part I: types of data

part II: what to do with all that data: data analysis techniques

W05 pre-reading quiz results

1. 86.4% got the correct answer
2. 94.4%
3. 61.6% guessed (a) & (b),
   36.8% guessed (a) (b) & (c)

Question 4 still being marked.
types of data & data analysis
where else we’re covering it

by now (W05 pre-readings)
• qualitative vs. quantitative data
• types of data that evaluation techniques generate
• two types of qualitative analysis methods
  – patterns and themes, critical incidents

upcoming assignments
• conducting observation + interview and analyzing results

learning goals
• describe the difference between data types in terms of subjective/objective and qualitative/quantitative;
• be able to give examples of each combination of data types on the spectrum for different analysis techniques
• describe methods for performing qualitative analysis, including the process and outcomes involved in each
• describe some simple techniques for quantitative analysis
part I: types of data

<table>
<thead>
<tr>
<th>Subjective</th>
<th>Data about a subject’s perspective, experiences, feelings, beliefs, and desires. Subjective data is personal, it’s someone’s opinion.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective</td>
<td>Data that is <em>not</em> influenced by emotions, opinions, or personal feelings. Based in <em>fact</em>, objective data is measurable, can be verified.</td>
</tr>
<tr>
<td>Qualitative</td>
<td>Data that is <em>not</em> expressed in numerical terms. Includes descriptions, quotes, images and stories.</td>
</tr>
<tr>
<td>Quantitative</td>
<td>Data that is in the form of numbers. It is a measure of something - number, size, etc.</td>
</tr>
</tbody>
</table>
types of data that evaluation methods provide

spectrum of data...

subjective:
- **users tell you** how frustrating a task is
- **you observe** users and note they appear to enjoy the app they are using

objective:
- measure **task performance** using time to complete, errors, dead-ends, learning curves for novices...
- **numerical data** from user-reported answers: e.g. # of books read per year
- **users tell you** what city they were born in

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types of data that evaluation methods provide

spectrum of data...

qualitative:
- **users tell you** of problems & situations of which they are aware
- **you observe** situations that users may not be fully aware of

quantitative:
- measure **task performance** using time to complete, errors, dead-ends, learning curves for novices...
- **numerical data** from user-reported answers: e.g. # of emails/day
- counting observed occurrences: e.g. # of times looked at instructions
activity 1: types of data that evaluation methods provide

<table>
<thead>
<tr>
<th></th>
<th>qualitative</th>
<th>quantitative</th>
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<tbody>
<tr>
<td>subjective</td>
<td></td>
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<tr>
<td>objective</td>
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</tbody>
</table>

transforming data

qualitative $\rightarrow$ quantitative
part II: what to do with all that data:
data analysis techniques

analyzing & interpreting data

where to start:
1) begin with initial reactions or observations from the data (e.g. patterns, simple calculations)
2) then more detailed analysis using structured frameworks/theories
analyzing & interpreting data

qualitative data – interpreted to tell a “story”
• categories, themes, patterns, etc.

quantitative data – presented as values, tables, charts and graphs
• counts (e.g., summary of total # of errors)
• simple statistical analysis (e.g., averages)
• advanced statistical analysis (e.g., linear regression)

likely as far as we’ll get

your choice of analysis method will depend on 1) the type of data you have, and 2) what you’re using it for

remembe you can often transform from qualitative to quantitative

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simple methods for qualitative analysis

• categorizing (coding) data
• critical incident analysis
• finding patterns and themes
  o tool: affinity diagrams

In all cases your aim is to interpret the data in ways that encapsulate and document your understanding.

many methods often used in combination

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qualitative analysis methods

*categories (coding) data*

typically used on transcripts (meetings, interviews, etc.)

- at **non-granular level of detail** to find stories or themes
- or at **fine levels of detail** focusing on words, sentences, gestures, etc.

First data is ‘coded’ according to a scheme of categories

- can be **predetermined** or **arise naturally** from the data

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**example of coded transcript**

*mid- to low-level of detail*

- When you move into your own home, you’re alone. There is no bustle of people around the house. I miss having someone to chat to when I get home. I put the TV or some music to
- lonely
- there’s some background noise, the silence makes me feel so alone. Sometimes I will be sat watching trash TV and thinking I should be out doing something rather than watching this.
- bored/depressed
- rubbish. I read a lot but sometimes I am too tired and just want to veg out. But it’s been good to move out of mum and dads as it’s not healthy to rely on them as they won’t last forever. I support independence and made my own decisions. It’s good they still there when I need them.
- distance/confide
- it’s good to have some distance as when I was at home I was arguing a lot with my dad and moving out that was made me decide it was time to go.
another example of coding data

[quiz marking spreadsheet example]

very informative approach, but time consuming! 
...not something you'll do in 344

qualitative analysis methods
categorizing (coding) data

results (quantitative or qualitative) then analyzed using appropriate methods. for example:

• average # problems mentioned per participant
• themes and patterns of behaviour
• recurring problems
qualitative analysis methods

critical incident analysis

identify and focus on the most significant incidents

• efficient when you have lots of data
• incidents can be either desirable or undesirable

NOT about summarizing all incidents that occur
→ more like finding tiny gold nuggets in buckets of sand

then analyze in detail and report on incidents

• often using combinations of other analysis techniques
  – e.g. themes and patterns between incidents
  – e.g. categorizing types of complaints made by users during incidents
activity 2: scenario

You are conducting evaluations of the graduation checklist as part of a project to design an online tool that will help students determine if they can graduate.

You have conducted a think-aloud observation with a student who worked through the B.Sc. graduation checklist. You want to analyze this session to identify issues with the materials that lead to problems.

The data available to analyze is:

- **video** of the think-aloud session
- **list** of courses and grad checklists the student filled out
- **field notes** (with timestamps corresponding to video)

activity 2(a): critical incident analysis

1. Get into groups of 4-5
2. Review field notes and **pick one critical incident** (labeled as C.I.1 and C.I.2 in field notes) to study in more detail
3. Review the materials available (including video) to:
   - understand the full problem this incident is a result of
   - identify the issues in the interface/materials that led to the problems
qualitative analysis methods  
*finding patterns and themes*

can emerge in many ways:
• through the process of conducting the study
• using tools and techniques (e.g. affinity diagrams)

can support many types of evaluation goals
• e.g., behaviour, culture, places or situations where events occur, breakdowns, user characteristics, etc.

very flexible and widely used
• can be reported as findings or inform more analysis
• also applicable to quantitative data

from quiz w05 – question 3

Which of the following are true of recurring patterns and themes in qualitative data:

(a) Can emerge during data gathering and initial processing steps.

(b) Can form the primary set of findings from a study, as well as identify data that could be analyzed in more detail.

(c) Describe specific incidents that are thought to be significant.

(d) Both (a) and (b)

(e) All of (a), (b) and (c)
affinity diagrams

- a tool for organizing and consolidating specific insights from collected data or ideas
- common technique to find recurring patterns/themes
- can be used for many purposes (including analysis)
  E.g. - brainstorming about design ideas
    → groups of ideas
    - comments from users
    → groups of desirable / successful features
    - problems observed/reported by users
    → groups of problems

affinity diagrams

process

1. Record each idea/observation/problem/etc. on an individual card or notes.
2. Look for notes that seem to be related.
3. Sort notes into groups until all used.
   - Sort and resort into larger clusters subgroups as necessary

Important to let groups emerge, rather than start with predefined groups.
activity 2(b): affinity diagramming

**Individually:**
1. Think back to your observations from the last activity. Review the field notes and your own notes
2. On post-it notes: write down each example of a problem/situation that you observed or see now

**In your group:**
3. Discuss the problems you wrote down, and generate any more you can think of
4. Organize the post-its into categories of problems

Be prepared to share the categories you find.
simple techniques for quantitative analysis

- averages (mean, mode, median)
- range, maximum, minimum
- percentages
- charts & graphs

averages & other descriptive statistics

- **mean** – “average” you’re used to
- **median** – middle value
- **mode** – most frequent
- **range** – difference between largest and smallest value
- **maximum**
- **minimum**
simple techniques for quantitative analysis

• averages (mean, mode, median)
• range, maximum, minimum
• percentages
• charts & graphs

bar charts!

<table>
<thead>
<tr>
<th>Question 2</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>0% 20% 40% 60% 80% 100%</td>
</tr>
<tr>
<td>A</td>
<td>40%</td>
</tr>
<tr>
<td>B</td>
<td>20%</td>
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<tr>
<td>C</td>
<td>15%</td>
</tr>
<tr>
<td>D</td>
<td>25%</td>
</tr>
</tbody>
</table>
how far do you take analysis?

as far as is helpful for your needs

useful until you have uncovered (with some rigor)...

• what are the most important activities/tasks to support
• key issues and areas that need improvement
• things that work well (and should be retained)
• where task dependencies occur
  people, resources, order
• what is essential vs. nonessential in an implementation
• ....etc.

→ from here, requirements begin to emerge
  (discuss next week!)