

# Human Computer Interaction

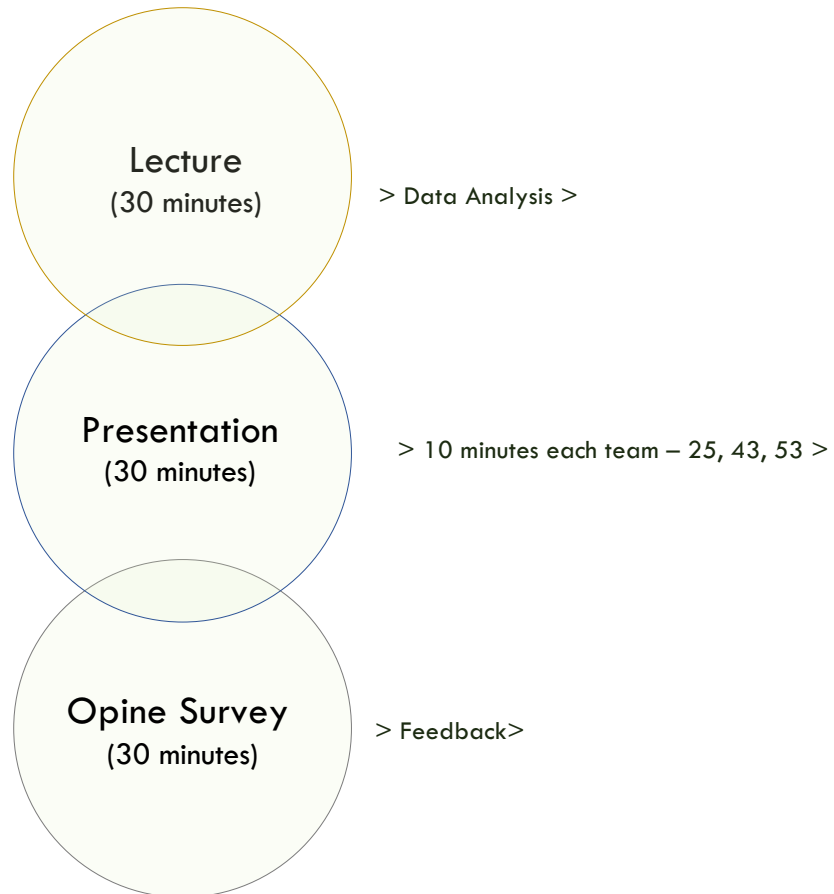


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## Agenda – 09 February



This week – 07 & 09 February

Monday 08 February

TEAMS - 12, 37, 51

**Wednesday 09 February**

TEAMS - **25, 43, 53**

Next week – 14 & 16 February

**Monday 14 February**

TEAMS - 1, 34, 47

**Wednesday 16 February**

TEAMS - 11, 45, 54

## Pre Mid-Semester

Week 1 (Jan)						Week 2 (Jan)						Week 3 (Jan)						Week 4 (Jan)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thurs	Fri	Sat
3	4	5	6	7	8	10	11	12	13	14	15	17	18	19	20	21	22	24	25	26	27	28	29
1st Day of Class				Last day for course Add/ Drop																Republic Day			TT
					H						H						H			H			Wed
Week 5 (Jan-Feb)						Week 6 (Feb)						Week 7 (Feb)						Week 8 (Feb)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
31	1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19	21	22	23	24	25	26
											TT							Mid-Sem Examinations (19th Feb - 23rd Feb)			Mid Recess		
					H						FRI										H	H	H

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Individual Assignment 1 THINKING ABOUT DESIGN 1	Individual Assignment 3 DOUBLE DIAMOND DESIGN PROCESS	Individual Assignment 5 HURISTIC EVALUATION	Group Assignment 1 COMPETITIVE ANALYSIS	Group Assignment 2 PERSONA	Group Assignment 4 INTERVIEWS (DATA COLLECTION)	INDIVIDUAL COGNITION SOCIAL INTERACTION EMOTIONAL INTERACTION	MID-SEM EXAMS + MID SEM BREAK
Individual Assignment 2 THINKING ABOUT DESIGN 1	Individual Assignment 4 USABILITY & DESIGN PRINCIPLES			Group Assignment 3 SCENARIO	Group Assignment 5 INTERVIEWS (DATA ANALYSIS)	Continue working on Group Assignment 4 & 5	

## Post Mid-Semester

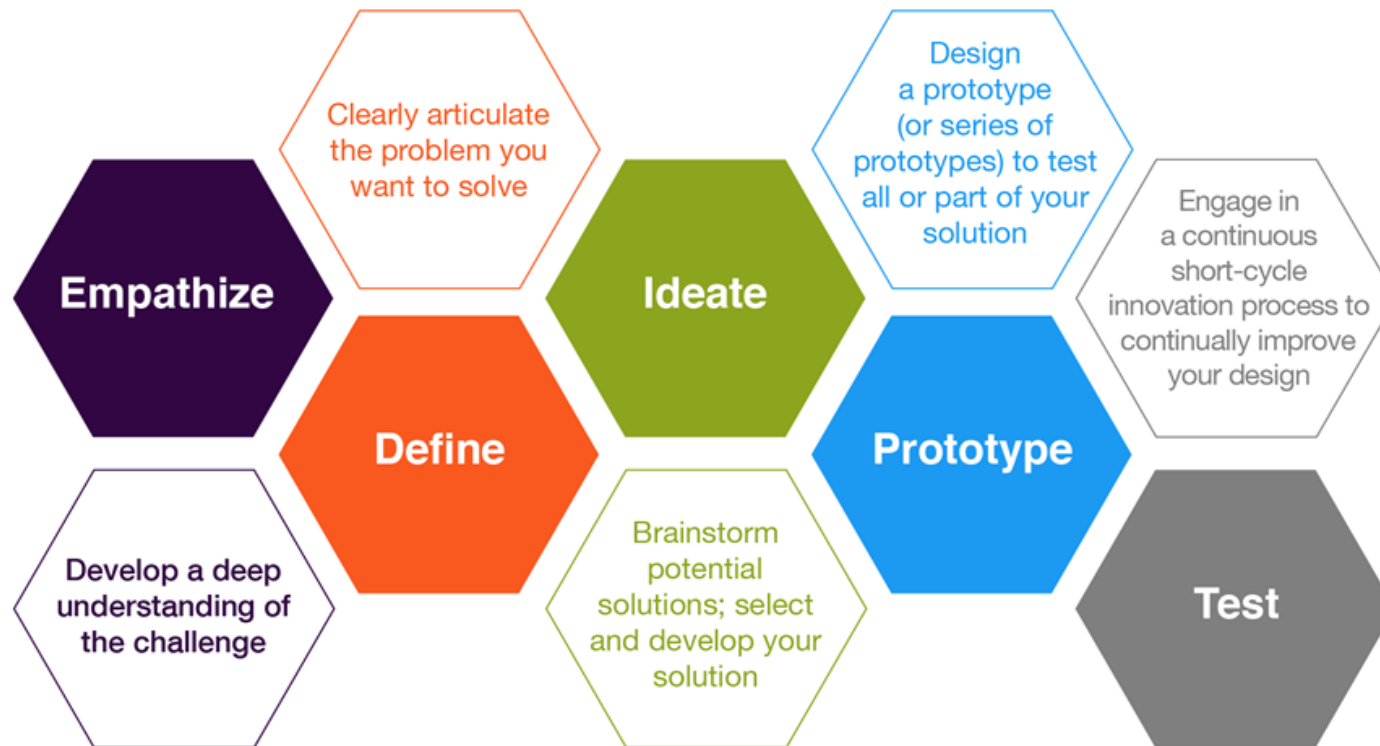
Week 9 (Feb-March)						Week 10 (March)						Week 11 (March)						Week 12 (March)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
28	1	2	3	4	5	7	8	9	10	11	12	14	15	16	17	18	19	21	22	23	24	25	26
	Mahashivr atri, Dropped GH															Holi						Pre- registration Starts	
					H						H						H						H
Week 13 (March-April)						Week 14 (April)						Week 15 (April)						Week 16 (April)					
Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat	Mon	Tue	Wed	Thur	Fri	Sat
28	29	30	31	1	2	4	5	6	7	8	9	11	12	13	14	15	16	18	19	20	21	22	23
					TT FRI				Last Day of the class	Research Showcase					Mahavir Jayanti	Good Friday				Moderation Meeting			
												End-Sem Examinations (9th April - 13th April 2022)				H	H	H					H

Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15
<p>Group In-Class Assignment 6 SPACE SATURATE &amp; AFFINITY DIAGRAMS</p> <p>Group Assignment 7 STORY BOARD</p>	<p>Group Assignment 8 INFORMATION ARCHITECTURE</p> <p>Submission of DATA COLLECTION &amp; DATA ANALYSIS (INTERVIEWS)</p>	<p>Group Assignment 9 LOW FIDELITY PROTOTYPE</p>	<p>Group Assignment 10 MEDIUM FIDELITY PROTOTYPE</p>	<p>Group Assignment 11 HIGH FIDELITY PROTOTYPE</p> <p>Group Assignment 12 PROTOTYPE EVALUATION</p>	<p>FINAL PROJECT PRESENTATION</p> <ol style="list-style-type: none"> <li>1. Problem Statement &amp; Competitive Analysis</li> <li>2. Data Gathering, Data Analysis</li> <li>3. Personas &amp; Scenarios</li> <li>4. Affinity Diagram</li> <li>5. Story Board</li> <li>6. Information Architecture</li> <li>7. Low-fi Prototypes</li> <li>8. Mid-fi Prototypes</li> <li>9. Hi-fi Prototype</li> <li>10. Prototype Evaluation</li> </ol>	<p>END-SEM EXAMS</p>

## Your project process

- **DEFINE**
  - Problem space
    - write a summary of the technology domain
- **EMPATHIZE**
  - Market insight (competitor analysis, interviews)
  - Audience insight (personas, user scenarios storyboards)
- **IDEATE**
  - User journey/scenario (goal-based journey)
  - Lo-Fi Sketching (interface & user flow)
- **PROTOTYPE**
  - Digital prototype (Med-fi & Hi-fi digital)
- **EVALUATE**
  - User testing (set-up & results)
  - Iterative design (incorporating feedback)

## Design Thinking Process





# *Data Analysis*

## Techniques of gathering data – Qualitative & Quantitative Methods

- 1) Interview (Structured or Unstructured)
- 2) Questionnaires & Surveys
- 3) Contextual Inquiry & Observation

### Data gathered & typical initial processing steps for interviews, questionnaires and observation

	Usual raw data	Example qualitative data	Example quantitative data	Initial processing steps
Interviews	Audio recordings. Interviewer notes. Video recordings	Responses to open questions. Video pictures. Respondent's opinions	Age, job role, years of experience. Responses to closed questions	Transcription of recordings. Expansion of notes
Questionnaires	Written responses. Online database	Responses to open questions. Responses in 'further comments' fields. Respondent's opinions	Age, job role, years of experience. Responses to closed questions	Clean up data. Filter into different data sets
Observation	Observer's notes. Photographs. Audio and video recordings. Data logs. Think-aloud	Records of behavior. Description of a task as it is undertaken. Copies of informal procedures	Demographics of participants. Time spent on a task. The number of people involved in an activity	Expansion of notes. Transcription of recordings. Synchronization between data recordings

## Data Analysis, Interpretation and Presentation

- The kind of **analysis** that can be performed on a set of data will be influenced by the goals identified at the outset, and the data actually gathered.
- Broadly speaking, you may take a **qualitative analysis** approach or a **quantitative analysis approach**, or a combination of qualitative and quantitative. The last of these is very common as it provides a more comprehensive account of the behavior being observed or performance being measured.
- Most analysis, whether it is quantitative or qualitative, begins with initial reactions or observations from the data. This might involve **identifying patterns** or calculating simple numerical values such as ratios, averages, or percentages.
- This initial analysis is followed by more detailed work using **structured frameworks** or **theories** to support the investigation.

## Objective Interpretation

- Interpretation of the findings often proceeds in parallel with analysis, but there are different ways to interpret results and it is important to make sure that the data supports your conclusions.
- A common mistake is for the investigator's existing assumptions, beliefs or biases to influence the interpretation of results.
- Another common mistake is to make claims that go beyond what the data can support. This is a matter of interpretation. The words 'many' or 'often' or 'all' need to be used very carefully when reporting conclusions.
- An investigator should remain as impartial and objective as possible if the conclusions are to be believed, and showing that your conclusions are supported by your results is an important skill to develop.
- In order to determine which of these potential interpretations is more accurate, it would be appropriate to look at other data.

## Presentation of Findings & Insights

- Finding the best way to present your findings & insights is also a skilled, and depends not only on your goals but also on the audience for whom the results were produced.
- For example, in the requirements activity you might choose to present your findings using a formal notation, while reporting the results of an evaluation to the team of developers might involve a summary of problems found, supported by video clips of users experiencing those problems.

## Qualitative and Quantitative

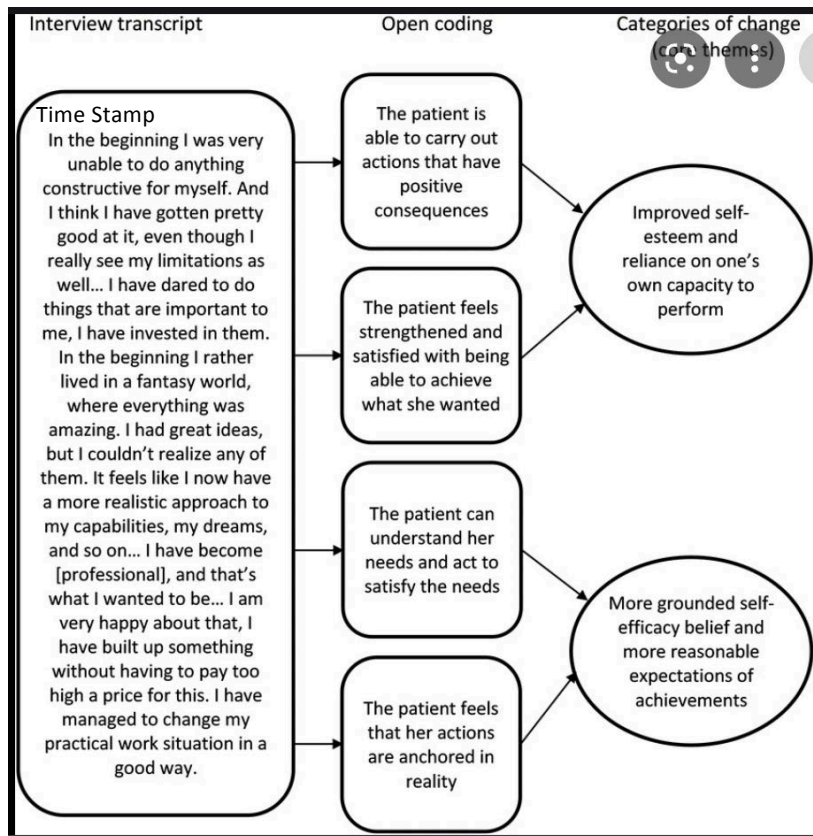
- Quantitative data is data that is in the form of numbers, or that can easily be translated into numbers. For example, the number of years' experience the interviewees have, the number of projects a department handles at a time, or the number of minutes it takes to perform a task.
- Qualitative data is not expressed in numerical terms. For example, qualitative data includes descriptions, quotes from interviewees, vignettes of activity, and images.
- Combination of quantitative and qualitative – For example, on a questionnaire, questions about the participant's age or number of software packages they use a day will result in quantitative data, while any comment fields will result in qualitative data. In an observation, quantitative data you may record includes the number of people involved in a project, or how many hours a participant spends trying to sort out a problem they encounter, while notes about the feelings of frustration, or the nature of interactions between team members, are qualitative data.
- As for interviews, closed questions are likely to be analyzed quantitatively and open questions qualitatively.

## The First Steps in Analyzing Data

- Having performed data gathering sessions, there is some initial processing of the data normally required before data analysis can begin.
- There are many different combinations of data, but here we discuss typical data collected through interviews, questionnaires, and observation sessions.

	Usual raw data	Example qualitative data	Example quantitative data	Initial processing steps
Interviews	Audio recordings. Interviewer notes. Video recordings	Responses to open questions. Video pictures. Respondent's opinions	Age, job role, years of experience. Responses to closed questions	Transcription of recordings. Expansion of notes
Questionnaires	Written responses. Online database	Responses to open questions. Responses in 'further comments' fields. Respondent's opinions	Age, job role, years of experience. Responses to closed questions	Clean up data. Filter into different data sets
Observation	Observer's notes. Photographs. Audio and video recordings. Data logs. Think-aloud	Records of behavior. Description of a task as it is undertaken. Copies of informal procedures	Demographics of participants. Time spent on a task. The number of people involved in an activity	Expansion of notes. Transcription of recordings. Synchronization between data recordings

## Analysing from Transcriptions of Interviews



- Raw interview data is usually in the form of audio recordings and interviewer notes. The notes need to be written up and expanded as soon as possible after the interview has taken place so that the interviewer's memory is clear and fresh. The audio recording may be used to help in this process, or it may be transcribed for more detailed analysis. Transcription takes significant effort, as people talk more quickly than most people can type (or write), and the recording is not always clear. It is therefore worth considering whether or not to transcribe the whole interview, or just sections of it that are relevant to your investigation.
- Interviews are sometimes video recorded, especially if the interviewee is given a task to perform or props are used to prompt discussion. The audio channel of the video data may also be transcribed.



## Analysing Raw Data from Questionnaires

- Raw data from questionnaires consists of the respondents' answers to the questions, and these may be in written format, or for online surveys, the data is likely to be in a database. It may be necessary to clean up the data by removing entries where the respondent has misunderstood a question.
- The data can be filtered according to respondent subpopulations, (e.g. everyone under 16) or according to a particular question (e.g. to understand respondents' reactions to color). This allows analyses to be conducted on subsets of the data, and hence to draw detailed conclusions for more specific goals.

## Observation & Contextual Inquiry

- This kind of data gathering can result in a wide variety of raw data including observer's notes, photographs, data logs, think-aloud recordings (often called protocols), video and audio recordings.
- All this raw data presents a rich picture of the activity under observation, but it can also make it difficult to analyze unless a structured framework is adopted. Initial data processing here would include writing up and expanding notes, visual analysis of photographs, transcribing of the audio and video recordings and the think-aloud protocols.
- For observation in a controlled environment, initial processing might also include synchronizing different data recordings.
- Transcriptions and the observer's notes are most likely to be analyzed using qualitative approaches, while photographs provide contextual information. Data logs and some elements of the observer's notes would probably be analyzed quantitatively.
- Throughout this initial processing, patterns and themes in the data may present themselves.

## Simple Quantitative Analysis

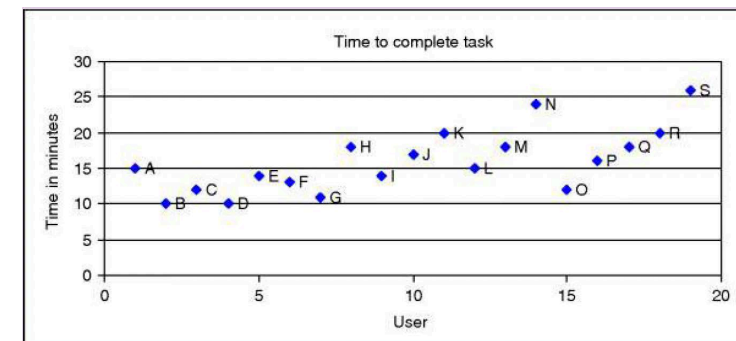
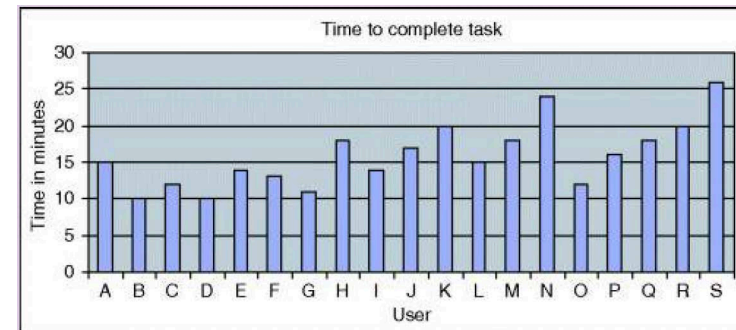
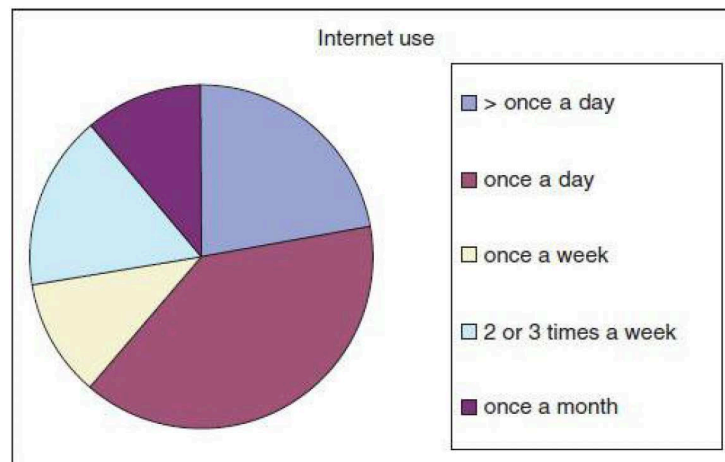
- Some simple quantitative analysis techniques can be use effectively in an interaction design context, like percentages & averages (mean, median, and mode).
- Before any analysis can take place, the data needs to be collated into analyzable data sets. Quantitative data can usually be translated into rows and columns.
- Need to be careful with column and not cluster similar e.g. 'don't know', 'maybe', 'no answer at all'... or cluster mindfully.
- Close-Ended Questions can be asked using:  
Spreadsheet, or a Simple Table      or      Likert Scale

Respondent	Easy to use	Tedious to use	Neither
A	1		
B			
C		1	
...		1	
Z			
Total	14	5	1 7

Respondent	Strongly agree	Agree	Neither	Disagree	Strongly disagree
A		1			
B	1				
C				1	
...					
Z					
Total	5	7	10	1	1 3

## Graphical Representation of Quantitative Data

- Bar Diagram/Graph
- Pie Diagram/Chart
- Scatter Diagram/Plot



## Responses Tabulated into Categories

Annoying						Pleasing
Easy to use						Difficult to use
Value-for-money						Expensive
Attractive						Unattractive
Secure						Not secure
Helpful						Unhelpful
Hi-tech						Lo-tech
Robust						Fragile
Inefficient						Efficient
Modern						Dated

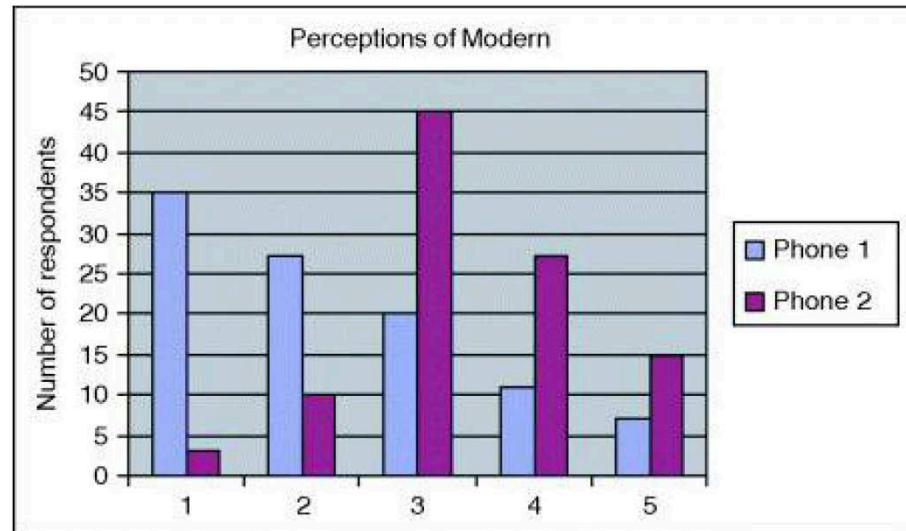
	1	2	3	4	5	
Annoying	35	20	18	15	12	Pleasing
Easy to use	20	28	21	13	18	Difficult to use
Value-for-money	15	30	22	27	6	Expensive
Attractive	37	22	32	6	3	Unattractive
Secure	52	29	12	4	3	Not secure
Helpful	33	21	32	12	2	Unhelpful
Hi-tech	12	24	36	12	16	Lo-tech
Robust	44	13	15	16	12	Fragile
Inefficient	28	23	25	12	12	Efficient
Modern	35	27	20	11	7	Dated

Phone 1

	1	2	3	4	5	
Annoying						Pleasing
Easy to use	24	23	23	15	15	Difficult to use
Value-for-money	37	29	15	10	9	Expensive
Attractive	26	32	17	13	12	Unattractive
Secure	38	21	29	8	4	Not secure
Helpful	43	22	19	12	4	Unhelpful
Hi-tech	51	19	16	12	2	Lo-tech
Robust	28	12	30	18	12	Fragile
Inefficient	46	23	10	11	10	Efficient
Modern	10	6	37	29	18	Dated
	3	10	45	27	15	

Phone 2

	1	2	3	4	5	
Annoying	35	20	18	15	12	Pleasing
Easy to use	20	28	21	13	18	Difficult to use
Value-for-money	15	30	22	27	6	Expensive
Attractive	37	22	32	6	3	Unattractive
Secure	52	29	12	4	3	Not secure
Helpful	33	21	32	12	2	Unhelpful
Hi-tech	12	24	36	12	16	Lo-tech
Robust	44	13	15	16	12	Fragile
Inefficient	28	23	25	12	12	Efficient
Modern	35	27	20	11	7	Dated



## Simple Qualitative Analysis

- There are three simple types of qualitative analysis
- Identifying recurring patterns and themes, categorizing data and analyzing critical incidents. These are not mutually exclusive and can be used in combination.

**Identifying Recurring Patterns or Themes** – There are different techniques for identifying themes in qualitative data.

- Affinity Diagram

The affinity diagram, which is used in contextual design is one common technique used in qualitative analysis. It aims to organize individual ideas and insights into a hierarchy showing common structures and themes. Notes are grouped together because they are similar in some fashion. The groups are not predefined, but emerge from the data.



Source: Figure 1, A. DeAngeli, U. Athavamker, A. Joshi, L. Coventry and G.I. Johnson (2004) "Introducing ATMs in India: a contextual inquiry", Interacting with Computers 16(1), 29–44. Reproduced with permission.



## Simple Qualitative Analysis

### Categorizing Data

- Transcripts of meetings, interviews, or think-aloud protocols can be analyzed at a high level of detail, such as identifying stories or themes, or at a fine level of detail in which each word, phrase, utterance, or gesture is analyzed.
- Elements identified in the data are usually categorized first using a categorization scheme.
- Which categories to use is largely determined by the goal of the study. One of the most challenging aspects is determining meaningful categories that are orthogonal (i.e. do not overlap). Another is deciding on the appropriate granularity for the categories (e.g. at word, phrase, sentence, or paragraph level); this is also dependent on the goal of the study and the data being analyzed.
- Also known as **Content Analysis** (Krippendorff, 2013). Content analysis typically involves categorizing the data and then studying the frequency of category occurrences. The technique may be used for any text, where 'text' refers to a range of media including video, newspapers, adverts, and so on.

## Simple Qualitative Analysis

- **Discourse Analysis**, is another way of analyzing a transcript. It focuses on the dialog, i.e. the meaning of what is said, and how words are used to convey meaning. Discourse analysis is strongly interpretive, pays great attention to context, and views language as a form of social reality that is open to interpretation from different perspectives. In this sense, the underlying philosophy of discourse analysis is similar to that of ethnography.
- By adding just three words, 'According to So and So...', the sense of authority changes, depending on what the reader knows about the author of the text and his/her work and reputation.
- **Conversation analysis** is a very fine-grained form of discourse analysis. In conversation analysis the semantics of the discourse are examined in fine detail, and the focus is on how conversations are conducted. This technique is used in sociological studies and examines how conversations start, how turn-taking is structured, and other rules of conversation. This analysis technique has been used to analyze interactions in a range of settings, and has influenced designers' understanding about users' needs in these environments. It can also be used to compare conversations that take place through different media, e.g. face-to-face versus email.



## Other Qualitative Analysis

- **Using Theoretical Frameworks**

Structuring the analysis of qualitative data around a theoretical framework can lead to additional insights that go beyond the results found from the simple techniques introduced earlier. However, these frameworks are quite sophisticated and using them requires investment to make sure that the framework is understood and applied appropriately. This section discusses three frameworks that are commonly used in interaction design to structure the analysis of data gathered in the field, such as observational and interview data:

Grounded Theory, Distributed Cognition, and Activity Theory.

- **Grounded theory** is an approach to qualitative data analysis that aims to develop theory from the systematic analysis and interpretation of empirical data, i.e. the theory derived is grounded in the data. In this respect it is a bottom-up development of theory since the data is needed to develop the theory. This contrasts with some types of analysis in which the theory (or previous published research) provides the categories used for the analysis of the data. The approach was originally developed by Glaser and Strauss (1967). The aim of grounded theory is to develop a theory that fits a set of collected data.

## Summary

- The kind of data analysis that can be done depends on the data gathering techniques used.
- Qualitative and quantitative data may be collected from any of the main data gathering techniques: interviews, questionnaires and observation.
- Quantitative data analysis for interaction design usually involves calculating percentages and averages. There are three different kinds of average: mean, mode, and median.
- Graphical representations of quantitative data help in identifying patterns, outliers, and the overall view of the data.
- Qualitative data may be analyzed using a variety of approaches including identifying categories or themes, and using theoretical frameworks, such as grounded theory.
- It was noted that presenting the results is just as important as analyzing the data, hence it is important to make sure that any summary or claim arising from the analysis is carefully contextualized, and can be justified by the data.

## Assignment 5

Submission Date: Saturday, 12th March 2022

### Interview:

#### GROUP PROJECT:

#### Objectives:

Plan and perform an analysis of the data gathered for your Final Project that is influenced by the goals identified at the outset and the data actually gathered.

#### 5. Data Analysis:

##### - Insights & Findings

- 1) Conduct a Basic Quantitative Analysis of the data that has been gathered for the Final Project and list your Insights and Findings.
- 2) Conduct a Basic Qualitative Analysis of the data that has been gathered for the Final Project and list your Insights and Findings.

#### Create a PDF

# Human Computer Interaction



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