

Financial Literacy in China as an Innovation Opportunity

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Abstract. The purpose of the study was to get insights of the financial knowledge, behavior, and attitudes of the young generation of Chinese (Millennials or Little Emperors, i.e. born between 1980–1995), in order to find and exploit design opportunities to improve the financial wellbeing of our target group. Our paper presents an introduction to the research area, the current technological trends, the results of our initial study, and further directions both for research and design of solutions targeted at our tentative users. Our results suggest that there is a strong growth in smartphone adoption and a growing availability of mobile applications targeted at managing finances, and conducting payments. However, the young Chinese have a middle-to-low level of financial literacy, and mimic the conservative behavior of their parents and family, who prefer to hold cash (or gold) in favor of investment instruments. There is a number of design opportunities to leverage our insights to improve the financial health and wellbeing of our target user group presented in our work.

Keywords: Cross-cultural research · Cultural markers · Design patterns · Design philosophy · Design thinking · DUXU in developing countries · Emotion · Financial competence · Financial inclusion · Financial literacy · Future trends in DUXU · HCI · Innovation · Methodology · Mobile products/services · Motivation · Persuasion design · Semiotics · Service design · Sustainability · User-interface

1 Introduction

The purpose of the study was to get insights of the **financial knowledge, behavior, and attitudes** of the young generation of Chinese (Millennials or Little Emperors, i.e. born between 1980–1995), in order to find and exploit design opportunities to improve their financial wellbeing.

Our results from the above three areas were then compared with data gathered in the Czech Republic [9] to provide some initial hints about the level of financial literacy in our target group across cultures. The Czech Republic was chosen as an example of a developed OECD-member country, and because of the availability of the latest survey data (courtesy of the Czech ministry of finance, and the University of Economics in Prague). China represents a contrasting example of a developing country.

We assume that by comparing the level of financial literacy in different cultures with the tools and products available in each culture we could provide a better guidance for the improvement of the financial wellbeing. This paper shows an initial progress in this direction.

Our paper presents an introduction to the research area, the current technological trends, the results of our initial study, and further directions both for research and design of solutions targeted at our defined user group.

1.1 Financial Literacy

Financial literacy is defined as follows: “A combination of awareness, knowledge, skill, attitude and behavior necessary to make sound financial decisions and ultimately achieve individual financial wellbeing” [1].

By improving financial literacy, we can improve the overall financial wellbeing of users. [22] There is also a positive effect of financial inclusion in general: “Financial inclusion has been broadly recognized as critical in reducing poverty and achieving inclusive economic growth. (...) Studies show that when people participate in the financial system, they are better able to start and expand businesses, invest in education, manage risk, and absorb financial shocks. Access to accounts and to savings and payment mechanisms increases savings, empowers women, and boosts productive investment and consumption. Access to credit also has positive effects on consumption—as well as on employment status and income and on some aspects of mental health and outlook” [5, page 2].

We start with the following research problem: “In developing economies [such as China] 110 million adults with an account—5 percent of account holders—are savers but save only semiformally, by using a savings club or a person outside the family. Designing appropriate savings products tailored to their needs could encourage these account holders to use their account for saving” [5, page 68].

We seek to address the problem by leveraging positive behavior modification techniques. Our rationale is based on previous research highlighting, that “a large proportion of individuals who could benefit from initiatives designed to change their behaviour. In almost every country surveyed, at least 3 in 10 respondents exhibited fewer than 6 of the 9 positive behaviours discussed” [1, page 12].

Positively modifying user’s behavior is especially important, because people are exposed to the cognitive biases of instant gratification and loss aversion, which prevents them from saving, or saving enough for their needs. Also, millennials in particular face problems of low financial literacy, and of not having enough money to save.

The research also has cross-cultural potential, in that financial attitudes are cultural markers that can be studied in different cultural and linguistic environments (e.g., the factor of time and its representation in grammar). Thanks to global surveys on financial literacy (e.g. by the World Bank, OECD, various financial institutions) we can quickly compare the data across cultures.

Financial Capability. People are, in the words of influential behavioral economist Dan Ariely, predictably irrational. And because we can predict user's behavior, the design should take it into account.

Financial Capability: expressed through actions or behavior. If we plan to improve people's financial capability, we need to decide which aspects of their behavior we would like to see changed, as discussed by Spencer, Niboer, Elliott. [19] According to the authors, these consist of the following:

- **Maintaining a budget** can be thought of as 'making ends meet'. It means that people know how much they can spend and ensure they don't fall short on a regular basis.
- **To manage debt well** is to plan for 'inevitable' purchases on credit, such as buying a house or education. It involves securing good credit terms, making use of tax incentives and ensuring there is enough room within a budget for repayment.
- **Protecting dependents** means that partners, children and other dependents are protected in case anything happens to the main household income earner. Examples: critical illness insurance, life insurance and joint pensions.
- **Achieving financial resilience by protecting assets** means being financially prepared for unexpected events – e.g., medical emergencies, burglaries or car breakdowns. Examples: insurance, reduce key risks and have a 'rainy day fund'.
- **Saving regularly** means putting some money aside (beyond an emergency fund), such as setting up a savings fund for holidays and household appliances.
- **Saving for retirement** includes behaviors such as forecasting future outcomes, ensuring enough money is saved to guarantee the desired pension and selecting the right 'mix' of investments for retirement savings.

1.2 Technological Background

Technology is a vehicle of positive change in our domain, since there is a correlation between financial exclusion and the digital divide [7]. According to the latest report by the GSM Association [8], the mobile industry continues to scale rapidly, with a total of 3.6 billion unique mobile subscribers at the end of 2014. In the developed world there is already a very high penetration (at 79 % at the end of 2014), while the penetration rate in the developing world is below half the population (at 44.6 % at the end of 2014).

The GSMA report further suggests that mobile in the developing world is the predominant infrastructure compared to other services, such as electricity, sanitation and financial. "As a result, mobile is already helping to address a number of pressing social, economic and environmental challenges". From the financial services perspective, mobile money helps with the financial inclusion of a growing number of the previously unbanked and underbanked, and are now available in over 60 % of the world's developing markets, according to the report.

According to Shrader [18], there is a pronounced effect of social media on the use of money in China, where people use them to research and buy products and services.

1.3 Financial Inclusion Opportunities

There is a number of opportunities to leverage the mobile infrastructure, including mobile insurance, savings and credit. According to the GSMA, there are 32 mobile credit services available in 15 countries globally. Mobile insurance services have reached a total of 100 live services. Some operators are even paying interest on the money in mobile wallets, offering thus also saving facilities [8].

While many banked people already use mobile banking in China, there is untapped potential to draw on low-cost, accessible channels, such as mobile wallets, particularly for younger, technology-savvy populations, according to Shrader and Duflos [17].

“New models must be supported by meaningful products and viable business models to drive a new phase of technology-enabled rural growth and poverty alleviation” [17].

Importantly, the utility financial services through social media could be a driver to reach the unbanked (such as Alipay or Tencent), as discussed by Shrader [18].

According to the Economist Intelligence Unit, “[c]hallenges still remain in developing an inclusive financial environment in China, although a lot of progress has been made. Microfinance in China is mainly focused on micro-, small- and medium-sized-enterprise (MSME) lending, instead of providing services to the low-income population” [23, page 31].

2 Research Rationale

To address the above trends, to contribute to the current state of knowledge, and to build a basis for comparison with future surveys, namely the upcoming OECD INFE report due in March 2016 [15]. Currently there are no directly comparable results from other surveys, although a number of similar ones exists. Among these ranks the pilot OECD questionnaire [1], which has been carried out in the 14 participating countries around the world. Another survey of financial literacy, this time focused on students (15–16 years old), was run as a part of the PISA project [14] comparing the performance between the OECD countries and some emerging regions including the Shanghai area in mainland China. The S&P Global financial literacy survey provides comprehensive results on the basic financial concepts, such as numeracy (debt), risk diversification, inflation, and compound interest (saving) [12].

3 Research Methods

To pursue our goal, we identified the following research questions, and hypotheses:

Research Questions.

- What is the level of financial knowledge in our target group?

- What are the behavioral patterns related to managing finances?
- What are the attitudes towards money in general?
- What is the level of financial inclusion?
- What are the ways UX design can improve the above?
- What are the cross-cultural implications of designing financial applications?

Hypotheses.

- H1: Despite rapid economic growth, rising wealth and disposable income and higher consumption rates Gen Y [b. 1980–1995] consumers are still very much collectivists with a high need for security, conformity and benevolence, as is reflected in the Chinese cultural values [24].
- H2: Predominantly a fear of debt [in China] hinders excess spending and the use of credit cards. This is linked to a perceived guilt when spending ‘future money’ that has not yet been earned [24, page 6].
- H3: There is a very low participation rate of the formal financing sector, but very active informal finance.
- H4: People are risk averse – a large portion of their financial asset is riskless [6].
- H5: Languages with obligatory future-time reference lead their speakers to engage in less future-oriented behavior. On savings, the evidence is consistent on multiple levels: at an individual’s propensity to save, to long-run effects on retirement wealth, and in national savings rates. [Mandarin is only a weakly future reference language, in contrast, e.g., to English or Czech]. [4] We expect therefore a high saving rate in China.
- H6: [US] millennials have financial goals. However, it appears many are not seeking guidance and advice from the appropriate sources. [11] We expect similar results in China.
- H7: Gen Y [in the USA] saves less than Gen X [b. 1965-1980]. The only savings vehicles young people today use more, than the previous generation did at the same age are transactional accounts. [25] We expect similar results in China.

Questionnaire Methodology. We constructed our questionnaire using varied guidelines, such as OECD [15] (areas include financial knowledge, behavior, attitudes), [20] (financial attitudes), [10] (UCD interview), as well others designed to better understand the user’s needs. Therefore, we based our methodology on the suggestions by OECD [15], mainly:

- Follow the interviewer’s instruction in different parts of the questionnaire
- The interviewers should ask the questions in the order that they are laid out in the questionnaire, without changing the wording and they should immediately record the responses. If necessary, they can go back to previous questions to make a correction or clarify a point (such as when asking about the product chosen most recently).
- Participants will not be expected to read any of the questions or write down their answers, and whilst it is important to reassure them that their responses are confidential and encourage them to participate, they must never be put under pressure to

answer anything that they don't want to answer – doing so is unethical and is also likely to significantly bias their responses.

Then we built a questionnaire for user interviews using an online reporting tool [21]. The study was conducted in November 2015, both on a qualitative and quantitative basis. 31 respondents were interviewed on ~ 50 questions (closed and open), and each session lasted 35 min. The respondents were recruited at the Dalian Maritime University (DMU) using a simple screener (they should be born in China between 1980–1995, be evenly split between males and females, be evenly split between lower, middle, and higher income). Local moderators conducted the study, because they shared the language and cultural background of the target group. After the interviews all the data was checked and translated, when appropriate.

4 Results

We organized our basic findings according to the main topics of our research as follows: Financial knowledge (Table 1), financial behavior (Table 2), and financial attitudes (Table 3). Each table contains a column presenting the topic, the question asked, and the result. The topics provide a structure for further comparison with other research.

To evaluate our dataset, we used a margin of error of 17.9 % (5 respondents) for the whole group of 31 respondents [16]. To limit the role of chance (50 %) we showed in percentage only the results higher than 67.9 % (50 % + 17.9 %). Results with a lower percentage were still taken into account, but confronted against qualitative responses to achieve maximum plausibility.

4.1 Triangulation of Results

In order to validate our data, we shall compare similar results from similar research in our target group. We expect to have the opportunity for a comprehensive comparison of our data with the upcoming results from the OECD INFE 2015 survey [15], both in our target cultures, and across cultures.

At present, we can triangulate the financial literacy data from different sources in the below table (Table 4) showing correct responses. The S&P results are based on a global survey from 2014 with more than 150000 respondents. The Czech data are based on data collected by the University of Economics and the Ministry of Finance in 2012 (212 university students of non-economic fields).

By triangulating the results, we can notice a pattern between the Czech and Chinese data. The data from student's research rank higher than the general population in each of the compared countries. Also, the data from the Czech students show a higher score compared to students in China, which is mirrored in the comparison between the general population. Our data has thus passed this plausibility check.

Table 1. Financial knowledge

Topic	Question	Results
Time-value of money	Five brothers are going to be given a gift of \$1,000 in total to share between them. Now, imagine that they have to wait for one year to get their share of the \$1,000 and inflation stays at X percent. In one year's time will they be able to buy: (a) More with their share of the money than they could today; (b) The same amount; (c) Or, less than they could buy today. (d) It depends on the types of things that they want to buy.	28/31(87 %) [response: C and D combined]
Interest paid on a loan	You lend \$25 to a friend one evening and he gives you \$25 back the next day. How much interest has he paid on this loan?	28/31 (87 %) [response: no interest paid]
Calculation of interest plus principle	Suppose you put \$100 into a savings account with a guaranteed interest rate of 2 % per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of the first year, once the interest payment was made?	27/31 (87 %) [response: 102 %]
	And how much would be in the account at the end of five years? Would it be: (a) More than \$110; (b) Exactly \$110; (c) Less than \$110; (d) Or is it impossible to tell from the information given	24/31 (77 %) [response: A]
Risk and return	An investment with a high return is likely to be involving high risk	23/31 (74 %) [response: True]
Definition of inflation	High inflation means that the cost of living is increasing rapidly	25/31 (81 %) [response: True]
Diversification	It is usually possible to reduce the risk of investing in the stock market by buying a wide range of stocks and shares.	17/31 (-%) [response: True]

5 Discussion

Apart from the quantitative data we gathered useful qualitative data about the challenges in achieving financial wellbeing. We were able to confirm all our initial hypotheses, except H5 (the relation between language and savings rate).

We found out that although our respondents were used to make their day-to-day decisions about money usually themselves, even though most of them see their financial knowledge about or below average. The majority of our respondents would welcome obtaining advice from expert, or friends. This is especially true when pondering buying decisions of products or services. Respondents mostly understand, how interests and inflation works, but are prone to cognitive biases, such as loss aversion.

Table 2. Financial behavior

Topic	Question	Results
Timely bill payment	I pay my bills on time	26/31 (84 %) [response: Completely agree]
Keeping watch of financial affairs	I keep a close personal watch on my financial affairs	25/31 (81 %) [response: Completely agree and agree]
Long term financial goal setting	Some people set themselves financial goals, such as paying university fees, buying a car or becoming debt free. Do you (personally, or with your partner) have any financial goals?	19/31 (-%) [response: No]
	I set long term financial goals and strive to achieve them	13/31 (-%) [response: Completely agree and agree]
Responsible, has a household budget	Does your household have a budget? A budget is used to decide what share of your income will be used for spending, saving or paying bills	17/31 (-%) [response: Yes]
Active saving	In the past 12 months, have you been [personally] saving money in any of the following ways, whether or not you still have the money?	24/30 (80 %) [Most save in a bank account, or at home]
Choosing products	and which of the following statements best describes how you made your choice? (a) I considered several options from different companies before making my decision; (b) I considered the various options from one company; (c) I didn't consider any other options at all; (d) I looked around but there were no other options to consider	21/29 (72 %) [response: A]
Borrowing to make ends meet	If you, personally, faced a major expense today – equivalent to your own monthly income – would you be able to pay it without borrowing the money or asking family or friends to help?	21/31 (68 %) [response: Yes]
	What did you do to make ends meet the last time this happened? (a) Existing resources; (b) Creating resources; (c) Access credit by using existing contacts or resources; (d) Borrow from existing credit line; (e) Access additional credit; (f) Fall behind/go beyond arranged amount	16/27 (-%) [response: C]

(Continued)

Table 2. (Continued)

Topic	Question	Results
	Sometimes people find that their income does not quite cover their living costs. In the last 12 months, has this happened to you, personally?	19/31 (–%) [response: Yes]
Loss aversion	I am prepared to risk some of my own money when saving or making an investment	18/31 (–%) [response: Completely agree and agree]

Table 3. Financial attitudes

Question	Results
I find it more satisfying to spend money than to save it for the long term	14/31 (–%) [Disagree and completely disagree]
I tend to live for today and let tomorrow take care of itself	16/31 (–%) [Disagree and completely disagree]
Money is there to be spent	24/31 (77 %) [Completely agree and agree]

Table 4. Triangulation of financial literacy data, cross-cultural comparison between Czech (CZ) and Chinese (CN) respondents.

	CZ (OECD)	CZ (S&P)	CN (our)	CN (S&P)
Risk diversification	89 %	56 %	(–%)	37 %
Inflation	73 %	64 %	87 %	36 %
Numeracy (interest)	97 %	71 %	87 %	45 %
Compound interest	73 %	54 %	77 %	45 %

Perhaps given their lower financial literacy most of the students were tricked to provide financial information to scammers.

The preferred method of saving is in cash or in a bank/savings account, and the mostly known and used products are bank accounts, insurance, and mobile payments. Although the students are willing to take some risk with their money when saving or investing, they keep a close watch on their finances, pay bills on time, and avoid debt whenever possible.

Most students budget under 1875 RMB a month (about 290 USD), and spend usually half on food. The financial situation limits their ability to do things important to them, but most of them are rather satisfied with their situation. Less than half of the respondents have some financial goals, the most frequently cited goals were traveling,

buying a house, or a car. Planning for retirement is obviously not a current issue, also because the students will rely on their workplace pension plan together with the governmental one.

When it comes to keeping track of income and expenses, which would be helpful in attaining financial goals, only around half the students keep a budget. However, most of the respondents would be able to cover an unexpected expense. Sometimes however, the income does not quite cover the living costs, and when that happens, users tend to borrow from family or friends, rather than from institutions. Their income usually covers the expenses of 1–4 weeks.

Our findings show that there is a need among the young generation of Chinese students for solutions that would help them cope with their financial matters, and make the most of the money they have at disposal. Given the high proliferation of mobile technology in our user group, a mobile-based solution would have a potentially high impact. According to our competitive analysis of 21 mobile applications, the currently available apps in the financial domain in China do not quite address the pressing problems our users face. Those applications that address them are not designed to appeal to our users, nor to provide all of the tools that our users need.

To tackle these problems, we identified an opportunity for innovation in the following areas: Comparison/recommendation of financial products, budgeting, improving financial literacy and financial capability. We conducted a series of sessions using exploratory design methods to define the proposed solutions to help users change their behavior in a positive way. A similar work applying persuasion and gamification techniques in the financial domain was done by Aaron Marcus [13].

6 Future Work

Future work consists in analyzing the full results from the OECD INFE 2015 survey related to our target audience and cultures, adopting our cross-cultural semiotic framework [2, 3] to the financial cultural markers (e.g. price, value, mental models leading to specific financial behaviors and attitudes), and in proposing research-based tools and/or products (mobile application) to benefit our target audience. We plan to summarize our work based on the current paper in a future publication.

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