and one kept exclusively for coupons (Figure 4), which, when we interviewed her contained about twenty $5 coupons for Bed Bath & Beyond that she purchased for $5 on eBay, thirteen coupons for Macys, and miscellaneous coupons for greeting cards, beauty products and clothing. Her coupon use didn't reflect the same sense of frugality as Bonnie; her emphasis was more on saving money on discretionary spending instead of groceries. Joelle bought coupons in bulk, rather than saving rain checks. She would check online for coupons before leaving the house:

> *I don't go anywhere or out to dinner unless I go online to see if there's a coupon. And if there isn't, like Friday night, we still went. But…I checked. Just because there's always a deal to be had…Why pay more?*

Like Bonnie, Joelle also made investment decisions based on emotional grounds. About ten years ago, she and her husband decided to engage a professional financial advisor to manage their portfolio. She still feels some disappointment over that decision:

> *I always would buy things that I liked, and I wish I had kept it instead of being talked into giving up control of these stocks and having them go into a portfolio*

Although professionals manage most of her money, Joelle keeps two stocks separate from her larger, professionally managed portfolio. The few stocks that Joelle keeps discrete include a tranche of stock from a grandmother, as well as a few that she purchased herself and that she feels have particular significance to her. Unlike the rest of her portfolio, she retains an emotional tie to these stocks.

MANAGING POTS OF MONEY

In a largely historical analysis, Zelizer pointed out that money in a household is rarely treated as homogenous [14]. Based on both origin (wages, investments, gambling, windfalls, inheritance) and intended use (groceries, school fees, vacations, loans) people treat money differently. We found that people divided both assets and expenses up according to different intentions: money for the kids' college fund, a credit card kept for wedding expenses. We call these *pots of money*: siloed, separated allocations to which money could be added and removed.

Figure 5: Rachel's cards, labeled to distinguish between those for personal purchases and those for her business.

Small Businesses

We saw many examples of this in our study, but perhaps the two strongest examples were two small business owners, Rachel and Olivia. Rachel was 36 years old and runs a professional photography business, primarily wedding photography. When we looked at her wallet, we noticed that she had a large number of bankcards, all from the same bank. As we took the cards out of the wallet, things became clearer. Rachel kept a strong separation between her business and personal accounts, paying herself a salary and with very explicit distinctions between which equipment, accounts and work were for her personal life and which were for work: each of her bank cards was labeled as either "Personal" or "Photo." (Figure 5)

Figure 6: Rachel's calendar, showing the integration of her professional and personal lives.

These two domains came together in her appointment book (Figure 6), in which her personal and professional lives were fully integrated, with tasks like "Elaine + Matt Gallery" and "Marsella + Ryan DVD" alongside "make Bangs appointment" and "Watch Oscars w/Jen". Olivia also ran a single proprietorship, but her practices were notably different from Rachel's. She was 24 years old, and her income came from a combination of attending births to support the mother as a professional doula, teaching childbirth education classes, and working as an independent contractor for researchers. She had a separate account for her doula and childbirth education work, against which she would write off business expenses and deposit certain payments. However, although she told us that she had been told in a business class "*do not use your business as a personal piggy bank*", Olivia's work was significantly less financially distinct from her personal life than Rachel's. This was due to the cash nature of many but not all of her transactions. In the United States, some (but not many) childbirth-related expenses are eligible for payment using pre-tax dollars through a system called a Health Spending Account. For these payments, therefore, Olivia needed to be able to receive documented transactions that would then be reported to tax authorities. But many clients paid cash:

> *It depends on what they want but most of my clients just pay me at the end of the day and the week, cash.*

In addition to income, Olivia's expenses were also not well tracked. We asked if she had a place she kept track of business expenses:

> *I thought I did but…I have it in the back of my mind, I have like advertising numbers and they always ask you ... like I've talked with people on Facebook and all this stuff and trying to determine what my budget would be, how much I'm willing to spend for my advertising, so I think about it in bits and pieces, but I don't think I really have the time to sit down and get the overall picture.*

Other people we interviewed would not describe themselves as small business owners, but still had multiple, and sometimes complicated, income streams. For example, Bonnie described several side businesses she operated at her job. These businesses often involved getting a product cheaply, like cereal or free coffee cards, and reselling them to people she knew:

> *I'd go and I'd get 20 coupons for $1. I'd buy 20 boxes of cereal, wouldn't cost me anything, in fact they paid me a penny. I'd schlep it to work and…one of the managers in personnel, she'd get all of her people [to buy them].*

Though these side businesses did generate some money for Bonnie, they were meaningful beyond a bit of extra income. She was proud of her involvement in them and in her ability to coordinate and carry out the operations necessary to make these micro-entrepreneur events happen, perhaps as a reaction to her family's meager beginnings and reliance on her father's small business for their livelihood. As such, the high value she places on these side businesses is disproportionate to the low importance assigned to this work by existing digital systems, in which this type of irregular, hard to assign, financial information would be entered as some miscellaneous form of additional income.

Managing Other People's Money

However, outside of small businesses, the most common distinctions we saw between different pots of money that people managed were between people's own money, and other people's money. Nearly everyone we talked to managed someone else's money, to some degree. Jane, 42, for example, told us she tracked the finances for her immediate family: her family and two children living at home, as well as her mother and an older daughter living with a boyfriend. Doug, 69, had most of his money in a trust, but shared a joint bank account with his girlfriend, 67, specifically so that she would have money in the event of his death. He also "helped her a little with rent", as well as managing her own rental property. Zoe, 47, helped manage her mother's assets, including several pieces of real estate and around $1M in mutual funds, which involved monthly visits to a financial advisor to check on the status of the mutual funds. Joelle, 54, told us she checked both her and her two collegiate children's balances and credit card transactions nearly daily. In each of these cases, boundaries between these different accounts were more or less porous at different times and in different situations. When we asked Zoe what she would do if she needed $20,000, she told us she would borrow it from her mother. Zoe's husband handled the mortgage and utility payments; Zoe's mother purchased many of the groceries of for the house; Zoe handled much of her mothers' investments and finances. For Zoe, clearly, finances are more communal than many financial systems may assume.

TOOLS & TRACKING

Financial Touch

The most common tool that people used to keep track of the overall state of their finances was nothing at all. (Contrast this to the British 80-somethings studied in [12]: "All of the participants had kept a careful check on their finances throughout their lives.") People's sense of their finances came from occasional glimpses at the complex whole, rather than a concerted and coherent overview of their entire situation as one might prepare when asking for a bank loan, or as presented by Mint.com. For example, 8 of the 14 people we interviewed told us they checked their checking account balance daily or several times a week. They did this in several ways: some used their mobile phones, although it was slightly more common to log onto the bank website through their computer. What people would describe as *"checking [my] balance"* was generally slightly more involved that just looking at a single number: people would review the last couple of transactions, looking for anomalies or things that stood out from their normal expectations. This behavior was a kind of *financial touch*, following the notion of *social touch* [7]. We saw this kind of financial interaction – transitory, ephemeral and reassuring – in a variety of ways across different systems.

Paper systems

One example of financial touch came from Doug, a retired real estate agent with $1.2M in assets, mainly municipal bonds. He had invested in municipal bonds for nearly 50 years, and had a system for keeping track of when they made interest payments and for how much. He had a card for each bond (Figure 7), listing details about the bond and the date that each payment was made.

Figure 7: Doug holding the stack of index cards he uses to keep track of payments from his municipal bond portfolio.

Doug had around forty cards, and would leaf through them once a month to match the payments shown on his statement to the cards. In nearly fifty years, he had caught precisely one mistake in his bonds. While not diminishing the real value of ensuring that the bonds functioned as required, this suggests that this practice had more to do with financial touch than active management.

Other people also kept track of their finances using paper-based tools. Charlotte, for example, had a notebook in which she kept a monthly record of her expenses; essentially a paper-based spreadsheet (Figure 8).

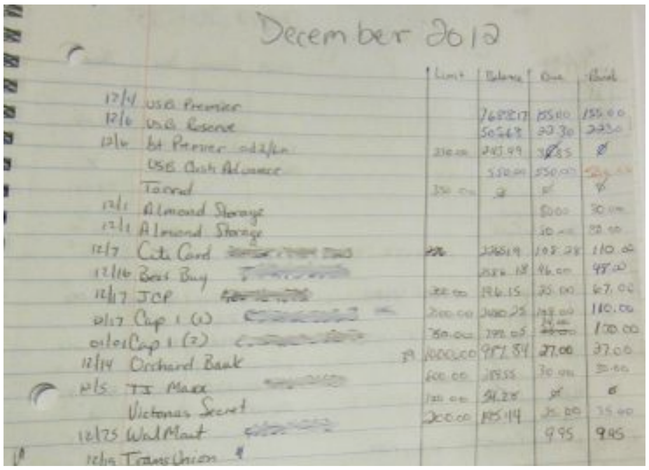

Figure 8: Charlotte's account notebook: a paper spreadsheet.

Others used paper-based systems that were less similar to digital systems. For example, while Veronica's husband earned most of the family's money, Veronica handled most of the family's finances primarily using her datebook. We observed annotations for gas bills, for car repairs, paying off credit cards and for her Pilates studio. Amounts were recorded both retroactively *"Books $150"* and in advance "*I got to go buy a $20 present for some kid I don't even know because there are 30 kids in the preschool*." While there were few chances for aggregation or a top-down view of her finances, Veronica was able to use her calendar along with checking her balance "*every day or so*" to ensure that she had enough money to pay bills and the like. (Figure 9)

Figure 9: Veronica's datebook with financial information.

As we saw earlier, in , Rachel also had a datebook, but her datebook took on a different function to Veronica's. While Rachel recorded some financial data in the databook — our own visit was labeled as [Institution Name] Study $150 — the majority of her financial information was tracked through an elaborate paper-based system for keeping track of her photography clients, shown in Figure 10.

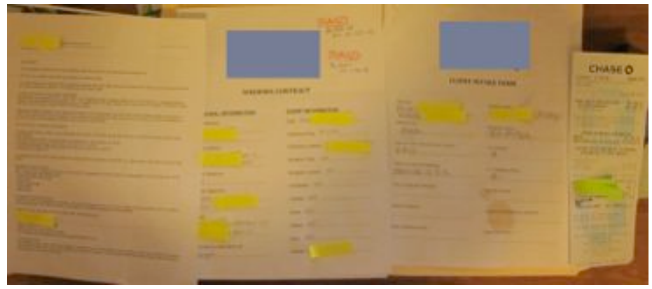

Figure 10: Content for one of Rachel's client's folders: emails, contract, intake form and paper record of a check deposit.

Each client was assigned a labeled folder, which would contain a client intake form with basic contact and date information, a signed wedding contract detailing payment plans, and, as each payment check came in, the physical receipt from the ATM including a small image of the check, providing tangible evidence of payment. This process, combined with a system for tracking a given client's status by storing the folders in different locations, meant that Rachel was able to track her income in a coherent and robust manner. However, her expenses were not as clearly organized, and she had recently started working with a tax preparer. This introduced its own overhead, however, as she prepared a year's worth of business expenses in one go:

> *I did so much work. I literally worked on it almost every day for a week and a half.*

Rachel's experience emphasized a repeated trend we saw in these interviews: the systems we saw were often optimized for or focused on a particular aspect of people's financial existence which dominated their financial practices: income, stock portfolio, expenses. None of the systems we saw provided a complete understanding of participant's overall finance situation.

Digital systems

Perhaps surprisingly, nobody we interviewed was a regular user of any financial aggregation system, like Mint.com, Quicken, or FinanceWorks. Steve and Ragnar had both previously used Mint, but had given it up: Ragnar because of a combination of fears about security and inconvenience of entering new accounts, and Steve due to frustration with the automatic categorization of expenses. Some people had developed their own spreadsheets. Arturo, for example, had a very simple monthly spreadsheet with a column for income from his wages and the rent his housemate paid, and one for expenses: mortgage, electricity, cell phone, credit cards, student loan and, the month we interviewed him, a deposit for his upcoming wedding. By comparison, Jane's spreadsheet was an elaborate creation, several hundred lines long. Columns in a color-coded header bar included typical financial information: due date, monthly payment, balance owed, and so on.

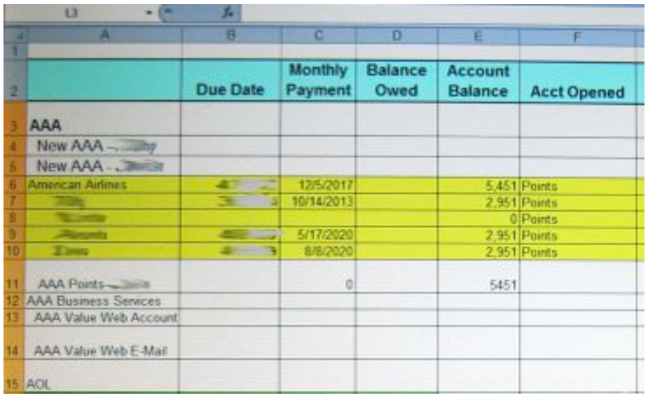

Figure 11: Jane's financial spreadsheet, showing a set of columns not matched by the actual use in the rows.

But when we looked closer at the spreadsheet, only data in a few of the rows in the spreadsheet corresponded to the column headings: as shown in Figure 11, the spreadsheet was much more of a dumping ground for heterogeneous data, containing URLs, usernames, passwords, account numbers, PINs and associated email addresses for emergency car services, frequent flier accounts, credit cards, ATM cards, insurance information — the unstructured digital clutter of modern life. Whether opportunistic, like Veronica's datebook cum financial tracker, or complex and optimistic, as Jane's master spreadsheet, participants put thought and effort into creating a system that made sense in their personal financial world while balancing out competing demands on their time.

HIGHER POWERS: ACCOUNTING FOR THE UNKNOWN

The amount of information that people can have about their finances is in some ways quite limited, as people's financial assets are a hedge bet against the inherently unknowable future. We also found that people did not have access to reliable information about finances that had a direct effect.

Credit Scores

In the United States, a key measure of your financial health is your credit score. Credit scores are determined by three credit agencies that take into account various aspects of your financial history: credit cards, mortgages, car payments, and so on. A high credit score can mean the ability to buy a house, to get a mortgage, and even to rent a house or car. While the overall influences on a credit score are generally known, the details of how to affect your credit score are actively obscured by rating agencies as a trade secret. For example, Veronica told us that she had several credit cards that she never used:

> *You're never supposed to close them, because closing them looks worse than having an open balance on a credit score.*

Of all our participants, Charlotte was the most aware of her credit score, and paid $10 to have a monthly report including all three agencies' credit scores emailed to her, something she described as "One of my best investments over the last three years." She told us:

> *It took me three years to get my credit up to 700. When I lost my job, it's dropped about 100 points. So far, up until last month because I lost the job June 1st, up until last month I have kept everything from being negative on my credit report. It's just dropped because of maxing things out and whatnot, you know what I mean?*

Charlotte timed payments for her credit cards carefully to avoid negatively impacting her credit report:

> *If I'm paying it late, I usually try to remember to put the date that I paid it because for example it was due on the 17th, I made sure I paid it before the 30th day so it wouldn't hurt my credit report.*

Charlotte had developed specialized knowledge about credit scores, but for many people this information was obscure and unclear. She became a source of expertise for friends seeking to improve their own credit scores:

> *I've had people come to me and ask me how did you do this? How did you fix your credit so fast? What did you do? I've given them advice and what not. I feel like I've got information that maybe other people won't be able to figure out on their own but then at the same time I'm always willing to figure out more.*

Fear and the Future

Credit scores were only one place where people had incomplete information. In addition, there were broader concerns about planning for the future. Several of our participants talked about the future with trepidation, and described how thinking about the future led to feelings of fear and helplessness. Rachel, the photographer, told us:

> *For the professional group that I am in, a lot of us are fearful. We don't trust our skills. We choose to ignore the reality of this really is a business and we really do need to pay attention to these things. A lot of people, they're artists and so it's not their strong suit. They decide to put their head in the sand and just focus on making art and not so much on the finance stuff. Twenty years later they're like "How come I have no money and no assets and have my things for retirement?"*

Rachel felt like she was at a disadvantage compared to others who had more background in thinking about finances. We asked her to tell us more about her feelings about the future:

> *There is a lot of fear about my own lack of knowledge and lack of skill and managing my own finances. It's more comfortable to ignore it or safe to ignore it than it is for me to head on and say I don't know what I'm doing, let me figure it out. What can happen is you take the time to look at it and one of the two things happen is*

you're going to realize you have no idea, you don't even understand which is scary or you do understand and then what you see is frightening. I think people just don't want to deal with it so they don't.

Some of our participants, like Arturo, were motivated to take action as a result of financial fears.

I think I have a fear that I won't have enough money when I retire. So, I think that's one of the reasons why I do certain things that I do, like just investing more now so that it will hopefully just kind of exponentially grow over the next twenty, thirty years to make it easier when I do retire. I think part of it is that my mom didn't really prepare for retirement. My grandparents didn't prepare for retirement, so I think them not doing it just kind of provoked me to look more into it and be more prepared for it.

By contrast, Olivia showed us a folder on her Google Drive labeled *Wedding 2013*, which contained a series of files about planning her wedding: pictures of an engagement ring, a cake, even a document labeled "Wedding Budget."

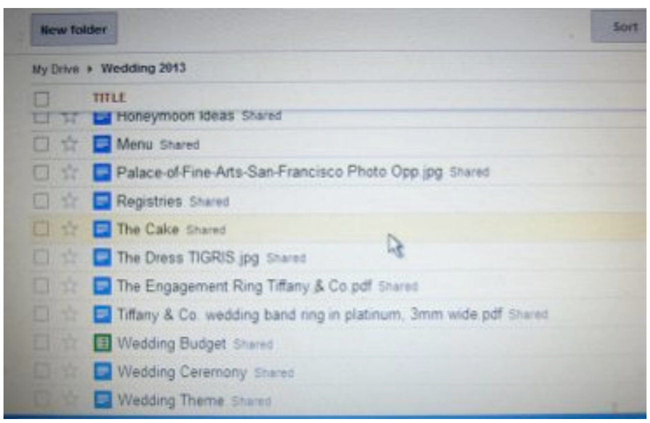

Figure 12: Olivia's Wedding 2013 folder on her Google Drive, despite an early-stage relationship with her boyfriend.

This was particularly striking, because when we asked her at the beginning of the interview if she had a partner she replied "Yes…sort of." But when we followed up to ask if she had a partner she shared finances with, she said no. When she showed us the folder, we asked if she had talked to her partner about her wedding plans:

No.. sort of. I mean we're talking about the possibilities like, you really don't want kids? I don't think so. Kids are just one of those things… like they're expensive…

Still, Olivia told us she would "*love to get married*";

I've been seeing a guy but we haven't really got to a point where we're sharing finances yet but I would love to consider marriage…I like the wedding of my dreams and a holiday…it's sad. I'm already thinking about trying to save for a marriage.

For Olivia, thoughts of her wedding and marriage brought both sadness and joy. On one hand, she felt the tension and a missing element in her current relationship, but on the other she derived some pleasure and perhaps comfort in planning this future wedding — even if it seemed unlikely to happen with her current boyfriend.

IMPLICATIONS FOR FINANCIAL RESEARCH & DESIGN

In the United States, and in many other countries, discussion of finances can be socially awkward. It is seen as impolite or inappropriate for friends or relatives to ask questions about, say, salaries, account balances, or housing costs. This meant, for example, we were unable to initially try out our questionnaire on friends and colleagues, normally a best practice in qualitative HCI; even discussing existing tools like Mint meant talking generalities rather than jointly looking at one of our own accounts on the screen. However, it impelled us to include aspects of our semi-structured interview that were particularly useful in encouraging our interviewees to open up to us. For example, we believe that beginning with the open-ended request to "Draw a map of your finances," something that people couldn't get wrong, went a long way towards dispelling any sense that we might be there to judge or grade their finances or financial knowledge. The use of the index cards containing a wide variety of life events *with financial consequences* gave us richer insights into people's experiences than we would have received from focusing only on financial events themselves.

In addition, this work has implications for the design of systems to aid people in financial management. For the people we interviewed, existing systems for integrating all aspects of your financial life *were not being used*. This suggests opportunities, both for rethinking those systems, but also for the design of novel financial interaction experiences. These could be modeled off the financial touch of balance checking that was the sole regular financial check-in of so many of our interviewees: perhaps augmenting that balance checking with simple prompts for good financial practices, such as visualizing the longer-term impacts of not paying off credit cards. The variety of physical systems we encountered suggests potential for tangible solutions, such as smart credit or ATM cards which actively display realtime balances. Alternatively, we see opportunities to design financial experiences that take into account emotional and personal circumstances that surround and influence financial decisions, rather than building tools that assume a sole focus on maximizing financial gain. For example, this might involve allowing users to categorize pots of money as earmarked for 'sentimental reasons', for 'rainy days', for 'learning and making mistakes', rather than assumptions of design for maximizing financial gain. The observation that so many people are handling other people's money also has strong implications for the design and redesign of financial tools, as well as encouraging more granular notions of privacy, perhaps with access to balances and payment history separated from viewing individual purchases to allow mothers like Joelle to feel connected to their children while maintaining privacy. For example, privacy aware brokerage of financial information could allow parents access to an overview without providing detail of a collegiate child's transactions, or allowing an app access only to car- and gas-related credit card charges while blocking access to all others. Finally, we found a wide variety of unknowns in financial affairs. Credit agencies' decisions to keep their algorithms for credit scores a secret reduces people's ability to understand and improve their own rating. Retirement decisions are shrouded in complexity, jargon and arbitrary rules. For some of our participants, feelings of fear and concern lead to well-thought-out reactions, but for many these emotions led to inaction. This suggests opportunities for structuring defaults to improve decisions, not just through technology, but also through public policy.

LIMITATIONS

We did not set out to fully characterize all of personal finance, but rather to provide sensitivities and insights into the range of issues that emerge around such a complicated topic, and as such we are subject to certain limitations. We are looking at financial practices within a limited population, residents of the San Francisco Bay Area, who are likely not typical for the United States, let alone the rest of the world. There are topics we didn't have space to cover in this paper: topics like trust, keeping secrets, financial education. Furthermore, these results are based off a single interview, with neither the deep understanding that comes from prolonged ethnographic exposure nor the scientific rigor that comes from extensive quantitative results.

CONCLUSION

In this paper, we have contributed to the development of the study of financial affairs in HCI. Our intent was not to solve the problem of personal finances in the field, but rather to demonstrate the complexity and richness in this domain. We have shown three areas where that richness and complexity becomes apparent. The first is in the emotional components of the decisions that people make around money. We show that while some of decisions people make may appear irrational when considered from a purely financial perspective, they reflect a larger sense of personal history and values. This suggests a challenge for ongoing work in this field: integrating existing thoughts and work on values and experience into the domain of finance. The second area we discussed was the wide variety of tools that people developed and used to keep track of at least some portion of their financial lives, pointing to opportunities to design financial systems that fit in with existing everyday practices rather than idealized notions of optimizing financial affairs. Finally, we looked at the ways people engage with the unknown and unpredictable parts of their financial existence: myths around credit scores, and ways in which people respond to the future. This suggests two directions for future work: the design of financial tools for better exploring and comparing possible futures, as well as the study of other questions of difficult to defined or know financial information: whom should one trust? What financial secrets do people hold from each other? How do we design for both deliberate and accidental unknowns? In so doing, we believe this work provides a solid foundation for work on financial HCI with significant implications for both improved financial tools and understanding, but also for other areas of the field concerned with how people think, feel and express themselves.

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