Questionnaires

Unit 6

Learning outcomes

- Understand when/how to use questionnaires in interaction design
  - Surveys
  - Satisfaction questionnaires (post use)
- Learn how to prepare them
  - Different types of scales
  - Questions wording
- Learn about the most common types of questionnaire used in user research
  - Usabilty
  - User research

Questionnaires

- Predefined set of questions in a predetermined order
- Provide data that can be analysed to identify patterns and relationships within the answers

- Questionnaires may be:
  - Self-Administrated (the respondent answer on their own)
  - Administrated by the researcher

Questionnaire

- Qualitative vs. quantitative data; self-report
  - opinions, beliefs, attitudes, behaviour
  - bias -> social desirability often there is an expectation that one answer is preferred

  questionnaire_score = true_score + error

- only as good as the questions asked

Source of Errors

- Systematic (bad design of the questionnaire)
- Random (this is not a problem in large sample)
- Use different items and techniques to address the same concept (average)
- Triangulation

Psychometric characteristics

- Reliability (reproducibility factor):
  - test-retest reliability: stability over time
  - internal reliability: stability over items
- Effective range in the scale (sensibility):
  - scale must be chosen according to variable peculiarities.
- Validity:
  - measures must reflect what it is investigated.

Surveys

- Systematic extraction of data from and about a population of people (or events) in a standardised & systematic manner
- The extraction of patterns from the responses from a sample enables statements and inferences about the whole population
- Sampling issues (random sample is often the best choice, but at times unfeasible)
- Requirements elicitation / adoption studies

Sampling

- Random Sampling
  - People selected at random from a population: All NHS patients, NHS Patient within a Primary Care Trust
- Systematic Sampling
  - People/events at regular intervals from random sample: NHS hypertensive patients remotely tele-monitored at regular intervals when presenting themselves at hospital
- Stratified Sampling
  - Choosing People/events that map stratifications in the whole population
  - Matching patients from various socioeconomic classes with diabetes remotely monitored on line, via phone.
- Snow-ball sampling
  - Self-selected sample: Patients with hypertension forwarding the survey to acquaintances with similar characteristics

Snow-ball sample

- Self-selected sample
- Shopping Web Sites
- Chat Sites
- Personal Sites
- Fan Sites
- Such sites are selected on the basis of convenience rather than for any in depth investigation

Scales of measurement

- Nominal data (nominal or categorical data)
  - Identity.
    - gender, (1= male; 2= female), ethnicity
    - Numbers are meaningless
    - Ordinal data (ordered data)
  - identity + magnitude (socioeconomic class)
    - Student ranks (1 = no pass; 2 = pass; 3 = merit; 4 = distinction)
    - Numbers reflect an order but arithmetical operations are limited
- Interval data (scores data)
  - identity + magnitude + equal intervals (evaluation scales)
    - I feel
  - Happy 1 2 3 4 5 6 7 Unhappy
    - This lecture is boring
  - strongly agree 1 2 3 4 5 Strongly disagree
- Ratio data (scores data)
  - identity + magnitude + equal intervals + a true zero (number of bugs)
    - There is a true zero
    - Age, height, annual turnover

Questionnaire design

- Questionnaires must be properly designed to elicit the answers you want from the respondent
- Answers should be valid and meet the researchers' need
- Each question has to effectively elicit an answer that contributes to addressing the overall research question

Questionnaire design

- Iterative approach
  - Establish the purpose of the questionnaire
    - what information is sought? how would you analyze the results? what would you do with your analysis?
    - determine the audience you want to reach
    - determine how would you will deliver the questionnaire
  - Define thematic areas
    - IT experience, attitudes toward technology, user satisfaction
  - Compose and pilot the items
    - wording issues, response biases
    - select scales (precision; effort needed to decide on a response)
    - do not ask questions whose answers you will not use!
  - Write instructions
  - Pilot

Pilot

- How long did it take to complete?
- Were the instructions clear?
- Were any questions ambiguous?
- Were any questions objectionable?
- Was the layout clear and easy to follow?
- Were any topics omitted?

Questions

- **Brief**: ideally 20 words or less, providing the question is still understandable
- **Relevant**:
  - each question should be relevant to the overall questionnaire and its purpose
  - each word within the question must be relevant to the overall (research) question you want to ask

Questions (2)

- Avoid ‘and’ questions
  - The web-site is interesting and appealing
  - The web site is interesting
  - The web site is appealing
- Avoid ‘negative’ questions
  - The web site design is not appealing
  - The web site design is ugly

Practical guidelines

- Don’t use jargon or abbreviations
- Keep questions simple and as short as possible
- Don’t use vague terms: be precise.
- Avoid ‘loaded’ or ‘leading’ questions that hint at the answer you want to hear
- Avoid “AND” questions: asking more than one question
- Avoid ‘double-negative’ questions
- Use common concepts
- Take care over questions that involve memory/recall

Practical guidelines

- Hypothetical questions need to be worded especially carefully. Are they really needed? Can the question be misinterpreted?
- Take care when covering embarrassing or sensitive issues.
- Avoid using negative words or implicit negatives as this might bias your responses.
- Avoid ‘presumption’ questions: do not assume that everyone has the same standards.
- Watch out for prestige bias in the question: social bias happen even if the responses are anonymous,

Styles of Questions

- Open-ended questions
  - asks for unprompted opinions
  - good for general subjective information
    - but difficult to analyze rigorously

"Can you suggest any improvements to the interface?"

Closed questions

- Restrict responses by supplying alternative answers
- easy to analyze
- watch out for hard to interpret responses!

Do you use computers at work:

O often O sometimes O rarely

vs

In your typical work day, do you use computers:

O over 4 hrs a day

O between 2 and 4 hrs daily

O between 1and 2 hrs daily

O less than 1 hr a day

Multi-choice

- Respondents offered a choice of explicit responses

How do you most often get help with the system? (tick one)

O on-line manual
O paper manual
O ask a colleague

Which types of software have you used? (tick all that apply)

O word processor
O data base
O spreadsheet
O compiler

Ranked

- respondent places an ordering on items in a list
- useful to indicate preferences
- forced choice
- Limit the number of items

Rank the usefulness of these methods of issuing a command

(1 most useful, 2 next most useful..., 0 if not used

__2__ command line

__1__ menu selection

__3__ control key accelerator

Likert Scales

- User judge a specific statement on a numeric scale
- usually corresponds with agreement or disagreement with a statement

The characters on the computer screen are hard to read

1		2	3	4	5
Strongly agree	agree	neutral	disagree	strongly disagree	

Combination

- Combining open-ended and closed questions
  - get specific response, but allows room for user's opinion

It is easy to recover from mistakes:

disagree agree

1 2 3 4 5

comment: *the undo facility is really helpful*

Semantic differential scale

- Bi-polar attitudes about a concept
- pair of adjectives

The look and feel of the web-site is

exciting	1	2	3	4	5	6	7	boring
annoying	1	2	3	4	5	6	7	pleasing

Appearance

- Make the questionnaire attractive
- Use space generously; avoid a cramped, untidy appearance
- Make headings and instructions clear
- Make sure the method of answering is obvious
- Don’t split a question between two pages
- Number all questions
- Take care over question order. Generally start with broad, straightforward ones and include more complicated, specific or sensitive ones later
- The questions should proceed in a logical manner (group by thematic areas)
- End questionnaire with a “Thank you” and give a clear deadline for responses.

Usability Questionnaire

SUS – System Usability Scale

- 10-item Likert-scale: overview of satisfaction with software
- Developed by John Brooke
- Freely available for use providing acknowledgement is made of the source.

SUS

	Strongly Disagree				Strongly Agree
1. I think I would like to use this website frequently.	○	○	○	○	○
2. I found the website unnecessarily complex.	○	○	○	○	○
3. I thought the website was easy to use.	○	○	○	○	○
4. I think I would need Tech Support to be able to use this website.	○	○	○	○	○
5. I found the various functions in this website were well integrated.	○	○	○	○	○
6. I thought there was too much inconsistency in this website.	○	○	○	○	○
7. I would imagine that most people would learn to use this website very quickly.	○	○	○	○	○
8. I found the website very cumbersome to use.	○	○	○	○	○
9. I felt very confident using the website.	○	○	○	○	○
10. I need to learn a lot about this website before I could effectively use it.	○	○	○	○	○

QUIS

- Questionnaire for User Interaction Satisfaction
  - Measures attitude towards different interface factors (screen factors, terminology and system feedback, learning factors, system capabilities, technical manuals, on-line tutorials, multimedia, voice recognition, virtual environments, internet access, and software installation)
  - http://www.cs.umd.edu/hcil/quis/

Overall Reaction to the Website		0	1	2	3	4	5	6	7	8	9		NA
1.	terrible	○	○	○	○	○	○	○	○	○	○	wonderful	○
2.	difficult	○	○	○	○	○	○	○	○	○	○	easy	○
3.	frustrating	○	○	○	○	○	○	○	○	○	○	satisfying	○
4.	dull	○	○	○	○	○	○	○	○	○	○	stimulating	○
5.	rigid	○	○	○	○	○	○	○	○	○	○	flexible	○

Web Page		0	1	2	3	4	5	6	7	8	9		NA
6. Reading characters on the page	hard	○	○	○	○	○	○	○	○	○	○	easy	○
7. Organization of information	confusing	○	○	○	○	○	○	○	○	○	○	very clear	○
8. Sequence of pages	confusing	○	○	○	○	○	○	○	○	○	○	very clear	○

Terminology and Website Information		0	1	2	3	4	5	6	7	8	9		NA
9. Use of terms throughout website	inconsistent	○	○	○	○	○	○	○	○	○	○	consistent	○
10. Terminology is intuitive	never	○	○	○	○	○	○	○	○	○	○	always	○
11. Position of messages on screen	inconsistent	○	○	○	○	○	○	○	○	○	○	consistent	○
12. Prompts for input	confusing	○	○	○	○	○	○	○	○	○	○	clear	○
13. Website informs about its progress	never	○	○	○	○	○	○	○	○	○	○	always	○
14. Error messages	unhelpful	○	○	○	○	○	○	○	○	○	○	helpful	○

Learning		0	1	2	3	4	5	6	7	8	9		NA
15. Learning to use the website	difficult	○	○	○	○	○	○	○	○	○	○	easy	○
16. Exploring new features by trial and error	difficult	○	○	○	○	○	○	○	○	○	○	easy	○
17. Performing tasks is straightforward	never	○	○	○	○	○	○	○	○	○	○	always	○
18. Help messages on the screen	unhelpful	○	○	○	○	○	○	○	○	○	○	helpful	○
19. Supplemental reference materials	confusing	○	○	○	○	○	○	○	○	○	○	clear	○

Website Capabilities		0	1	2	3	4	5	6	7	8	9		NA
20. Website speed	too slow	○	○	○	○	○	○	○	○	○	○	fast enough	○
21. Website reliability	unreliable	○	○	○	○	○	○	○	○	○	○	reliable	○
22. Sounds associated with this website	detracts value	○	○	○	○	○	○	○	○	○	○	adds value	○
23. Correcting your mistakes	difficult	○	○	○	○	○	○	○	○	○	○	easy	○
24. Designed for all levels of users	never	○	○	○	○	○	○	○	○	○	○	always	○

Italian version

Stefano FEDERICI, Simone BORSCI, Fabio MELONI

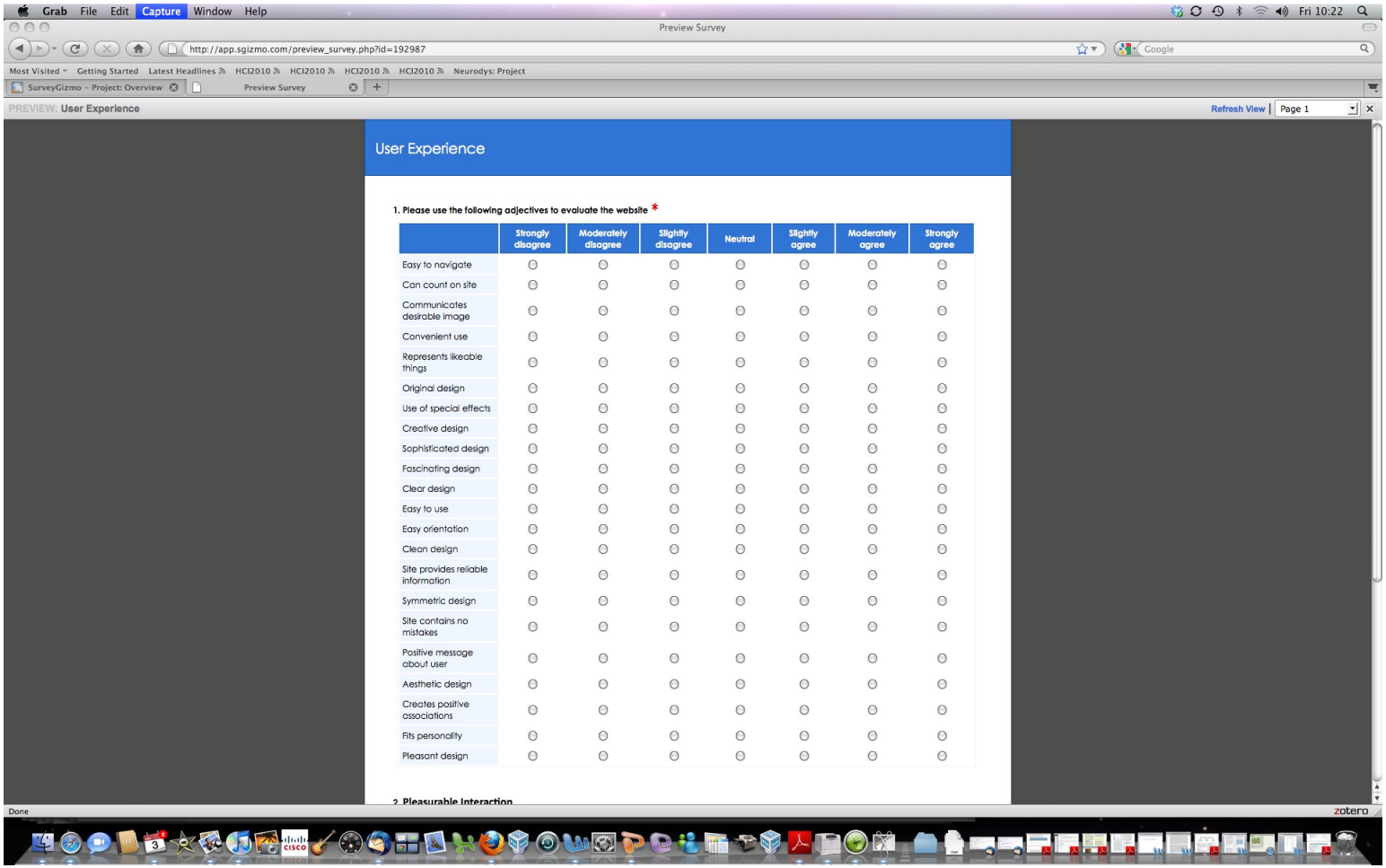
Le misure dell’usabilità: Studio sulle caratteristiche psicometriche del QUIS e del SUMI nella versione italiana

Giornale di Psicologia (2009), Volume 3, Numero 2 (Giugno)

PVA

- Perceived Visual Aesthetic scale Lavie and Trackitnsky
- Two dimension of aesthetics
  - Classical Aesthetics
  - Expressive Aesthetics

PVA



Preview Survey

http://app.sgizmo.com/preview_survey.php?id=192987

PREVIEW: User Experience

User Experience

1. Please use the following adjectives to evaluate the website *

	Strongly disagree	Moderately disagree	Slightly disagree	Neutral	Slightly agree	Moderately agree	Strongly agree
Easy to navigate							
Can count on site							
Communicates desirable image							
Convenient use							
Represents likeable things							
Original design							
Use of special effects							
Creative design							
Sophisticated design							
Fascinating design							
Clear design							
Easy to use							
Easy orientation							
Clean design							
Site provides reliable information							
Symmetric design							
Site contains no mistakes							
Positive message about user							
Aesthetic design							
Creates positive associations							
Fits personality							
Pleasant design							

2. Pleasurable Interaction

Factors

- Usability: Easy to navigate, Convenient use, Easy to use, Easy orientation
- Expressive aesthetics: Original design, Use of special effects, Creative design, Sophisticated design, Fascinating design
- Classical aesthetics: Clear design, Clean design, Symmetric design, Aesthetic design, Pleasant design
- Service quality: Can count on site, Site provides reliable information, Site contains no mistakes
- Symbolism: Communicates desirable image, Represents likeable things, Positive message about user, Creates positive associations, Fits personality

Information Quality

- Info. provided is useful
- Website conveys important info.
- The content is of good quality
- The level of detail is good
- Right amount content provided
- The information reported is well-documented and researched
- The site reports up to date info.
- The content of the website is relevant
- De Angeli et al. 2007

Interface Quality Scale

	Factor		
	Content	Usability	Pleasure
The level of detail of the content is good	**.816**	-.171	.140
The right amount of content is provided	**.709**	.076	-.023
The content is relevant	**.559**	.099	-.103
The content is of good quality	**.502**	.119	.124
The website is easy to use	.023	**.912**	-.079
I feel in control when I am using this website	-.027	**.807**	.033
The website requires little effort to use	-.030	**.763**	.058
Using the website is effective	.221	**.638**	.091
I feel pleasure interacting with the website	-.165	.038	**.923**
The website is pleasurable to look at	.070	-.055	**.737**
The website has design features I like	.145	-.020	**.692**
The website evokes positive feelings	.020	.097	**.641**

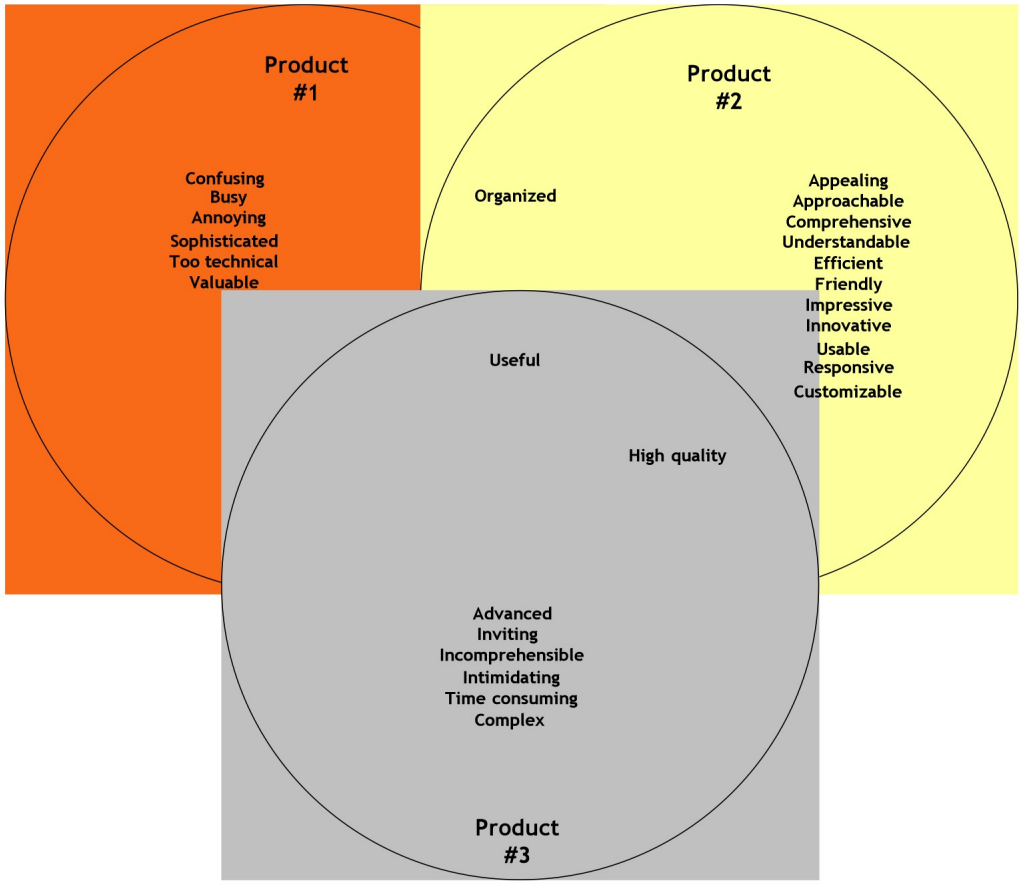
Desirability Tool Kit

- Developed by Microsoft
- Example of use and tools
- http://www.userfocus.co.uk/articles/satisfaction.html

Desirability Kit

Accessible	Desirable	Gets in the way	Patronizing	Stressful
Appealing	Easy to use	Hard to use	Personal	Time-consumi
Attractive	Efficient	High quality	Predictable	Time-saving
Busy	Empowering	Inconsistent	Relevant	Too technical
Collaborative	Exciting	Intimidating	Reliable	Trustworthy
Complex	Familiar	Inviting	Rigid	Uncontrollable
Comprehensive	Fast	Motivating	Simplistic	Unconventiona
Confusing	Flexible	Not valuable	Slow	Unpredictable
Connected	Fresh	Organized	Sophisticated	Usable
Consistent	Frustrating	Overbearing	Stimulating	Useful
Customizable	Fun	Overwhelming	Straight Forward	Valuable

Example data

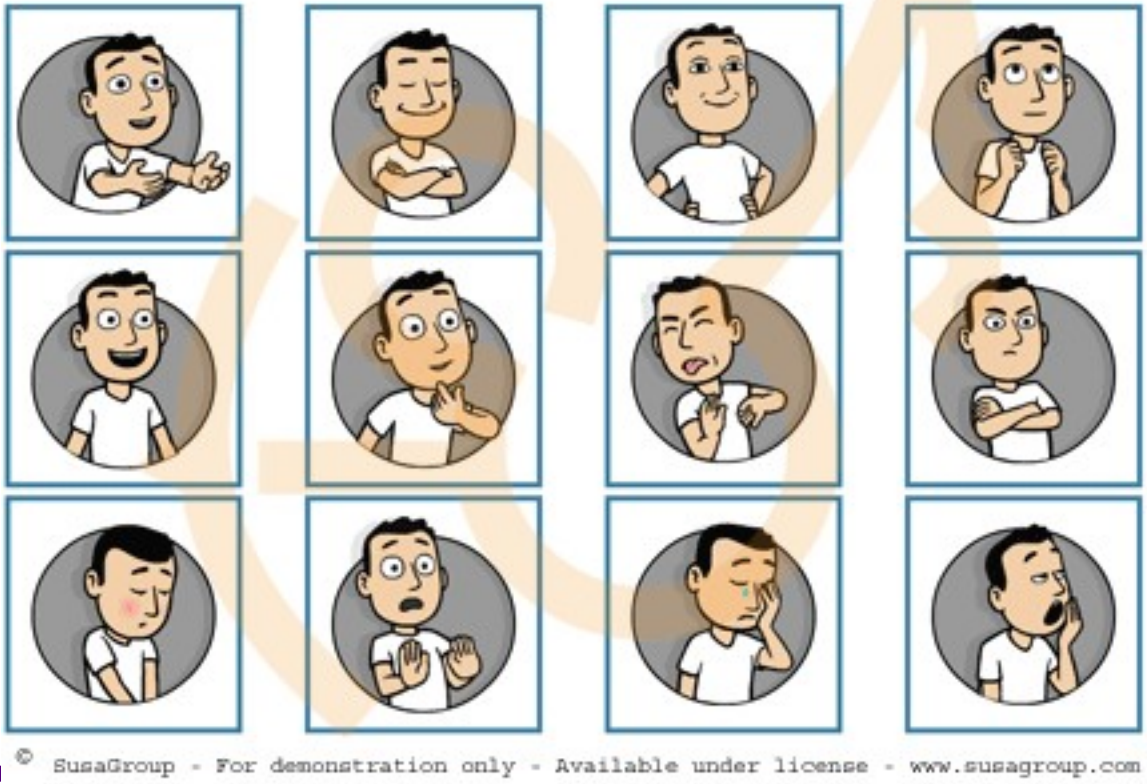


PrEmo

- Emotional responses elicited are difficult to measure because
  - their nature is subtle (low intensity)
  - they are often mixed (more than one emotional response at the same time)
- Instead of words, use animated cartoon characters
- Evaluation does not become a rational process
-

PreEmo

"To which extent do the feelings expressed by the characters correspond with your own feelings towards the stimulus?"



http://www.premo-online.com/en/how-does-it-work/

Data coding

- Direct measurements
  - Data are already in numeric form
- Indirect measurement
  - Need to be coded into a number
    - Code each predefined answer of a questionnaire
    - Code each time which something happens
    - open questions
  - Codes need to be
    - mutually exclusive
    - Exhaustive
    - Consistently applied
  - Code book
- Enter data into computing tools
  - Check them

Data exploration

- Values that are unlikely
  - E.g. age 170
- Codes that do not exist
  - E.g., gender neutral
- Illogical relationships
  - E.g., age 3 and education Msc
- Filtering rules not applied
  - If yes jump to answer 8 (answer 7 = yes)

Visual aids

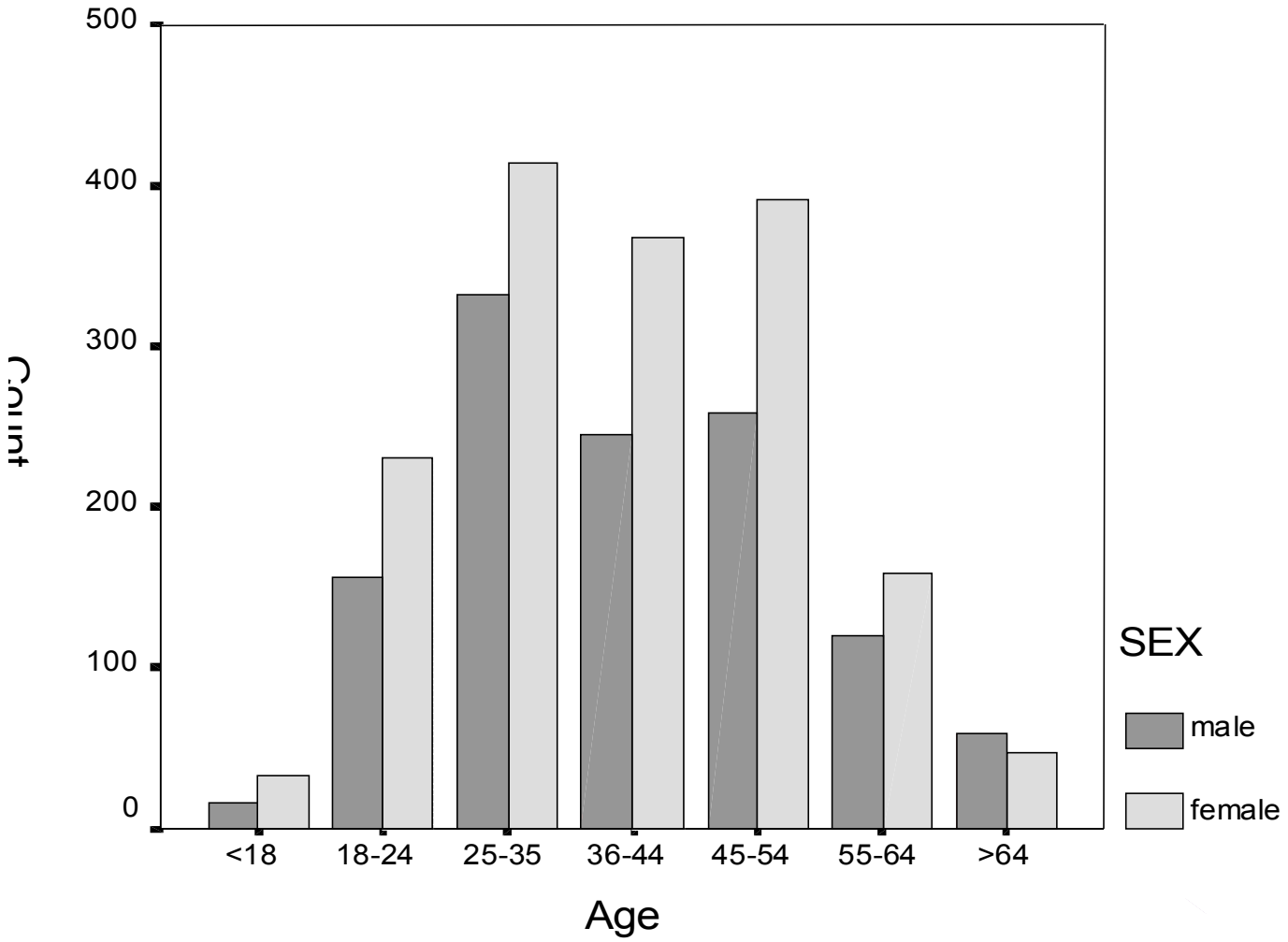
- Tables
  - General summaries
- Bar charts
  - Frequencies - means
- Pie charts
  - Good for showing proportion
- Scatter graph
  - Relationship
- Line graph
  - trends

Tables

	Menu-based			Metaphor-based		
	Freq	%	Severity	Freq	%	Severity
Poor menu/navigation	21	45	2.95	47	47	3.87
Poor graphical design	13	27	2.93	38	38	3.97
Poor information	7	15	2.50	9	9	3.67
Other	6	13	3.33	6	6	3.67
Total	**47**	**100**	**2.94**	**100**	**100**	**3.87**

Table 2. Statistics of usability problems classified by cause in the two experimental conditions.

Bar Charts


500
400
300
200
100
0
Count
<18
18-24
25-35
36-44
45-54
55-64
>64
Age
SEX
male
female

Bar Charts

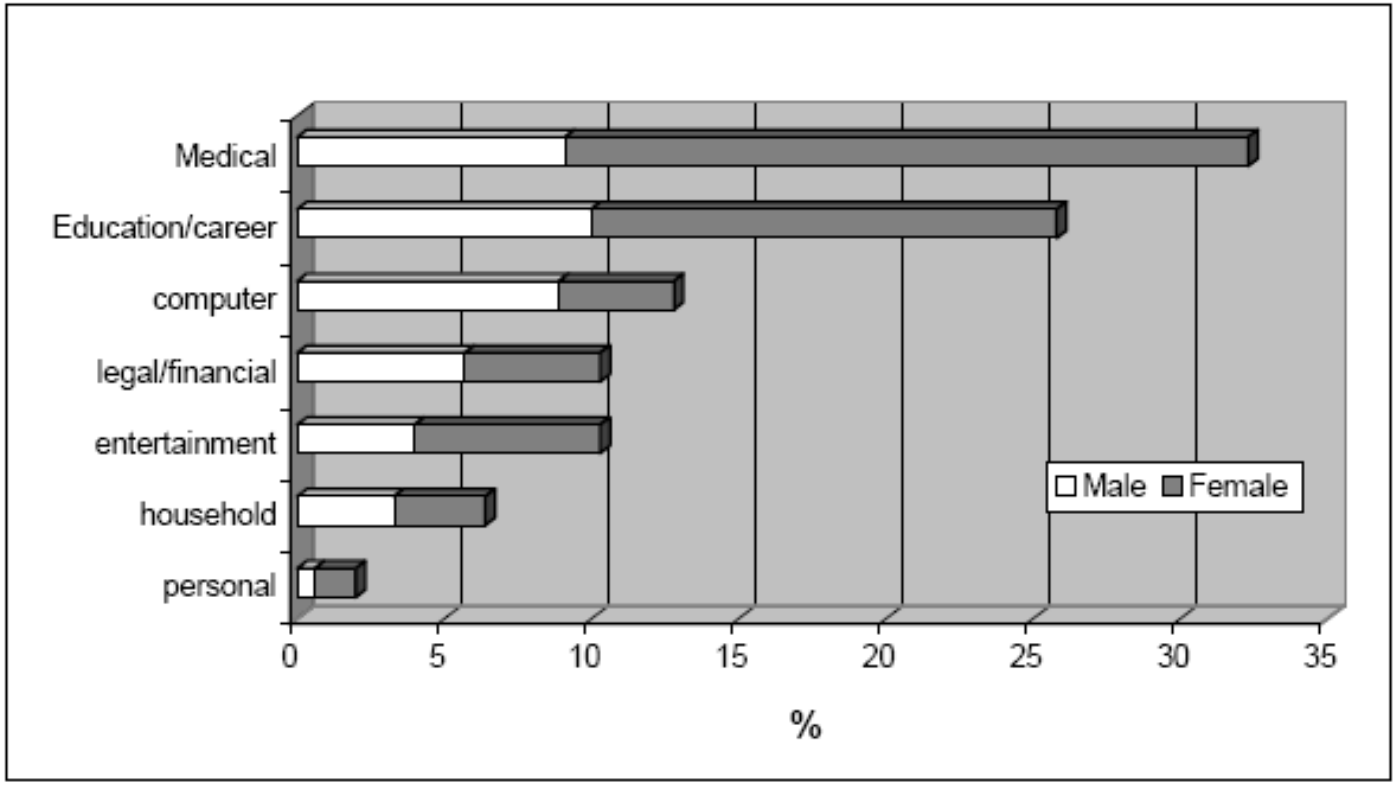
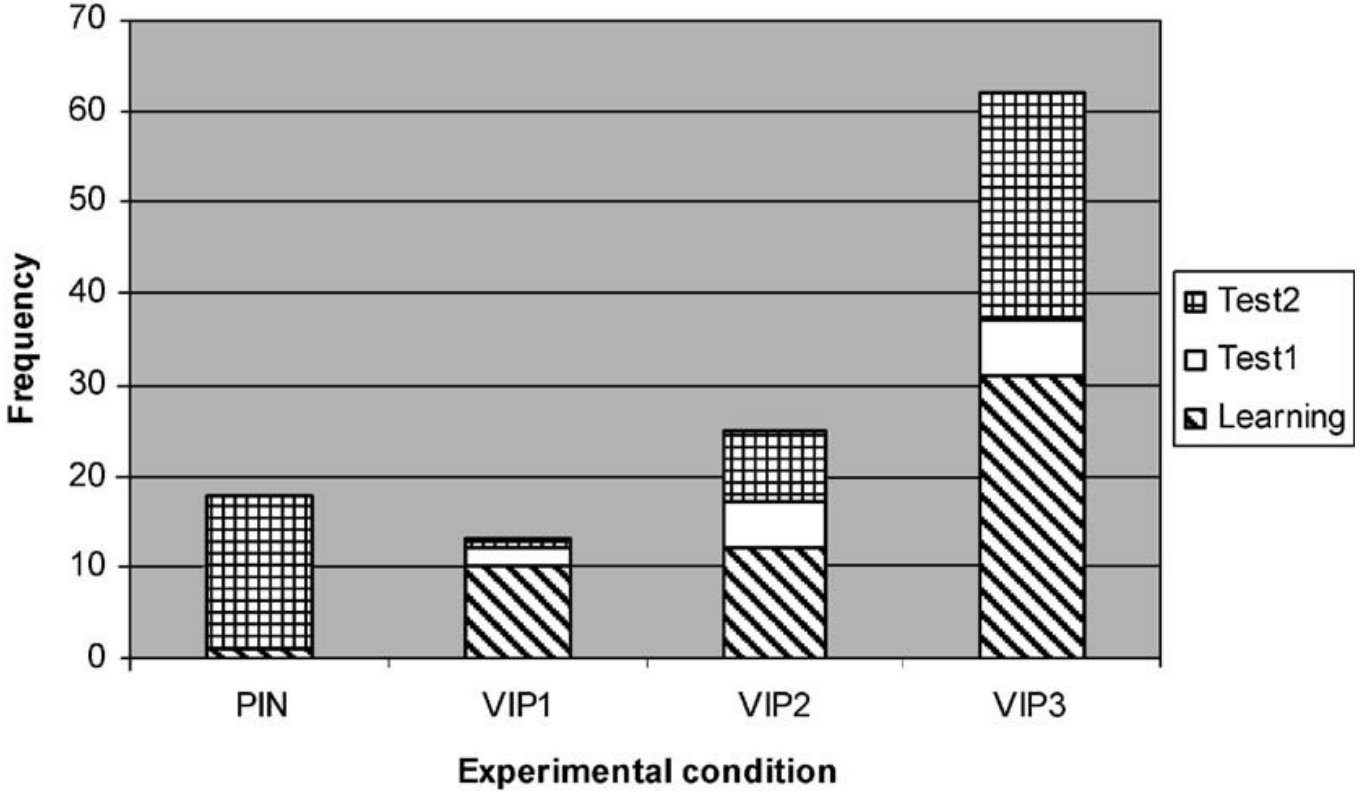
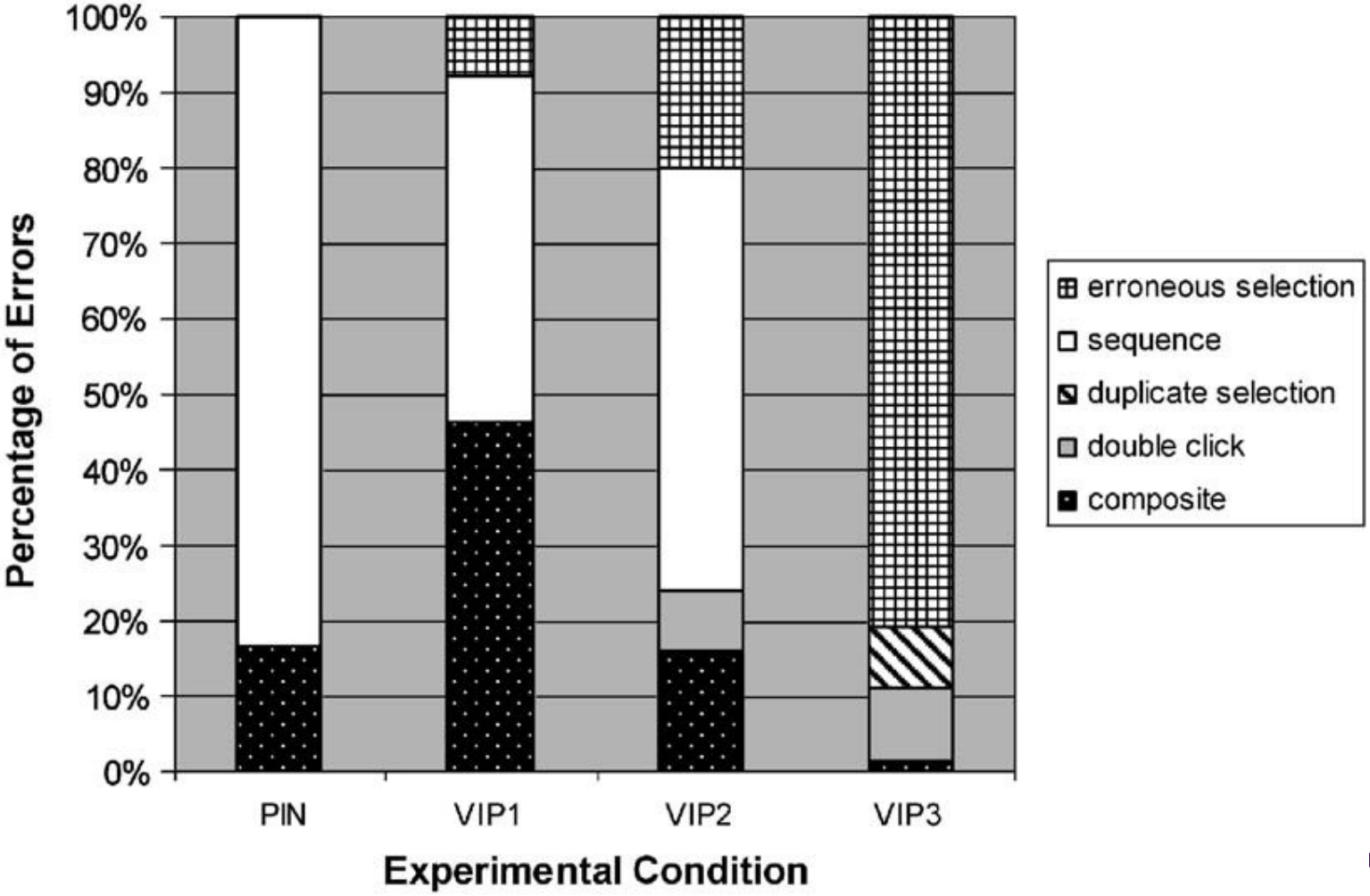


Figure 3. Type of advice sought by males and females.

Bar Charts


70
60
50
40
30
20
10
0
Frequency
PIN
VIP1
VIP2
VIP3
Experimental condition
Test2
Test1
Learning

Bar Charts


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percentage of Errors
PIN
VIP1
VIP2
VIP3
Experimental Condition
erroneous selection
sequence
duplicate selection
double click
composite

Line graphs

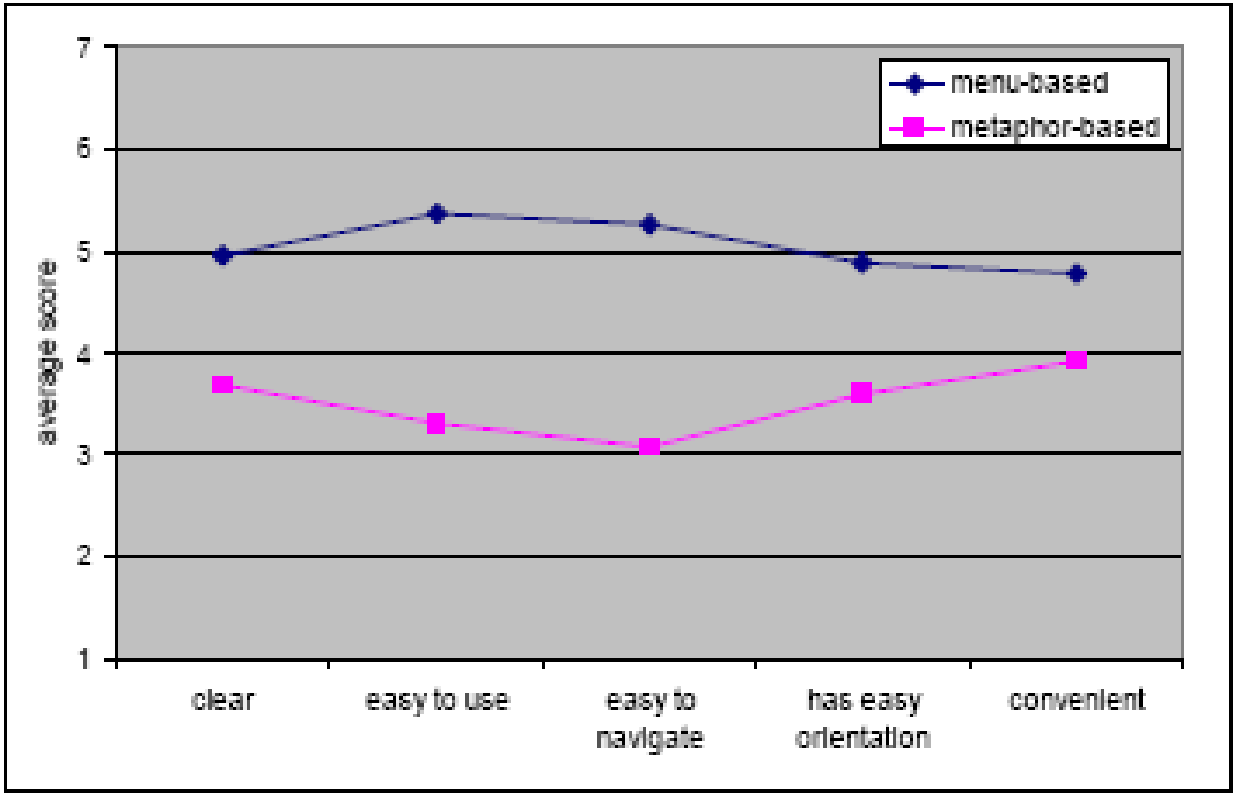
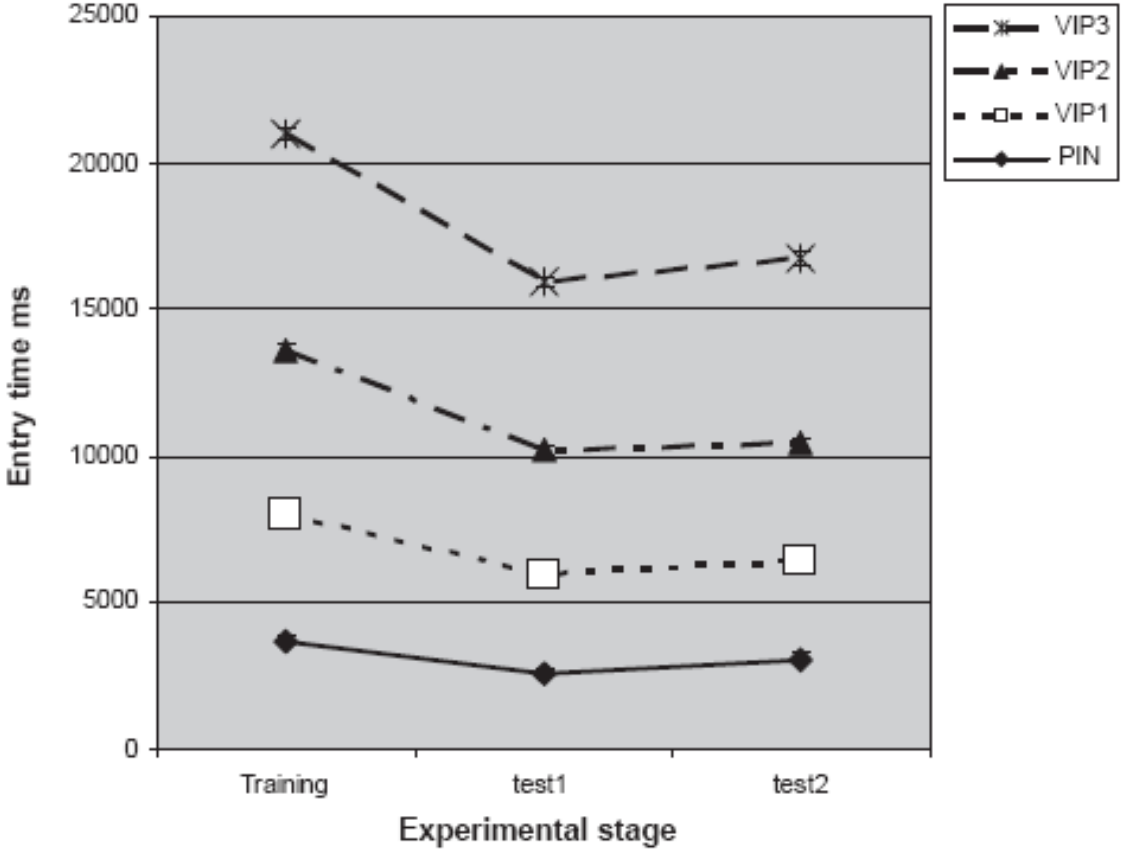
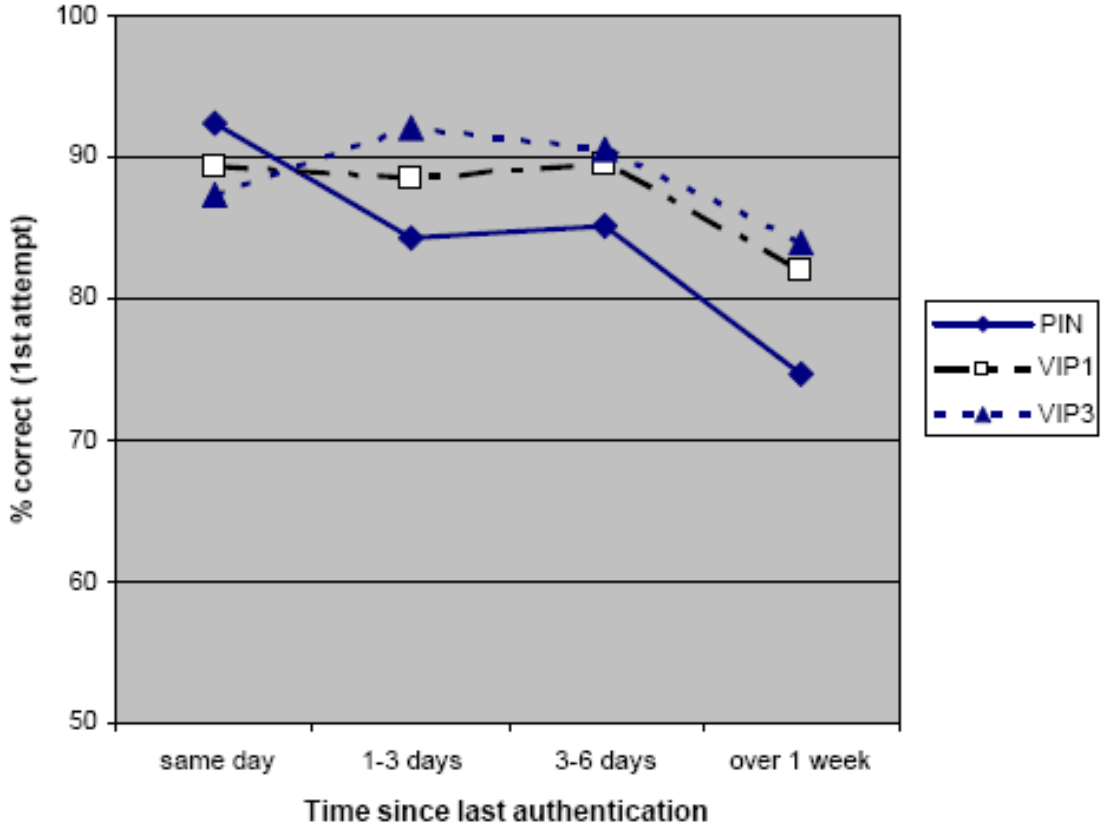


Figure 3: Usability ratings as a function of experimental condition

Line graphs


25000
20000
15000
10000
5000
0
Entry time ms
Training
test1
test2
Experimental stage
VIP3
VIP2
VIP1
PIN

Line graphs


100
90
80
70
60
50
% correct (1st attempt)
same day
1-3 days
3-6 days
over 1 week
Time since last authentication
PIN
VIP1
VIP3

Pie Charts

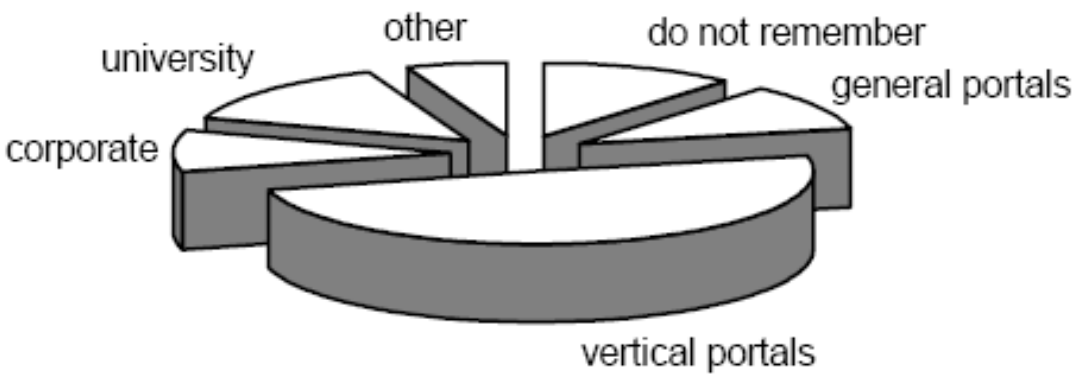


Figure 4. Type of site used to seek advice

Visual Aids must

- Be easy to read
- Have a title / labels/
- Be referenced in the paper
- Give information about the units represented in it
- Displays enough information but not too much

Statistics

- Central tendency
  - Means
    - Average
    - Interval scales on
    - Need enough data
    - Outliers
  - Median
    - Mead point in a distribution
    - Ordinal scale on
    - No effect of outliers
  - Mode
    - Most common value
    - Nominal on
    - No effect of outliers

Distribution

- Range
  - Distance between highest and lowest value
- Fractiles
  - Quartiles – deciles – percentiles
- Standard deviation
  - Average amount of variability in a set of scores
  - Average distance of each value from the mean

Presenting the findings

- Only make claims that your data can support
- The best way to present your findings depends on the audience, the purpose, and the data gathering and analysis undertaken
- Graphical representations may be appropriate for presentation
- Other techniques are:
  - Rigorous notations, e.g. UML
  - Using stories, e.g. to create scenarios
  - Summarizing the findings