

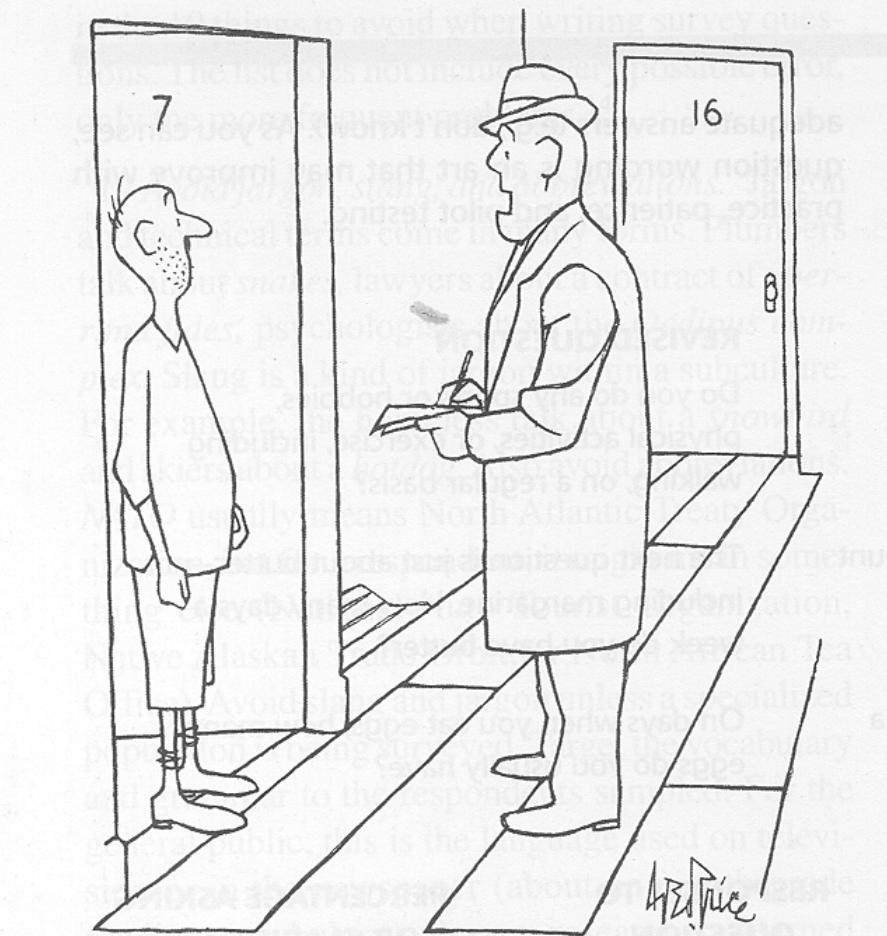
WEEK 12

QUALITATIVE DATA IN IS:

BASIC CONCEPTS

Wally Smith

COMP90044 Research Methods in IS



"Next question: I believe that life is a constant striving for balance, requiring frequent tradeoffs between morality and necessity, within a cyclic pattern of joy and sadness, forging a trail of bittersweet memories until one slips, inevitably, into the jaws of death. Agree or disagree?"

Week 12 Overview

- Survey methodology
- Exercise: writing a survey

BREAK

- Analysis of survey data – SPSS
- Thematic analysis of rich data

HISTORY AND CONCEPTS OF SURVEYS

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Survey of Computer and Internet Use

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Please first answer these background questions, then complete the rest of the survey.

Sex: Male Female

Age: years

Which of the following best describes your educational level?

- None
- Some elementary school
- Some secondary school
- Some university
- Advanced degree

In what country were you born?

In what country do you presently reside?

What is your religion?

In which of the following settings have you ever made use of a computer connected to the Internet? (check all that apply)

- cybercafe or other setting open to the public

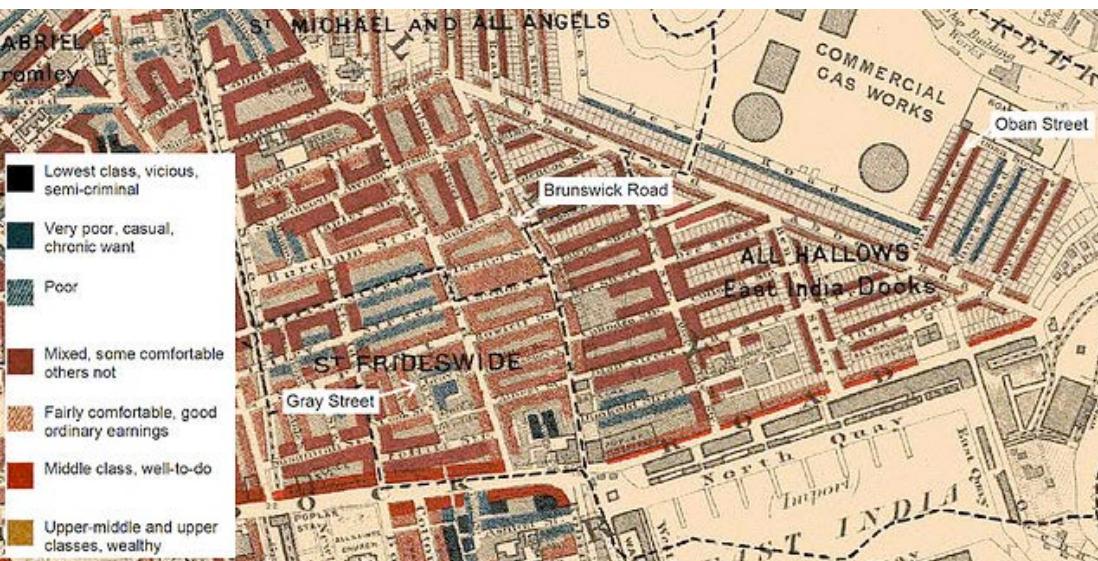
Origins of Surveys – a brief history

- Doomsday Book – England, 1086
- 19th Century - Social surveys, for example ...
 - Charles Booth's 17 volume 'Labour, Life & the People of London' (1889 – 1902)
 - Social Survey Movement (USA, Canada, Britain) eg. Pittsburgh Survey 1914

Doomsday Book

The Abbot (of St Benedict's of Ramsey) also holds Sethlingdone. It answers for 10 hides, land for 14 ploughs. In lordship 2 hides, 2 ploughs there. 27 villagers have 12 ploughs, 5 small-holders and 4 slaves. 1 broken mill which pays nothing, meadow for 6 ploughs, woodland for 100 pigs. The value is £12 and always was as much.





Charles Booth's “geodemographic” survey of life and labour in London (1886-1903)

- Lowest class. Vicious, semi-criminal.
- Very poor, casual. Chronic want.
- Poor. 18s. to 21s. a week for a moderate family
- Mixed. Some comfortable others poor
- Fairly comfortable. Good ordinary earnings.
- Middle class. Well-to-do.
- Upper-middle and Upper classes. Wealthy.

Social Survey Movement

The Pittsburgh Survey 1914



SAW MILL RUN.

These houses, facing on Steuben street, show dry closets emptying at the side of the run.

What Bad Housing Means to Pittsburgh

F. Elisabeth Crowell

Member Staff of Pittsburgh Survey, National Publication Committee,
Charities and The Commons

To the average householder in any city the housing problem is largely a question of bricks and mortar or stone or wood plus a desirable location. In the rapid development of urban life, what were once considered luxuries grew to be regarded as modern conveniences and have now become necessities. These, of course, he must have. If he is a property owner, he grumbles about the taxes; if he leases his house from another, he grumbles about the rent, and here the story ends for him. He knows in a vague way that a tenth of the city's population, familiarly known as the "submerged," live under conditions and amid surroundings which are, to say the least,

unpleasant, but beyond a comfortable feeling of gratitude that his lines have fallen in pleasant places, and a passing shade of careless pity for those other less fortunate ones, he gives no further thought to the subject. It has never occurred to him to consider the deeper issues underlying this matter of bad housing—considerations which have to do with the preservation of the public health, with the prevention of disease, and with the maintenance of certain recognized standards which make for the conservation of decency and morality among those who have been compelled by the pressure of economic forces to dwell in the adverse environment created by unsanitary,

John Snow's cholera map (1854)

London





Latter 20th century to today

After WWII modern quantitative survey emerges (gradually) with the following emphasis:

- **statistical sampling and precise measurement**
- **new applied areas** – like marketing, public opinion
- **professionalisation of research in universities** – shift to theoretical/conceptual rather than social/community focus (academia was reluctant to take on commercial methods!)

Survey information is now central

Many centres of excellence of surveys ...

- Australian Bureau of Statistics
- The Council of American Survey Research Organization (for commercial polling)
- World Association of Public Opinion Research

... with a central role in governance and commerce.

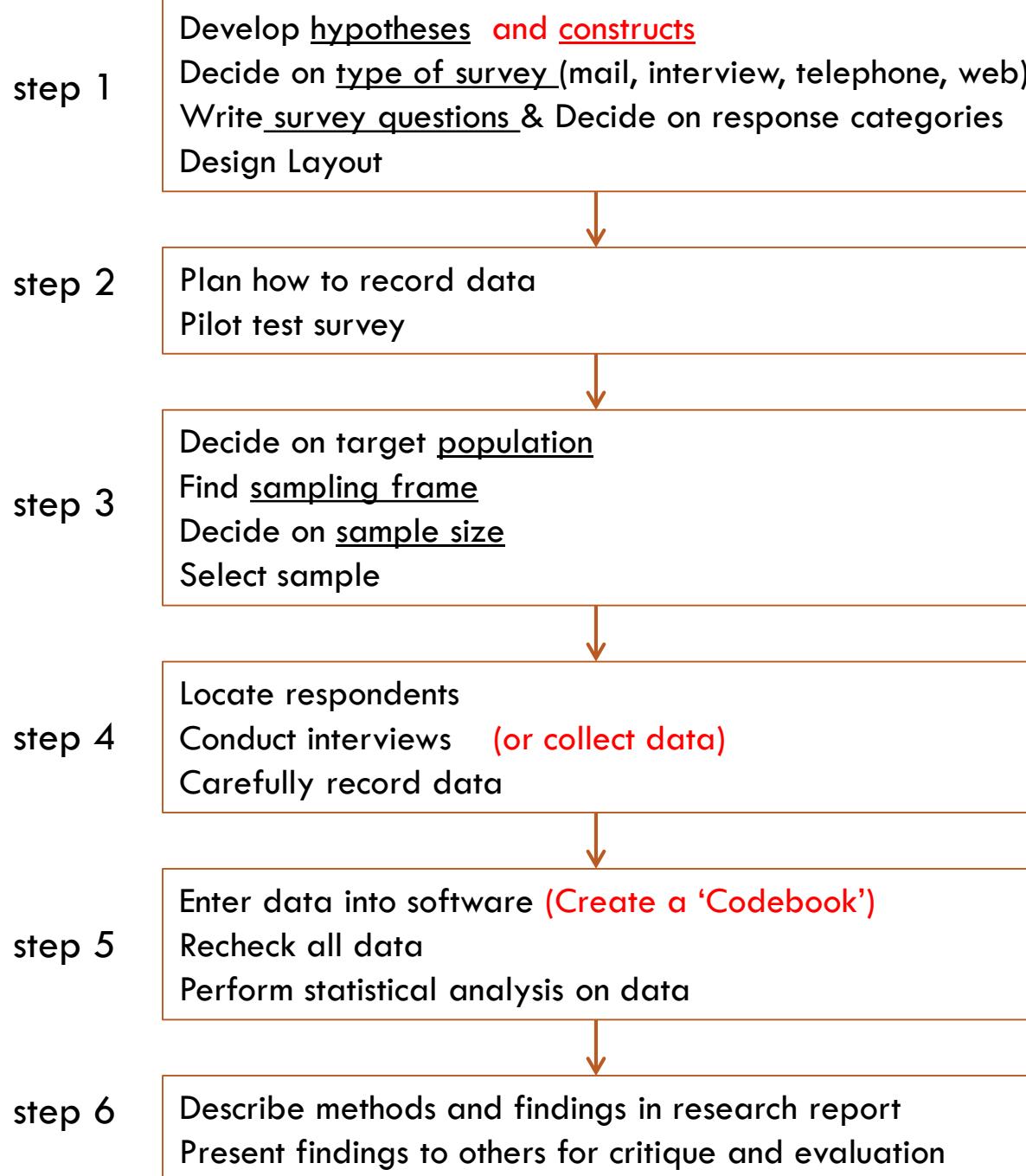
HOW TO DESIGN A SURVEY

An example of a survey

Imagine that you want to find out the reasons why people visit the website of a particular organization.

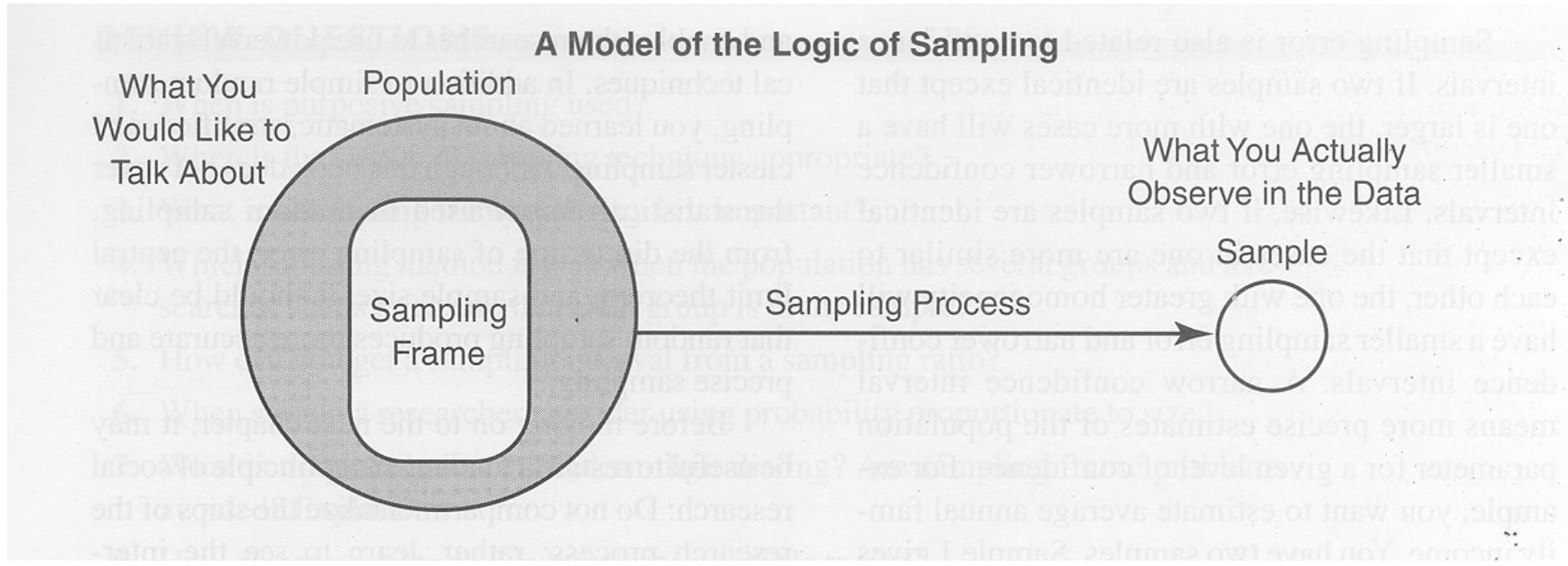
You want to know ...

- their reasons for visiting
- what they hope to find
- what other sites they might visit for the same reasons
- how much time they want to spend on the site
- how easily they find what they want
- if they find unexpected that are useful
- how much they remember later about the site



Populations & Samples

- **population:** The abstract set of entities that you are interested to know more about
- **elements or cases:** the units you want to study that make up the population: people, companies, software, decisions, budgets.
- **sample:** the selected set of elements that you actually study
- **sampling frame:** the ‘list’ or procedure that you use as a source of sample elements



EXAMPLE

Population: People who visit Telstra's website

Sampling Frame: People who agree to take part in the survey in response to an invitation placed on the website over one month, forming a list of possible participants.

Invited Sample: People selected by the researcher from the 'list'

Sample: People who actually provide data to the study.
(the 'return rate')

Example of Populations & Sampling Frames

- Population: People who like gardening in Melbourne.
- Sampling Frame: The list of people who registered for a garden show with contact details.

- Population: Knowledge workers who multi-task to a great extent.'
- Sampling Frame: A list of office workers in government departments located in Sydney's CBD.

- Population: Staff in large companies responsible for data back-up and recovery.
- Sampling Frame: People on an attendance list at a major international conference in 2017 who ticked a box saying 'Data-back up' in answer to the question 'What are your main duties?'

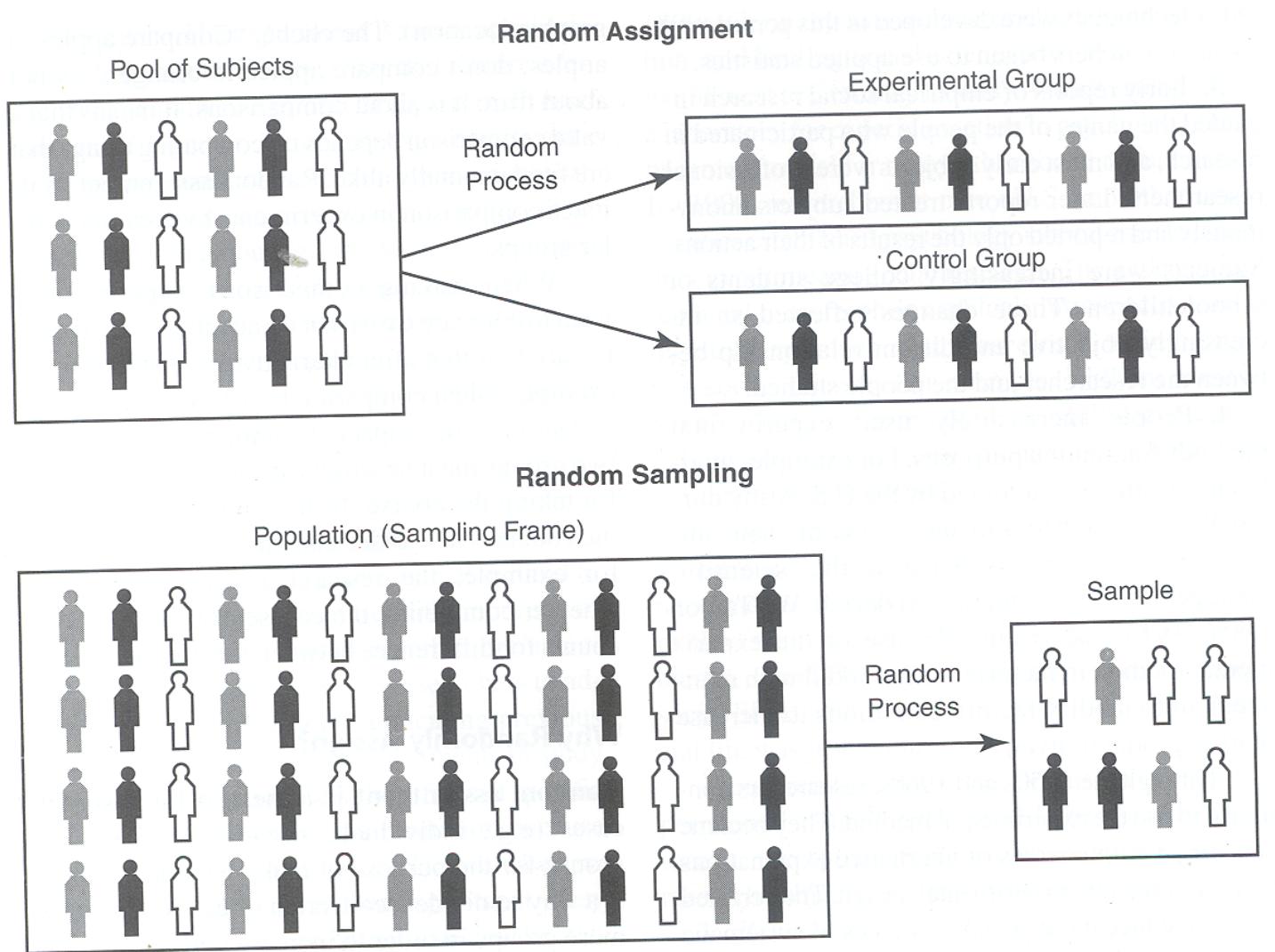


FIGURE 9.1 Random Assignment and Random Sampling

Types of Sampling Techniques

- **Simple Random:** Cases selected Picked at random from frame
- **Systematic:** Cases selected by a process –e.g. every 7th person on the list
- **Stratified:** Cases selected to ensure representation of the various ‘strata’ of the population (e.g., age ranges, ethnic groups, male/female)
- **Cluster:** Clusters first selected from population, then cases selected from chosen clusters

These all contrast with ...

- **Convenience sampling** = finding cases that are easiest to enroll in your study

BOX 8.2 Illustration of Stratified Sampling

Sample of 100 Staff of General Hospital, Stratified by Position

POSITION	POPULATION		SIMPLE RANDOM SAMPLE	STRATIFIED SAMPLE	ERRORS COMPARED TO THE POPULATION
	N	Percent	n	n	
Administrators	15	2.88	1	3	-2
Staff physicians	25	4.81	2	5	-3
Intern physicians	25	4.81	6	5	+1
Registered nurses	100	19.23	22	19	+3
Nurse assistants	100	19.23	21	19	+2
Medical technicians	75	14.42	9	14	+5
Orderlies	50	9.62	8	10	-2
Clerks	75	14.42	5	14	+1
Maintenance staff	30	5.77	3	6	-3
Cleaning staff	25	4.81	3	5	-2
Total	520	100.00	100	100	

Randomly select 3 of 15 administrators, 5 of 25 staff physicians, and so on.

Note: Traditionally, N symbolizes the number in the population and n represents the number in the sample.

The simple random sample overrepresents nurses, nursing assistants, and medical technicians, but underrepresents administrators, staff physicians, maintenance staff, and cleaning staff. The stratified sample gives an accurate representation of each position.

Example of cluster sampling

- Suppose you want to study all University of students of IT in Australia
- A three-stage cluster sampling technique
 - Stage 1: Select 6 of the 38 Universities at random
 - List all the IT courses from the chosen 6 universities
 - Stage 2: Select 12 of the all the courses identified
 - List all the students in the 12 courses identified
 - Stage 3: Select 200 of the 1200 students identified
 - The 200 students are now the sample of all IT university students in Australia.

How many cases do you need?

Depends on

The variability of scores in the population

The size of the expected differences that are being examined

The number of variables being measured

TABLE 8.4 Sample Size of a Random Sample for Different Populations with a 99 Percent Confidence Level

POPULATION SIZE	SAMPLE SIZE	% POPULATION IN SAMPLE
200	171	85.5%
500	352	70.4%
1,000	543	54.3%
2,000	745	37.2%
5,000	960	19.2%
10,000	1,061	10.6%
20,000	1,121	5.6%
50,000	1,160	2.3%
100,000	1,173	1.2%

[How It Works](#)[Products ▾](#)[Examples ▾](#)

Sample Size Calculator

How many people do you need to take your survey? Even if you're a statistician, determining survey sample size can be tough.

Want to know how to calculate it? Our sample size calculator makes it easy. Here's everything you need to know about getting the right number of responses for your survey.

Calculate Your Sample Size:

① Population Size:

① Confidence Level (%):

① Margin of Error (%):

Sample Size:

370

CALCULATE

HOW TO WRITE SURVEY QUESTIONS

Considerations in question writing

- Demographic questions
- Open / versus Closed answer formats
- Neuman's 10 pitfalls of question writing
- Response biases
- Sensitive topics
- Response rates

Demographic Questions

Demographic questions are designed to find out more information about the members of your sample ...

For example:

Age?

Male/Female?

Marital status?

Occupation?

etc

These questions relate to the identity of the participants and need to relevant to the study, framed carefully, and well-protected according to the approved Ethics procedure for the project.

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Please first answer these background questions, then complete the rest of the survey.

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Which of the following best describes your educational level?

- None
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- Some university
- Advanced degree

In what country were you born?

In what country do you presently reside?

What is your religion?

In which of the following settings have you ever made use of a computer connected to the Internet? (check all that apply)

- cybercafe or other setting open to the public

Open versus Closed

How would you describe your training on the new accounting software?

write your comments here

How would you describe your training on the new accounting software?



inadequate



OK, but
need much
more



OK, but
need a little
more



OK, and no
more needed

TICK ONE BOX

Neuman's 10 Tips of Survey Question Writing

TABLE 10.1 Summary of Survey Question Writing Pitfalls

THINGS TO AVOID	NOT GOOD	A POSSIBLE IMPROVEMENT
Jargon, slang, abbreviations	Did you drown in brew until you were totally blasted last night?	Last night, about how much beer did you drink?
Vagueness	Do you eat out often?	In a typical week, about how many meals do you eat away from home, at a restaurant, cafeteria, or other eating establishment?
Emotional language and prestige bias	"The respected Grace Commission documents that a staggering \$350 BILLION of our tax dollars are being completely wasted through poor procurement practices, bad management, sloppiness, bookkeeping, 'defective' contract management, personnel abuses and other wasteful practices. Is cutting pork barrel spending and eliminating government waste a top priority for you?"*	How important is it to you that Congress adopt measures to reduce government waste?
Double-barreled questions	Do you support or oppose raising social security benefits and increased spending for the military?	Very Important Somewhat Important Neither Important or Unimportant Somewhat Unimportant Not Important at All
Leading questions	Did you do your patriotic duty and vote in the last election for mayor?	Do you support or oppose raising social security benefits? Do you support or oppose increasing spending on the military?
Issues beyond respondent capabilities	Two years ago, how many hours did you watch TV every month?	Did you vote in last month's mayoral election?
False premises	When did you stop beating your girl-/boyfriend?	In the past two weeks, about how many hours do you think you watched TV on a typical day?
Distant future intentions	After you graduate from college, get a job, and are settled, will you invest a lot of money in the stock market?	Have you ever slapped, punched, or hit your girl/boyfriend?
Double negatives	Do you disagree with those who do not want to build a new city swimming pool?	Do you have definite plans to put some money into the stock market within the coming two months?
Unbalanced responses	Did you find the service at our hotel to be: Outstanding, Excellent, Superior, or Good?	There is a proposal to build a new city swimming pool. Do you agree or disagree with the proposal?
		Please rate the service at our hotel: Outstanding, Very Good, Adequate, or Poor.

*Actual question taken from a mail questionnaire that was sent to me in May 1998 by the National Republican Congressional Committee. It is also a double-barreled question.

BOX 10.8 Question Format Examples

EXAMPLE OF HORIZONTAL VERSUS VERTICAL RESPONSE CHOICES

Do you think it is too easy or too difficult to get a divorce, or is it about right?

- Too Easy
- Too Difficult
- About Right

Do you think it is too easy or too difficult to get a divorce, or is it about right?

- Too Easy
- Too Difficult
- About Right

EXAMPLE OF A MATRIX QUESTION FORMAT

	<i>Strongly Agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Strongly Disagree</i>	<i>Don't Know</i>
The teacher talks too fast.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I learned a lot in this class.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tests are very easy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The teacher tells many jokes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The teacher is organized.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

EXAMPLES OF SOME RESPONSE CATEGORY CHOICES

Excellent, Good, Fair, Poor

Approve/Disapprove

Favor/Oppose

Strongly Agree, Agree, Somewhat Agree, Somewhat Disagree, Disagree, Strongly Disagree

Too Much, Too Little, About Right

Better, Worse, About the Same

Regularly, Often, Seldom, Never

Always, Most of Time, Some of Time, Rarely, Never

More Likely, Less Likely, No Difference

Very Interested, Interested, Not Interested



Likert item

Response Biases

Research into the reliability of survey questions show that they can suffer from various forms of bias = influenced by circumstances of how the questions are posed and answered:

Biased non-response

Response format effects

Order effects, Recency effects

Telescoping on recent events

Social desirability

Under reporting of threatening and sensitive topics

Biased Non-Response

Many questions will get a NON-RESPONSE. Sometimes allowed by the questionnaire.

This creates a Bias if a particular answer is over represented in the NON-RESPONDENTS

Questionnaire sent from the IT department to staff ...

Do you sometimes get angry when IT Help does not answer your help request quickly?

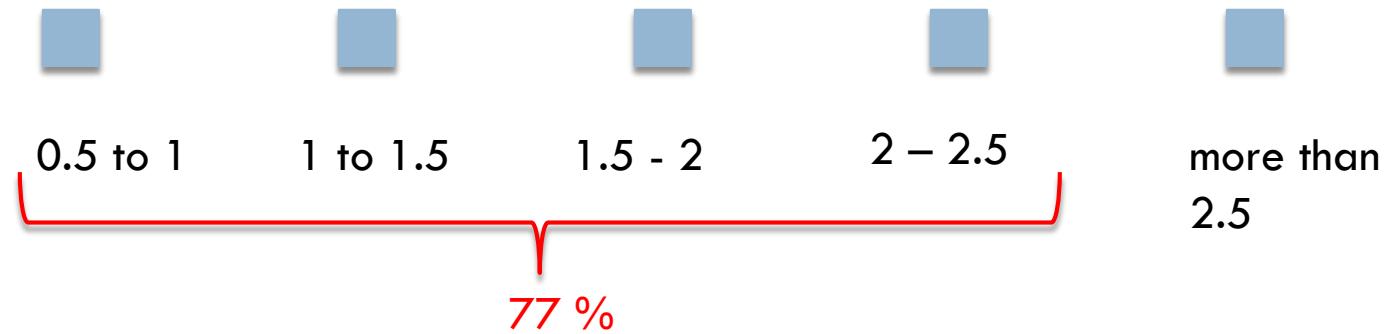
Yes

No

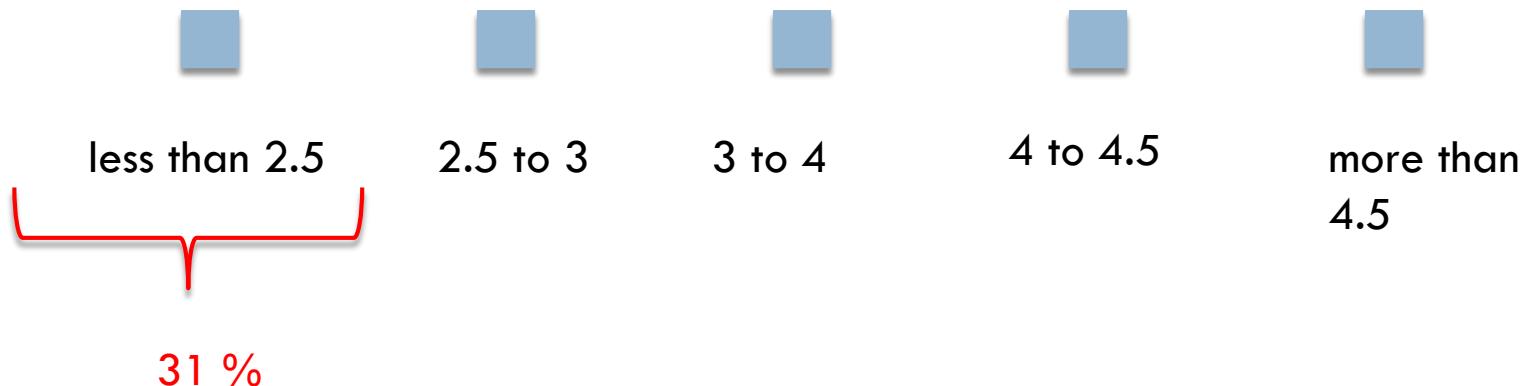
Response range effect

Question to students

How many hours a day do you study?



How many hours a day do you study?



Social desirability

People report a positive view of themselves

e.g. in one study 34% report giving money charity (when other sources indicated they did not)

Particularly affects face to face & telephone interview method

TABLE 10.4 Types of Surveys and Their Features

FEATURES	TYPE OF SURVEY			
	Mail Questionnaire	Telephone Interview	Face-to-Face Interview	Web Survey
<i>Administrative Issues</i>				
Cost	Cheap	Moderate	Expensive	Cheapest
Speed	Slowest	Fast	Slow to moderate	Fastest
Length (number of questions)	Moderate	Short	Longest	Moderate
Response rate	Lowest	Moderate	Highest	Moderate
<i>Research Control</i>				
Probes possible	No	Yes	Yes	No
Specific respondent	No	Yes	Yes	No
Question sequence	No	Yes	Yes	Yes
Only one respondent	No	Yes	Yes	No
Visual observation	No	No	Yes	Yes
<i>Success with Different Questions</i>				
Visual aids	Limited	None	Yes	Yes
Open-ended questions	Limited	Limited	Yes	Yes
Contingency questions	Limited	Yes	Yes	Yes
Complex questions	Limited	Limited	Yes	Yes
Sensitive questions	Some	Limited	Limited	Yes
<i>Sources of Bias</i>				
Social desirability	No	Some	Worse	No
Interviewer bias	No	Some	Worse	No
Respondent's reading skill	Yes	No	No	Some

ANALYSIS OF SURVEY DATA

The Analysis of Survey Data

from Week 6 As for any set of data, presentation and plots are a vital part of the analysis and the communication of findings.

The level of measurement is an important consideration.

Nominal data - very common in surveys: eg., country of origin, car ownership

Ordinal data – very common in surveys: 5-point rating scales are usually at this level

Interval data - less common in social surveys. But many analytical surveys and questionnaires can be used to produce Scales – that is a sum of scores on particular items, e.g. an extroversion/introversion scale, or a lie scale.

Ratio data - also important in surveys, eg. Age, years of experience, time spent doing an activity.

Tests of Association

Statistical tests for survey data typically ask about possible **associations** between the different measures. Does one variable affect another variable?

Categorical Data tests (there are many others)

- CHI square test widely used (See Survey Analysis Example–Analysis 1)
- Lamba – is a test for the strength of association between nominal variables; Kendall tau – is a test of the same for ordinal data

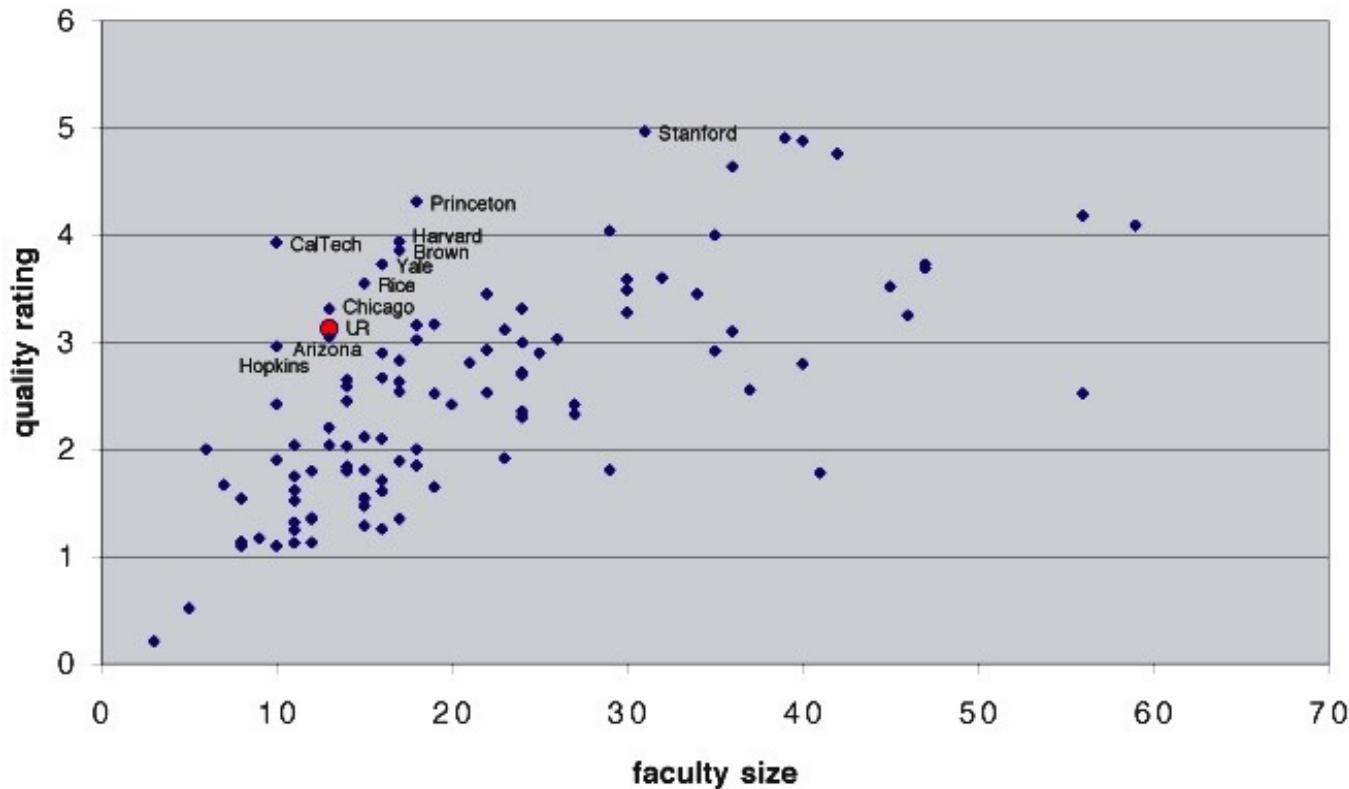
Continuous Data tests

- Pearson's r (a correlation coefficient) – is the most widely used measure for interval or ratio data (Analysis 2)

SATISFACTION WITH FINANCIAL SITUATION * JOB OR HOUSEWORK Crosstabulation

		JOB OR HOUSEWORK				Total	
		VERY SATISFIED	MOD. SATISFIED	A LITTLE DISSAT	VERY DISSATISFI ED		
SATISFACTION WITH FINANCIAL SITUATION	SATISFIED	Count	274	94	18	3	389
		% within JOB OR HOUSEWORK	35.4%	16.5%	13.4%	5.7%	25.4%
	MORE OR LESS	Count	331	262	50	14	657
		% within JOB OR HOUSEWORK	42.7%	46.0%	37.3%	26.4%	42.9%
	NOT AT ALL SAT	Count	170	214	66	36	486
		% within JOB OR HOUSEWORK	21.9%	37.5%	49.3%	67.9%	31.7%
Total		Count	775	570	134	53	1532
		% within JOB OR HOUSEWORK	100.0%	100.0%	100.0%	100.0%	100.0%

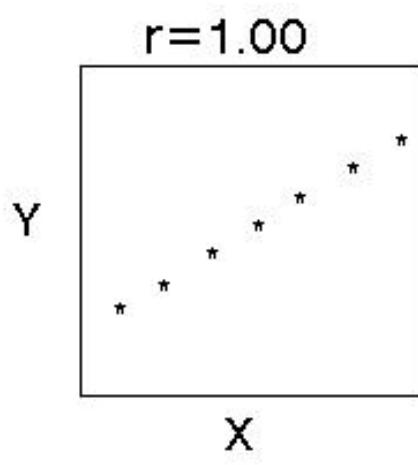
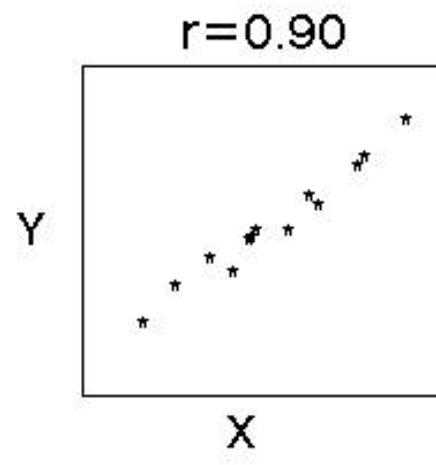
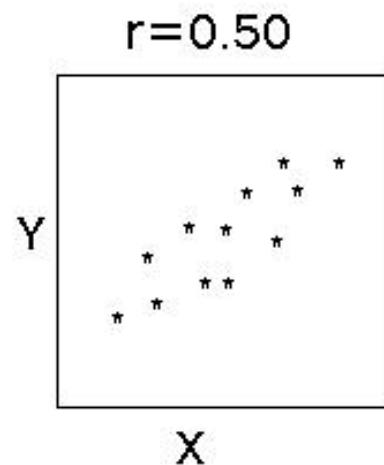
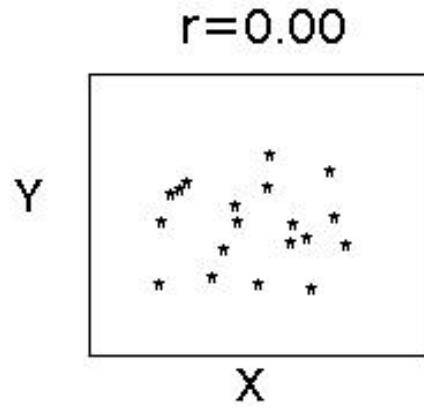
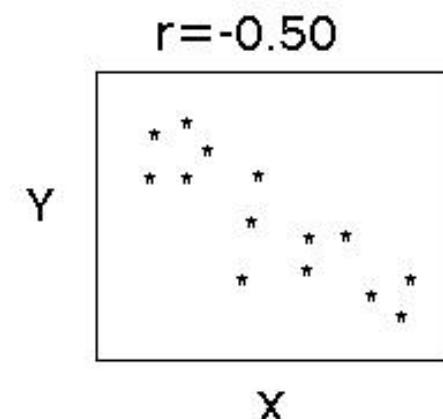
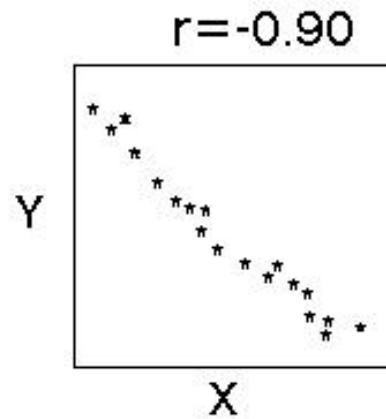
Correlation



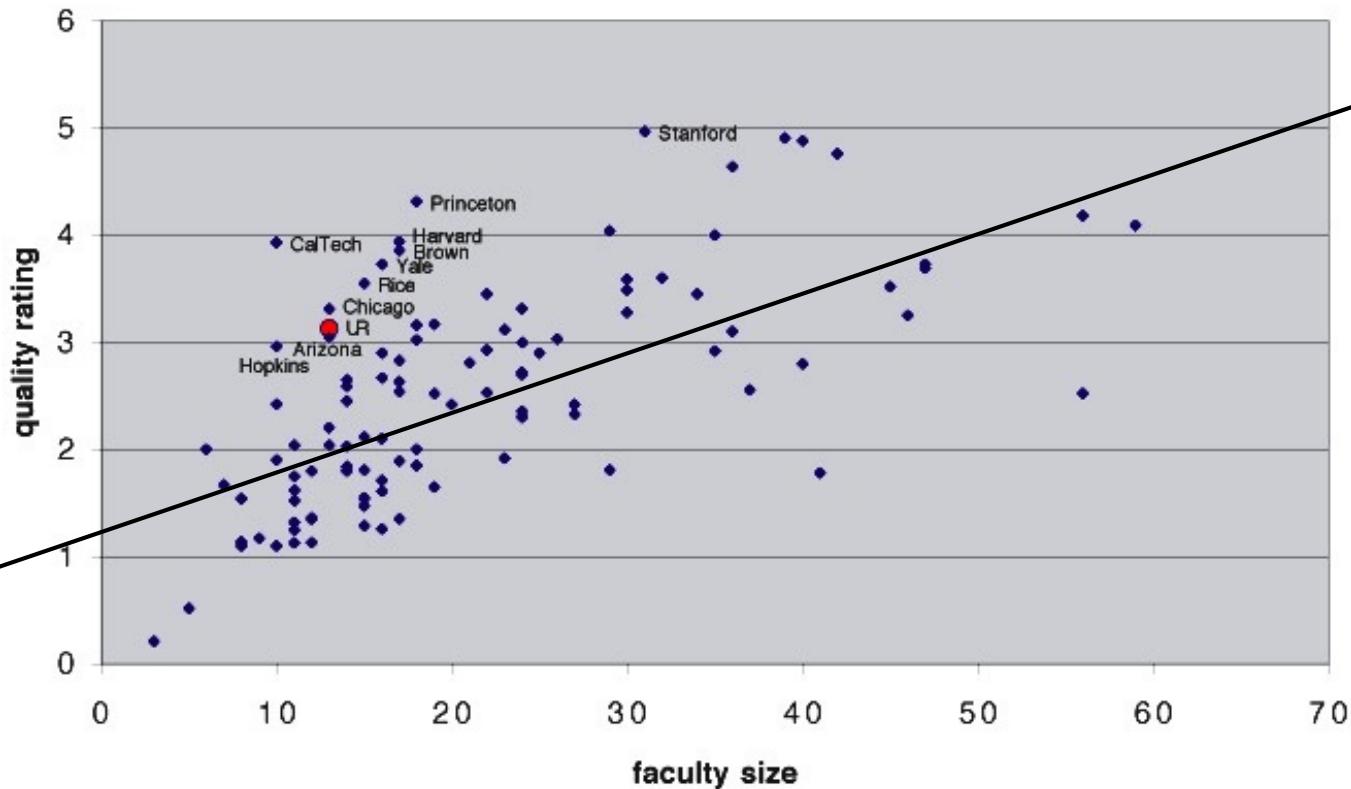
National Research Council Study of Ph.D. Programs in Computer Science, 1995.

Correlation - Pearson r

Pearson r is the most common correlation coefficient for continuous & normal data



Regression



Regression

Regression is a related technique to fit an equation to correlation data (of interval or scale level)

Linear regression fits a straight line to the data – giving an estimate of the slope of the line and its intercept with the y-axis

In regression we ask to what extent can we predict one variable from the other?

r^2 , ie. the square of the correlation coefficient

= proportion of variance in factor Y explained by factor X

More complex tests ...

There is a large family of statistical methods that builds on this approach and asks more complex questions about sets of interval/scale measures.

Two examples are ...

Factor analysis. Is a technique for reducing the overall number of variables by looking for groups of variables that correlate closely together. It is possible to identify latent variables – things which haven't been measured but are hypothetical variables that correlate closely with a group of measures.

Structured Equation Modelling. Builds on the idea of factor analysis and regression. It looks for produces a model normally shown as a diagram that links variables together through causal links.

THEMATIC ANALYSIS OF RICH DATA (Interviews, Open-ended questions)

The examples in this section are from:

Michael Muller & Sandra Kogan 'Grounded theory method in HCI and CSCW', IBM

Thematic analysis methods

A large family of methods that provide systematic ways to interpret rich data.

Typically they involve adding codes to the data to identify points of interest, and then building up these codes into higher level concepts

There are many software tools that assist with this coding process: examples are NVivo, ATLAS.ti, MAXQDA, Quirkos, Dedoose, Provalis Research, webQDA, Raven't Eye, HyperRESEARCH, Focuss On, F4analyse, Annotations, Qiqlqa, Datagrav, Interpris, ... others.

Dementia carers 8.nvp - NVivo

File Edit View Go Project Links Code Format Tools Window Help

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Normal Free Nodes

Code At Name

Nodes

- Free Nodes
- Tree Nodes
- Cases
- Relationships
- Matrices
- Search Folders
 - All Nodes

Sources

Nodes

Sets

Queries

Models

Links

Classifications

Folders

Look for: Search In: Free Nodes Find Now Clear Options

Free Nodes

Name	Sources	References	Created On	Created By	Modified On	Modified By
bowling competitio	1	1	6/18/2006 10:20	GRG	6/18/2006 10:2	GRG
at home	1	1	3/13/2007 2:40	GRG	3/13/2007 2:40	GRG
Nurse	1	5	6/17/2006 3:59	GRG	3/13/2007 12:5	GRG
Walk	1	2	3/13/2007 4:09	GRG	3/13/2007 4:10	GRG
When first noticed	1	1	11/14/2006 5:39	GRG	3/13/2007 12:5	GRG

Barry

INTERVIEWER
Have you had to give anything up specifically that you enjoyed doing that was important to you?

BARRY
Well, the only thing that we've really given up is - well we used to go dancing. Well she can't do it now so I have to go on my own, that's the only thing really. And then we used to go indoor bowling at the sports centre. But of course, that's gone by the board now. So we don't go there. But I manage to get her down to works club, just down the road on the occasional Saturdays, to the dances. She'll sit

Changes
Togetherness
Core activity
Activities
Coding Density

Dancing
Bowling
Dances
Doing for

Joint activities ceased
Joint activ

GRG Nodes: 16 References: 20 Read-Only Line: 138 Column: 0

Grounded Theory

One very influential approach to thematic analysis is Grounded Theory (Glaser & Strauss, 1967)

Aimed to help us make sense of a new domain where we currently have little understanding.

There are many different approaches within Grounded Theory.

We will look at just some of its ideas about coding qualitative data.

Start by making Open Codes

Open codes identify the elements of what it being described, or how it is being described, or whatever strikes the researcher as of interest.

Informant Statement	Open code
From my perspective	• <i>Personal view</i>
the main challenge is	• <i>Assertion</i>
in changes in technology	• <i>Changes in technology</i>
or the product improvement	• <i>Changes in product</i>
done by the ... supplier.	• <i>Supplier</i>
You	• <i>Pronoun shift</i>
can never guarantee that	• <i>Assertion Uncertainty</i>
if you are buying several	• <i>Procurement</i>
they will all be the same.	• <i>Product inconsistency</i> • <i>Necessary condition</i>

Figure 4. Microanalysis coding from a study of Configuration Management (CM) (excerpted from Allen, 2003)

Informant Statement	Open code
Status accounting is used to report monthly to the Project Board.	• <i>CM process</i>
Main difficulty is in getting people to buy-in to CM.	• <i>People difficulty</i>
3 rd parties have a preconceived set of established tools and are not willing to see the in-house point of view	• <i>People difficulty</i> • <i>Tool difficulty</i>
Developers saw CM as a control mechanism rather than a helpful tool.	• <i>Not helpful</i> • <i>Control</i> • <i>People difficulty</i>

Figure 5. Key-point coding form a study of Configuration Management (excerpted from Allen,

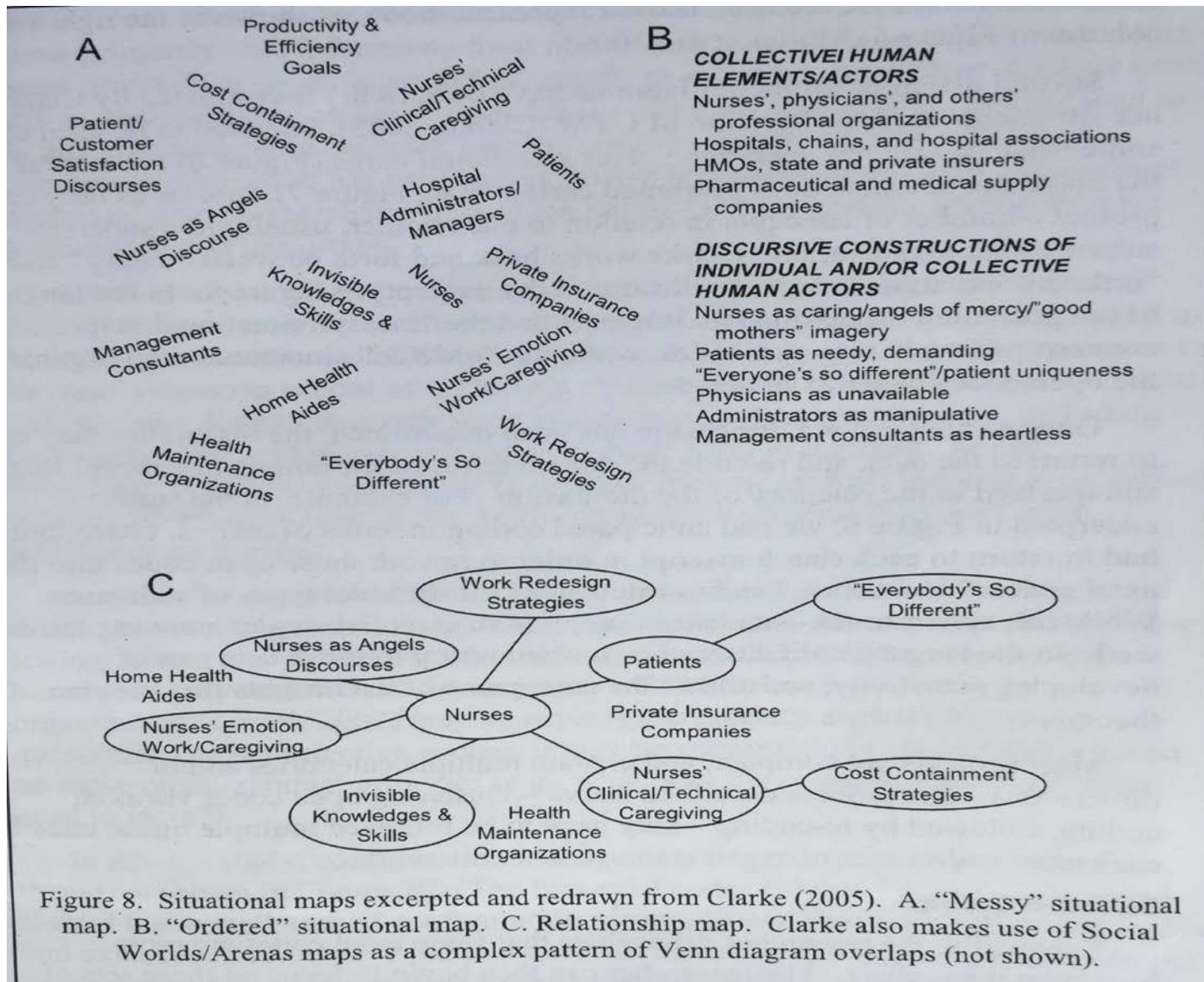
From Open Codes create Axial Codes

Axial codes are formed by identifying relationships between open codes - to identify the main dimensions or categories of interest in the data

Chat question	Informant's Chat Answer	Open Code	Axial Code
Q. what was your goal (or goals) in using collections?	A. put some structure around the content I collect/create around my topic for me and readers	<i>Structure around content For self For others</i>	<i>Purpose/structure content Self Audience</i>
Q. what kind of structure?	A. taxonomy By Topic I guess	<i>Structure Taxonomy</i>	<i>Purpose/taxonomy</i>
Q. did you make collections for yourself, and other collections for your readers? or were all the collections for both "audiences"	A. both: what's good for me is good for my readers ☺	<i>Collection for both self and others</i>	<i>Audience Self</i>
Q. who are your readers?	A. sales teams, technical teams I do this basically for the sellers and supporting communities in the web1.0 world I used teamrooms I needed an alternative	<i>Readers Sales team Technical team Prior technology</i>	<i>Audience/Sales-team Audience/Tech-team Technology/team-room</i>

Figure 6. Open coding and axial coding from a study of Collections

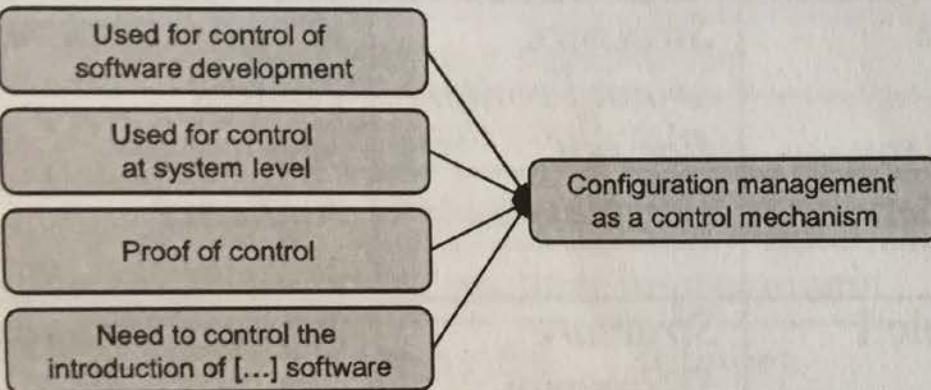
Sometimes diagrams are helpful to express relationships between axial codes and open codes



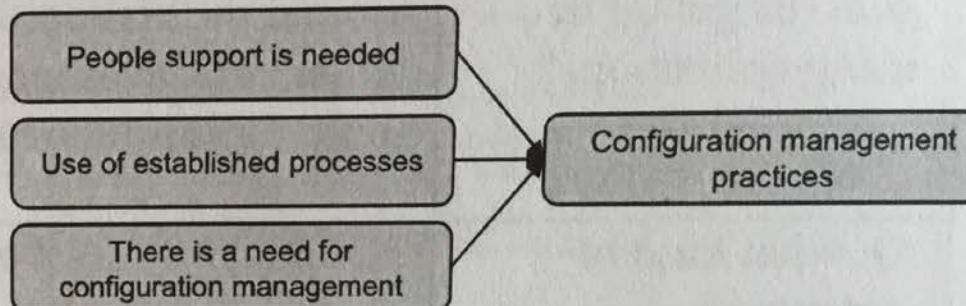
Select Axial Codes and create Core Concepts

Axial codes are formed by identifying relationships between open codes - Axial codes identify the main dimensions or categories of interest in the data

A



B



Reporting a thematic Analysis

The final picture of thematic analysis should be reported carefully to show how it emerged from the data

A. Collecting for others

“regular collections with manually selected / curated resources.... trying to help people (and myself!) make sense of the files that are available.... putting together a collection and deciding what goes into it... and if they are different from the ones I’ve seen before then I add them to my collection...”(I15, enterprise 2.0 evangelist, Canada)

“a kind of editor, you share your own and other useful info via collections” (I18, sales, Finland)

“put some structure around the content I collect/create around my topic... what is good for me is good for my readers ☺” (I19, product manager, France , already quoted in Figure 5).