Quantitative Data Analysis 3 : Making Survey Questions

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Things to Remember When Making Questions

- You should not ask questions for any purpose
- Need to be made with specific criteria
- It is very important to use the already proven and quantified questions(s), especially for the measurement of latent variables
- Creating theoretical and reliable questions about specific variables is one of the studies that social science researchers do

Common Metrics When Measuring System Use Experience

- Task-level satisfaction
  - NASA Task Load Index (NASA-TLX) - 5 questions
  - After-Scenario Questionnaire (ASQ) - 3 questions
  - Subjective Mental Effort Questionnaire (SMEQ) - 1 question
  - Usability Magnitude Estimation (UME) - 1 question
  - Single Ease Question (SEQ) - 1 question
- Test-level satisfaction
  - System Usability Scale (SUS) - 10 questions
  - Standardized User Experience Percentile Rank Questionnaire (SUPR-Q) - 13 questions
  - Post-Study System Usability Questionnaire (PSSUQ) - 16 questions
  - Questionnaire for User Interaction Satisfaction (QUIS)

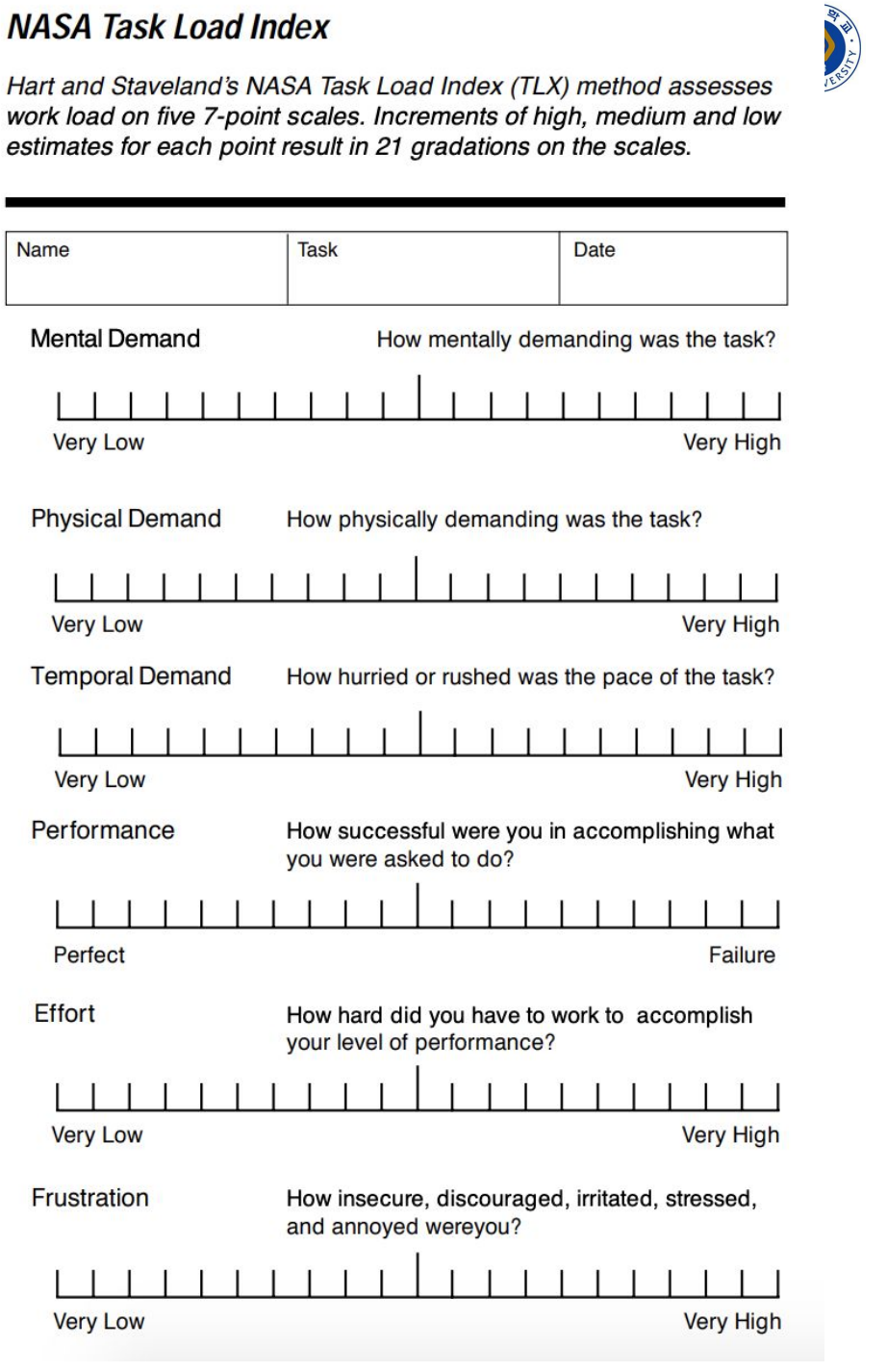
LET US SEE SOME EXAMPLES

Task-level satisfaction

NASA Task Load Index

- NASA-TLX is a subjective workload assessment tool.
- NASA-TLX allows users to perform subjective workload assessments on operator(s) working with various human-machine systems.
- NASA TLX derives an overall workload score based on a weighted average of ratings on six subscales:
  - Mental Demand
  - Physical Demand
  - Temporal Demand
  - Performance
  - Effort
  - Frustration

NASA Task Load Index



NASA Task Load Index

Hart and Staveland's NASA Task Load Index (TLX) method assesses work load on five 7-point scales. Increments of high, medium and low estimates for each point result in 21 gradations on the scales.

Name	Task	Date

Mental Demand — How mentally demanding was the task?

Very Low — Very High

Physical Demand — How physically demanding was the task?

Very Low — Very High

Temporal Demand — How hurried or rushed was the pace of the task?

Very Low — Very High

Performance — How successful were you in accomplishing what you were asked to do?

Perfect — Failure

Effort — How hard did you have to work to accomplish your level of performance?

Very Low — Very High

Frustration — How insecure, discouraged, irritated, stressed, and annoyed wereyou?

Very Low — Very High

After-Scenario Questionnaire (ASQ)

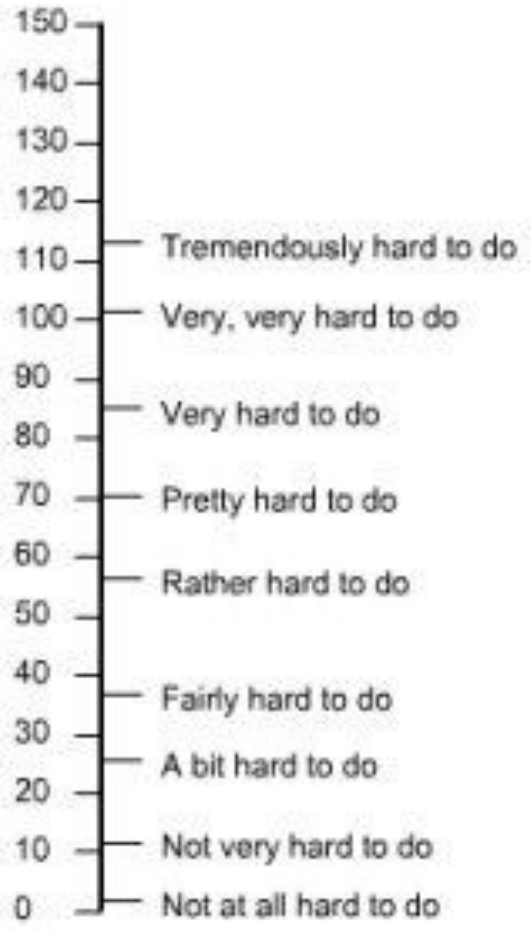
The ASQ is commonly used, and research has supported that it has acceptable psychometric properties of reliability, sensitivity, and concurrent validity, and may be used with confidence in other, similar usability studies.

1. Overall, I am satisfied with the ease of completing the tasks in this scenario
2. Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario
3. Overall, I am satisfied with the support information (online-line help, messages, documentation) when completing the tasks

Subjective Mental Effort Questionnaire (SMEQ)

SMEQ is made up of just one scale, and it measures the mental effort that people feel was involved in a certain task.

SMEQ correlates highly with SUS scores, as well as completion time, completion rates, and errors.



Single Ease Question (SEQ)

SEQ is often recommended for task-level satisfaction for its ease and correlation with other usability metrics

Figure 1: The Single Ease Question (SEQ).

Test-level satisfaction

System Usability Scale

- The System Usability Scale (SUS) provides a “quick and dirty”, reliable tool for measuring the usability
- It consists of a 10-item questionnaire with five response options for respondents; from Strongly agree to Strongly disagree
- Benefits of using a SUS
  - SUS has become an industry standard, with references in over 1,300 articles and publications.
- The noted benefits of using SUS include that it:
  - Is a very easy scale to administer to participants
  - Can be used on small sample sizes with reliable results
  - Is valid - it can effectively differentiate between usable and unusable systems

System Usability Scale

- Q1: I think that I would like to use this system frequently.
- Q2: I found the system unnecessarily complex.
- Q3: I thought the system was easy to use.
- Q4: I think that I would need the support of a technical person to be able to use this system.
- Q5: I found the various functions in this system were well integrated.
- Q6: I thought there was too much inconsistency in this system.
- Q7: I would imagine that most people would learn to use this system very quickly.
- Q8: I found the system very cumbersome to use.
- Q9: I felt very confident using the system.
- Q10: I needed to learn a lot of things before I could get going with this system

System Usability Scale

- 5-point Likert scale question/answer

- Strongly disagree
- Disagree
- Neutral (Neither disagree nor agree)
- Agree
- Strongly agree

System Usability Scale - Calculation

- First, sum the score contributions from each item.
- Each item's score contribution will range from 0 to 4.
- For items 1,3,5,7,and 9 the score contribution is the scale position minus 1.
- For items 2,4,6,8 and 10, the contribution is 5 minus the scale position.
- Multiply the sum of the scores by 2.5 to obtain the overall value of SU.

Standardized User Experience Percentile Rank Questionnaire (SUPR-Q)

1. I am able to find what I need quickly on this website.
2. It is easy to navigate within the website.
3. The website is easy to use.
4. I feel comfortable purchasing from this website.
5. This website keeps the promises it makes to me.
6. I feel confident conducting business with this website.
7. I can count on the information I get on this website.
8. I consider myself a loyal customer of this website.
9. How likely are you to recommend this website to a colleague or friend?
10. I plan on continuing to purchase from this website in the future.
11. I found the website to be attractive.
12. This website has a clean and simple presentation.
13. I enjoy using the website.

From 1 (Strongly Disagree) to 5 (Strongly Agree)

Post-Study System Usability Questionnaire (PSSUQ)

1. Overall, I am satisfied with how easy it is to use this system.
2. It was simple to use this system.
3. I was able to complete the tasks and scenarios quickly using this system.
4. I felt comfortable using this system.
5. It was easy to learn to use this system.
6. I believe I could become productive quickly using this system.
7. The system gave error messages that clearly told me how to fix problems.
8. Whenever I made a mistake using the system, I could recover easily and quickly.
9. The information (such as online help, on-screen messages, and other documentation) provided with this system was clear.
10. It was easy to find the information I needed.
11. The information was effective in helping me complete the tasks and scenarios.
12. The organization of information on the system screens was clear.
13. The interface of this system was pleasant.
14. I liked using the interface of this system.
15. This system has all the functions and capabilities I expect it to have.
16. Overall, I am satisfied with this system.

Post-Study System Usability Questionnaire (PSSUQ)

- Evaluation
  - Overall: the average scores of questions 1 to 16
  - System Usefulness (SYSUSE): the average scores of questions 1 to 6
  - Information Quality (INFOQUAL): the average scores of questions 7 to 12
  - Interface Quality (INTERQUAL): the average scores of questions 13 to 15
- PSSUQ score starts with 1 (Strongly Agree) and ends with 7 (Strongly Disagree).
  - The lower the score, the better the performance and satisfaction.

Other Questions

Commonly Used Metrics Used

- Choose proper metrics depending on a research domain and purposes
- Perceptions
  - Perceived usefulness
  - Perceived ease-of-use
- Intention to use
  - Question whether you are willing to use a service if it is available (now or in the future)

- Virtual Reality context
  - iGroup Presence Questionnaire

Perceived Usefulness and Ease-of-Use

Variable	Question
Perceived Usefulness	Using [this product] in my job would enable me to accomplish tasks more quickly.
	Using [this product] would improve my job performance.
	Using [this product] in my job would increase my productivity.
	Using [this product] would enhance my effectiveness to do my job.
	Using [this product] would make it easier to do my job.
	I would find [this product] useful in my job.
Perceived Ease-of-Use	Learning to operate [this product] would be easy for me.
	I would find it easy to get [this product] to do what I want it to do.
	My interaction with [this product] would be clear and understandable.
	I would find [this product] would be clear and understandable.
	It would be easy for me to become skillful at using [this product].
	I would find [this product] easy to use.

Intention to Use

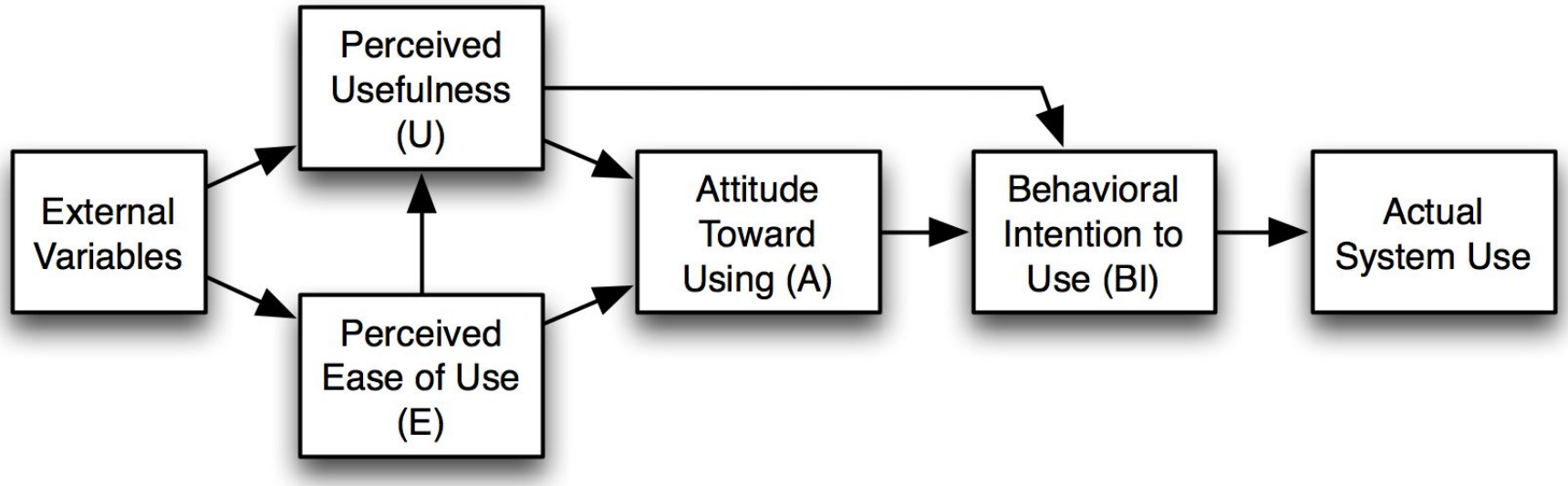
Variable	Question
Intention to Use	I plan to use [this product] in the future.
	Assuming that I have access to [this product], I intend to use it.

iGroup Presence Questionnaire

Variable	Question
G1	In the computer generated world I had a sense of "being there"
SP1	Somehow I felt that the virtual world surrounded me.
SP2	I felt like I was just perceiving pictures.
SP3	I did not feel present in the virtual space.
SP4	I had a sense of acting in the virtual space, rather than operating something from outside.
SP5	I felt present in the virtual space.
INV1	How aware were you of the real world surrounding while navigating in the virtual world? (i.e. sounds, room temperature, other people, etc.)?
INV2	I was not aware of my real environment.
INV3	I still paid attention to the real environment.
INV4	I was completely captivated by the virtual world.
REAL1	How real did the virtual world seem to you?
REAL2	How much did your experience in the virtual environment seem consistent with your real world experience ?
REAL3	How real did the virtual world seem to you?
REAL4	The virtual world seemed more realistic than the real world.

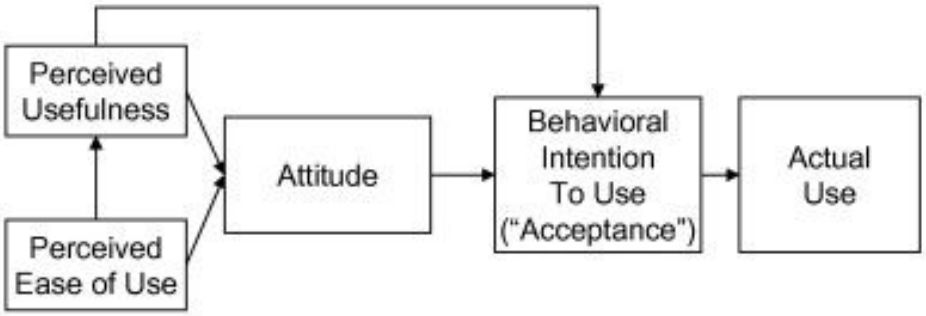
Technology Acceptance Model

- A model already verified by many studies

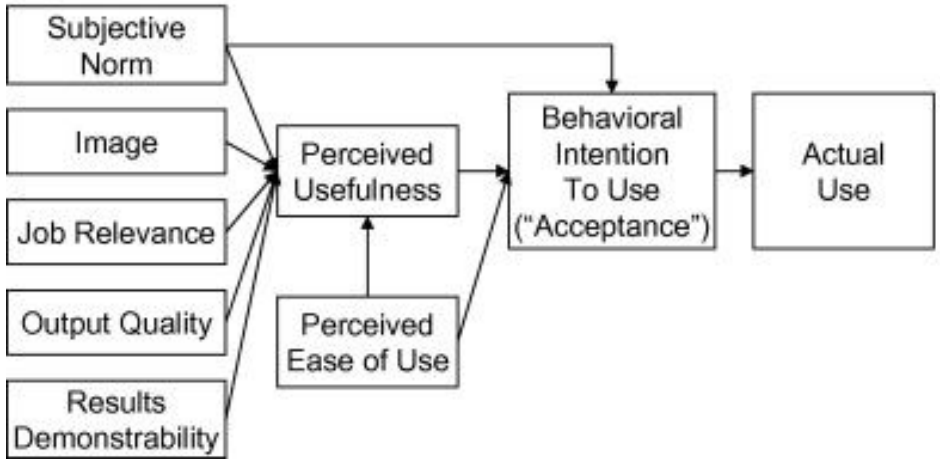


Variations of Technology Acceptance Model

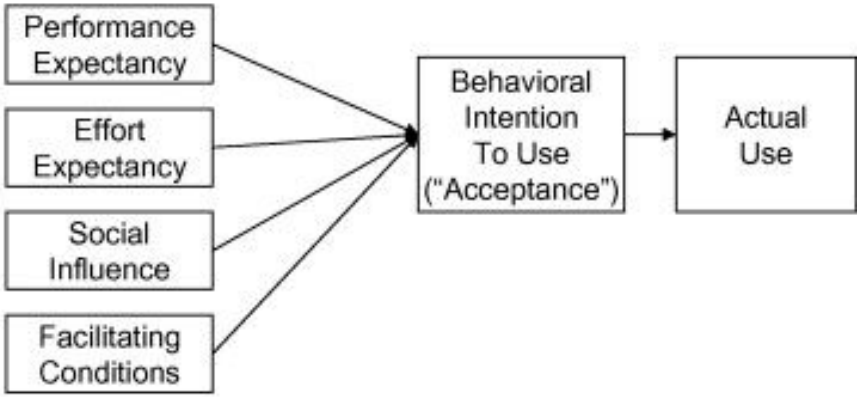
(a) Technology Acceptance Model (TAM)



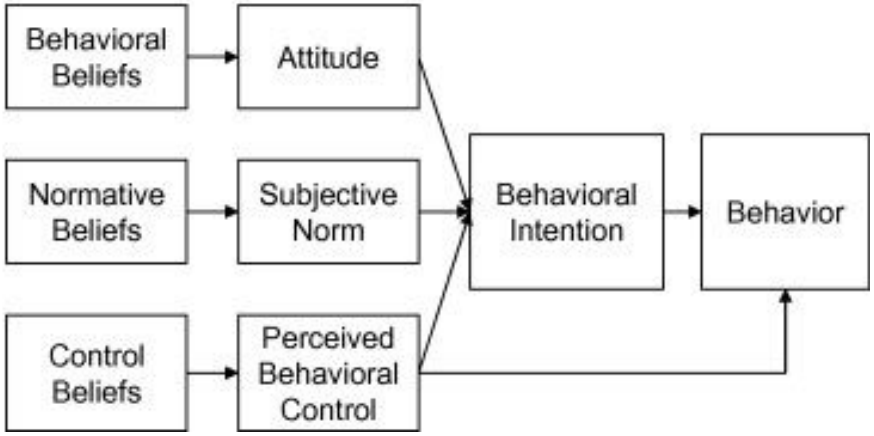
(b) Technology Acceptance Model 2 (TAM2)



(c) Unified Theory of Acceptance and Use of Technology (UTAUT)



(d) Theory of Planned Behavior (TPB)



Well-defined Questions

- Communication Quality

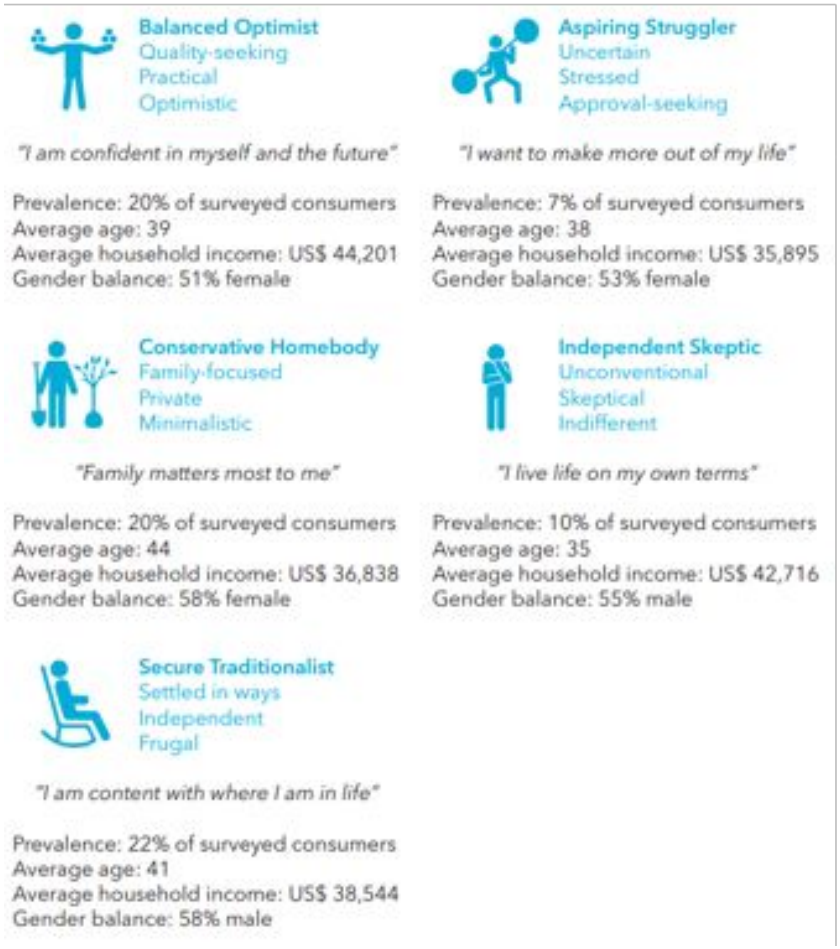
Type		Question (1: Strongly Disagree, 5: Strongly Agree)	alpha
Source Credibility (SC)	SC1	The author seems honest	0.89
	SC2	The author seems trustworthy	
	SC3	The author seems genuine	
Interpersonal Attraction (IA)	IA1	The author could be a friend of mine	0.92
	IA2	I could establish a personal friendship with the author	
	IA3	I have confidence in the author's ability to get the job done	
	IA4	If I wanted to get things done, I could probably depend on the author	
Communication Competence (CC)	CC1	The author seems effective in accomplishing what was set out to do	0.92
	CC2	The author's tweets seem easy to understand	
	CC3	The author's tweets seem written in a confident style	
Intent to Interact (INT)	INT1	If the topic matches my interest, I may want to follow the author	0.93
	INT2	If the topic matches my interest, I may want to receive tweet updates from this author	

Things to Remember

Example

Can study any aspects of users but **not all can be reliably studied**

Example: modern consumer types



Example

Confident

- What is your level of confidence in yourself?
- Do you have high confidence in yourself?

Status-oriented

- What is your level of status orientation?
- Do you interact with others in terms of your role?
- Are you status-oriented?

Tech-savvy

- What is your tech-savviness level?
- Are you tech-savvy?

Need to be careful about measuring
subjective concepts/latent variables through surveys