

# Chapter 8

## Data analysis, interpretation and presentation



# Overview

- Qualitative and quantitative
- Simple quantitative analysis
- Simple qualitative analysis
- Tools to support data analysis
- Theoretical frameworks: grounded theory, distributed cognition, activity theory
- Presenting the findings: rigorous notations, stories, summaries

# Quantitative and qualitative

- Quantitative data – expressed as numbers
- Qualitative data – difficult to measure sensibly as numbers, e.g. count number of words to measure dissatisfaction
- Quantitative analysis – numerical methods to ascertain size, magnitude, amount
- Qualitative analysis – expresses the nature of elements and is represented as themes, patterns, stories
- Be careful how you manipulate data and numbers!

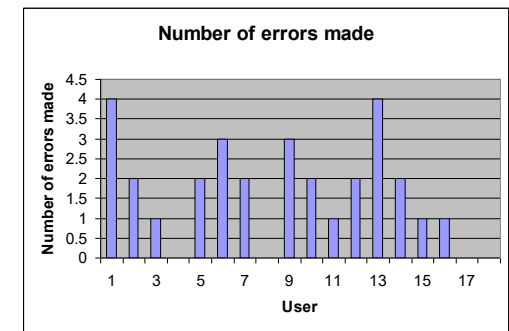
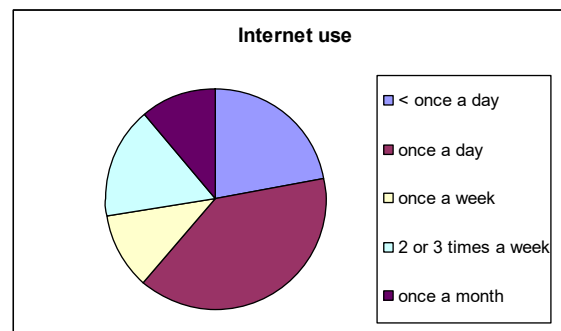
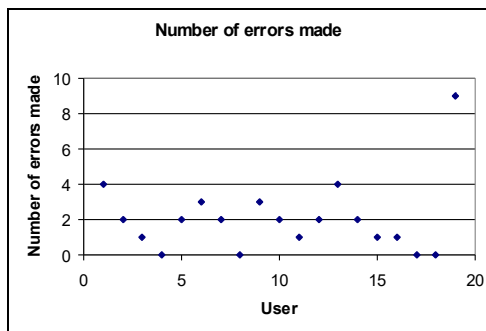
# Simple quantitative analysis

- Averages

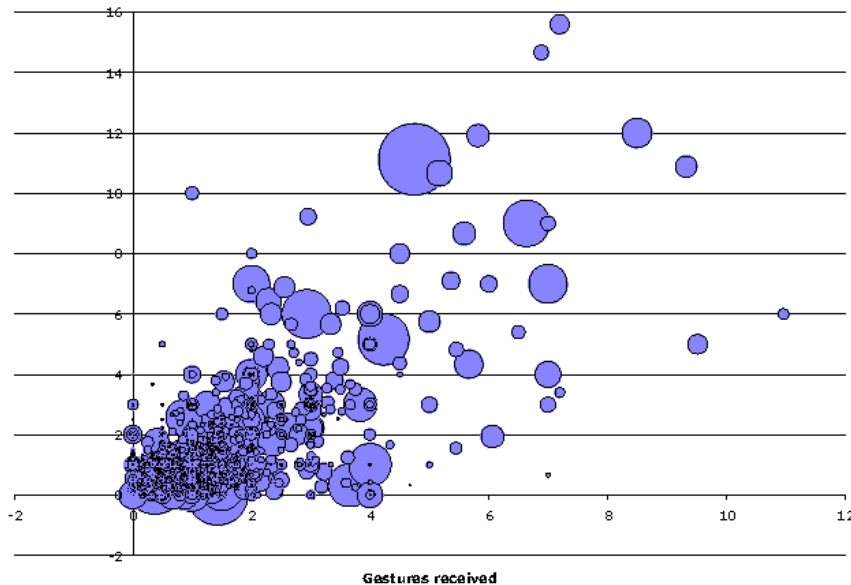
- Mean: add up values and divide by number of data points
- Median: middle value of data when ranked
- Mode: figure that appears most often in the data

- Percentages

- Graphical representations give overview of data

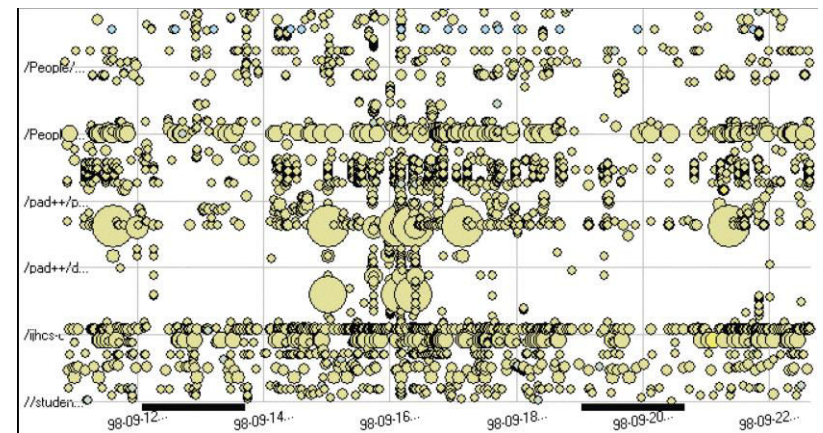


# Visualizing log data

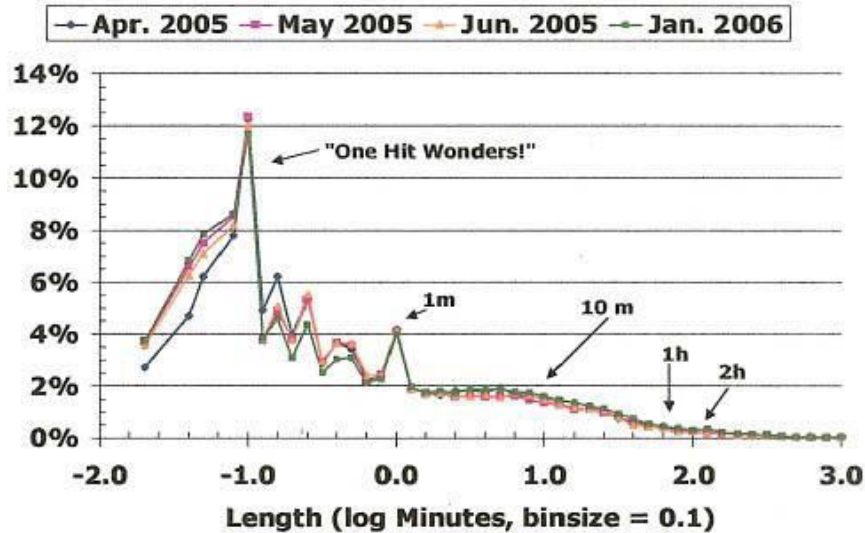


Interaction  
profiles of players  
in online game

Log of web page  
activity

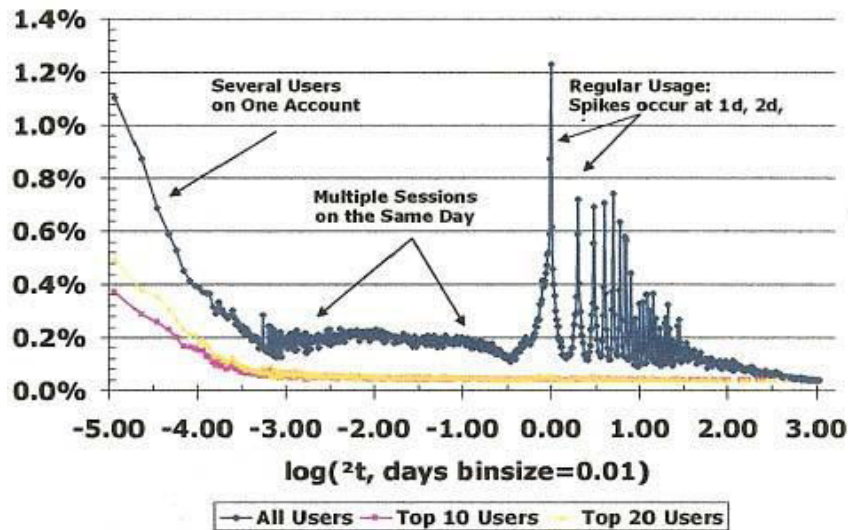


## Session Length



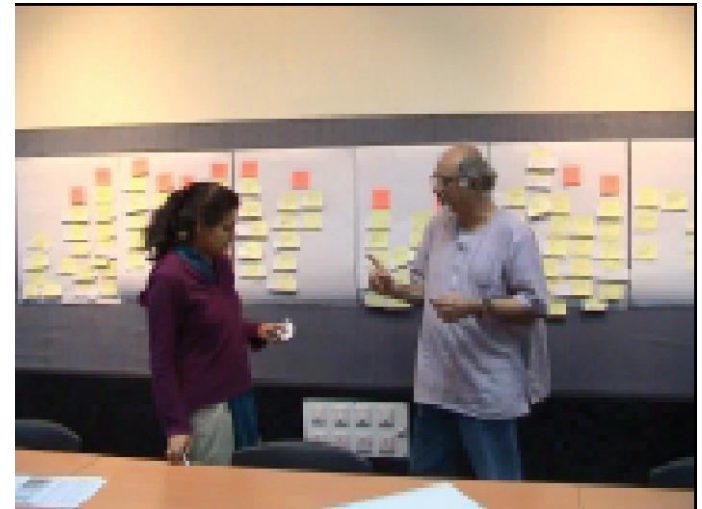
# Web analytics

## Login Frequency Histogram



# Simple qualitative analysis

- Recurring patterns or themes
  - Emergent from data, dependent on observation framework if used
- Categorizing data
  - Categorization scheme may be emergent or pre-specified
- Looking for critical incidents
  - Helps to focus in on key events



# Tools to support data analysis

- Spreadsheet – simple to use, basic graphs
- Statistical packages, e.g. SPSS
- Qualitative data analysis tools
  - Categorization and theme-based analysis, e.g. N6
  - Quantitative analysis of text-based data
- CAQDAS Networking Project, based at the University of Surrey (<http://caqdas.soc.surrey.ac.uk/>)



# Theoretical frameworks for qualitative analysis

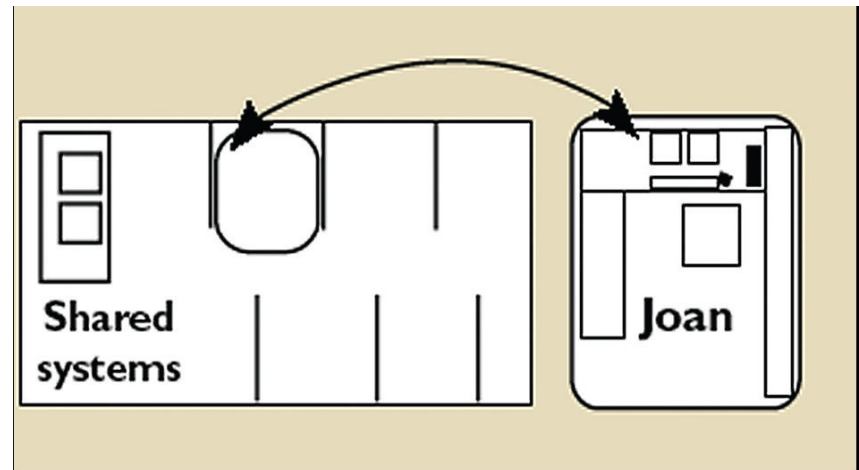
- Basing data analysis around theoretical frameworks provides further insight
- Three such frameworks are:
  - Grounded Theory
  - Distributed Cognition
  - Activity Theory

# Grounded Theory

- Aims to derive theory from systematic analysis of data
- Based on categorization approach (called here 'coding')
- Three levels of 'coding'
  - Open: identify categories
  - Axial: flesh out and link to subcategories
  - Selective: form theoretical scheme
- Researchers are encouraged to draw on own theoretical backgrounds to inform analysis

# Distributed Cognition

- The people, environment & artefacts are regarded as one cognitive system
- Used for analyzing collaborative work
- Focuses on information propagation & transformation



# Activity Theory

- Explains human behavior in terms of our practical activity with the world
- Provides a framework that focuses analysis around the concept of an 'activity' and helps to identify tensions between the different elements of the system
- Two key models: one outlines what constitutes an 'activity'; one models the mediating role of artifacts

# Individual model

Activity – Motive

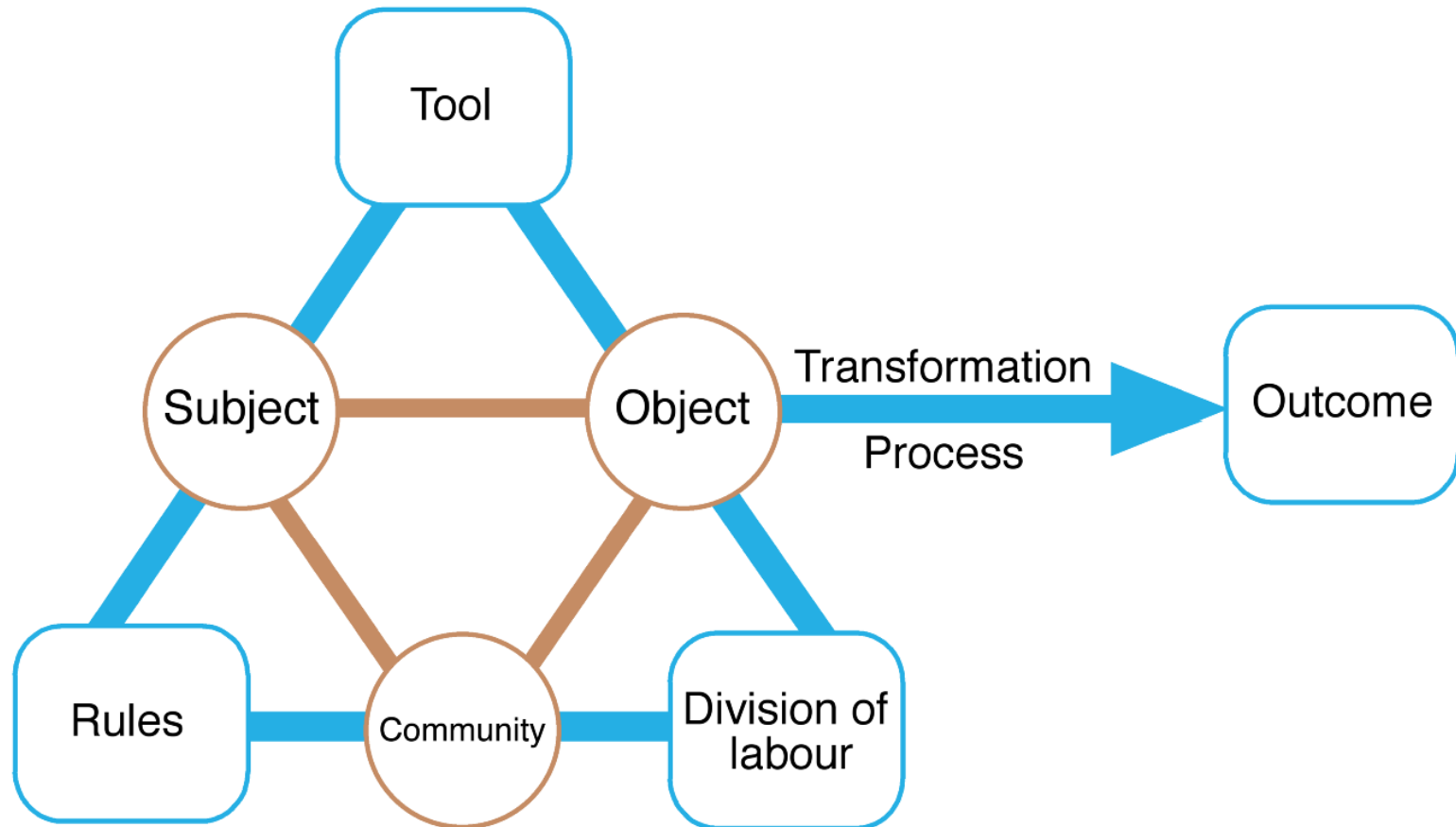


Action – Goal



Operation – Conditions

# *Engeström's (1999) activity system model*



# 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 (as discussed above) may be appropriate for presentation
- Other techniques are:
  - Rigorous notations, e.g. UML
  - Using stories, e.g. to create scenarios
  - Summarizing the findings

# Summary

- The data analysis that can be done depends on the data gathering that was done
- Qualitative and quantitative data may be gathered from any of the three main data gathering approaches
- Percentages and averages are commonly used in Interaction Design
- Mean, median and mode are different kinds of 'average' and can have very different answers for the same set of data
- Grounded Theory, Distributed Cognition and Activity Theory are theoretical frameworks to support data analysis
- Presentation of the findings should not overstate the evidence