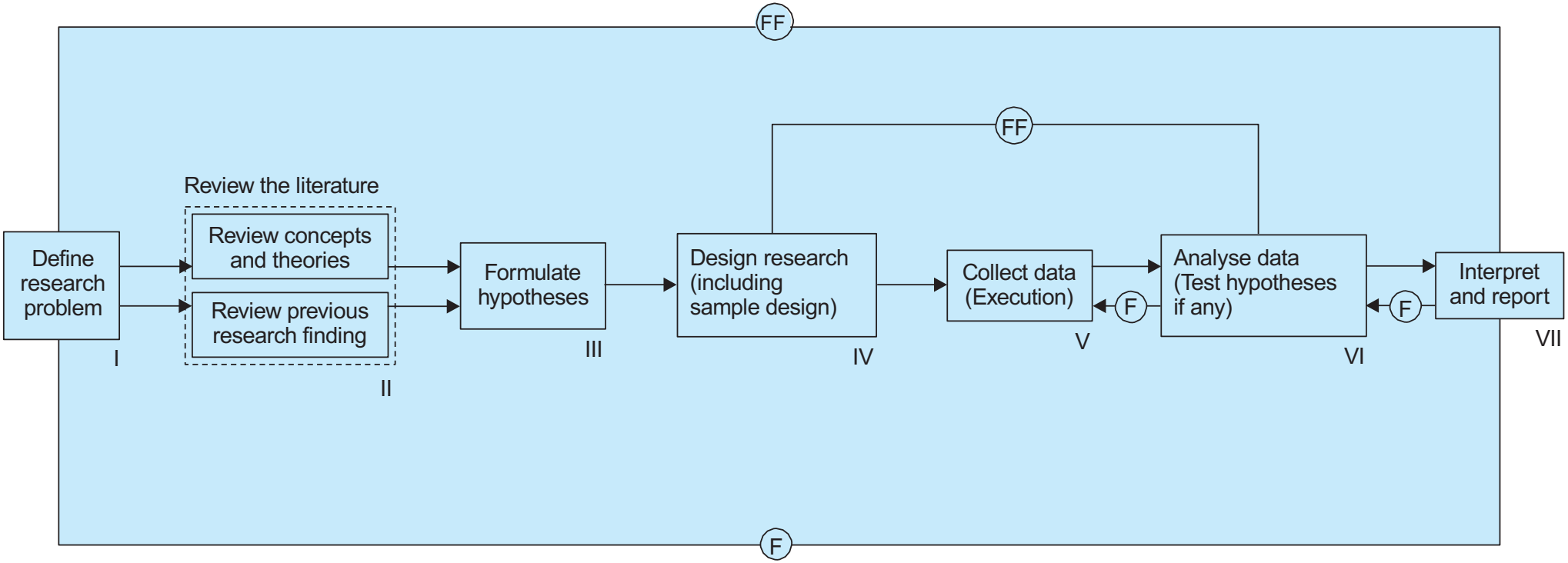
Research Design

This set of slides was
edited from previous slides
used for this subject. --LeongHW

Outline of Research Design

- Exploratory research,
- Descriptive and diagnostic research,
- Hypothesis-testing research,
- Causal research (Explanatory research)
- Qualitative research
- Quantitative research
- Scientific research

RESEARCH PROCESS IN FLOW CHART



Where (F) = feed back (Helps in controlling the sub-system to which it is transmitted)

(FF) = feed forward (Serves the vital function of providing criteria for evaluation)

Design

1. The **purpose** of the study,
2. The **type** of research design,
3. The **nature of data collection** if required and the techniques of data collection that would be used,
4. What is the **research problem/hypotheses**,
5. The **method of research**,
6. The **methods of data analysis** that would be adopted,
7. The manner in which the report would be prepared

Types Of Research Design:

There are different types of research designs.

They may be broadly categorised as:

(1) Exploratory Research Design,

(2) Descriptive and Diagnostic Research Design,

(3) Hypothesis-Testing Research Design, and

(4) Causal Research (**Explanatory research**)

	Causal research	**Exploratory research** (http://research-methodology.net/research-methodology/research-design/exploratory-research/)	**Descriptive research** (http://research-methodology.net/research-methodology/research-design/conclusive-research/descriptive-research/)
Amount of uncertainty characterising decision situation	Clearly defined	Highly ambiguous	Partially defined
Key research statement	Research hypotheses	Research question	Research question
When conducted?	Later stages of decision making	Early stage of decision making	Later stages of decision making
Usual research approach	Highly structured	Unstructured	Structured

Examples…

- **Causal** (by hypothesis): Which two factors more **significant** for users to use a cloud system?

- **Exploratory**: Which cloud storage are students interested in?

- **Descriptive**: Which mobile products are the most popular to young people?

Exploratory Research

- For a problem that has not been studied more clearly
- The objective of exploratory research is to gather preliminary information that will help define problems
- On the basis of the collected facts the researcher may be able to formulate a sound research problem for further research.
- It may also enable the researcher to get himself familiar to the phenomena which he expects to investigate at a later stage.
- The **aim** of an exploratory study may be clarification of concepts, establishing priorities for future research.

Exploratory Research

- Exploratory research often relies on techniques such as
  - literature review
  - qualitative approaches
  - in-deep interview, questionaries, focus group, case studies, etc.

Exploratory Research

Analysis of insight stimulating cases or methods from previous work

- Exploring the cases or methods from the previous work.
- Thinking regarding the formulation of the research problem.

Descriptive Research

- The purpose of descriptive type of design is to describe some event, situation, people, group or community or some phenomena.
- Fundamentally, it is a fact of an entity, aiming at precise and systematic measurement of some dimensions of a phenomenon.
- It does not answer questions about how/when/why the characteristics occurred

Examples of Descriptive Research

- Usually a descriptive design involves detailed numerical descriptions, such as distribution of the population of a community by age, sex, caste or education.
- Estimating the proportion of people in a particular geographical locality in respect of their specific views or attitudes.
- Case studies and preliminary observation of a group

Diagnostic Research

- Find out relationship between causes and also suggest ways for the solution.
- Discover and test whether certain variables (factors) are associated.
- Diagnostic studies are mostly motivated by hypotheses.
- Diagnostic studies seek immediate to timely solution.
  - Before going through other references, remove and solve the factors and the causes responsible for giving rise to the problem.

Causal Research

- Causal research, also known as **explanatory research** is conducted in order to identify the extent and nature of cause-and-effect relationships.
- Causal research can be conducted in order to assess impacts of specific changes on existing norms, various processes etc.
- Causal studies focus on an analysis of a situation or a specific problem to explain the patterns of relationships between variables.

There are two research methods for exploring the cause-and-effect relationship between variables:

1 Experimentation (e.g., in a laboratory), and
2 Statistical research.

Example of Causal Research

A company wants to find out why fewer customers were demanding one of its cloud storage service, so management might experiment to find out if possibly the current subscribing price would be a cause.

The purpose of such research is to find out what is causing a specific change, and in business, this might be a decline in sales.


Qualitative
vs
Quantitative

Understanding the Difference between Qualitative and Quantitative Research

- Qualitative research explores attitudes, behaviour and experiences through such methods as interviews, **focus groups** and other methods. It attempts to get an in-depth opinion from participants.
- As attitudes, behaviour and experiences are important, fewer people take part in the research
- Under the umbrella of qualitative research there are many different methodologies.

Focus Group: a small, but demographically diverse group of people who focus on a topic. The process may consist of interviews and discussions in regards of their perceptions, opinions and attitudes towards the topic.

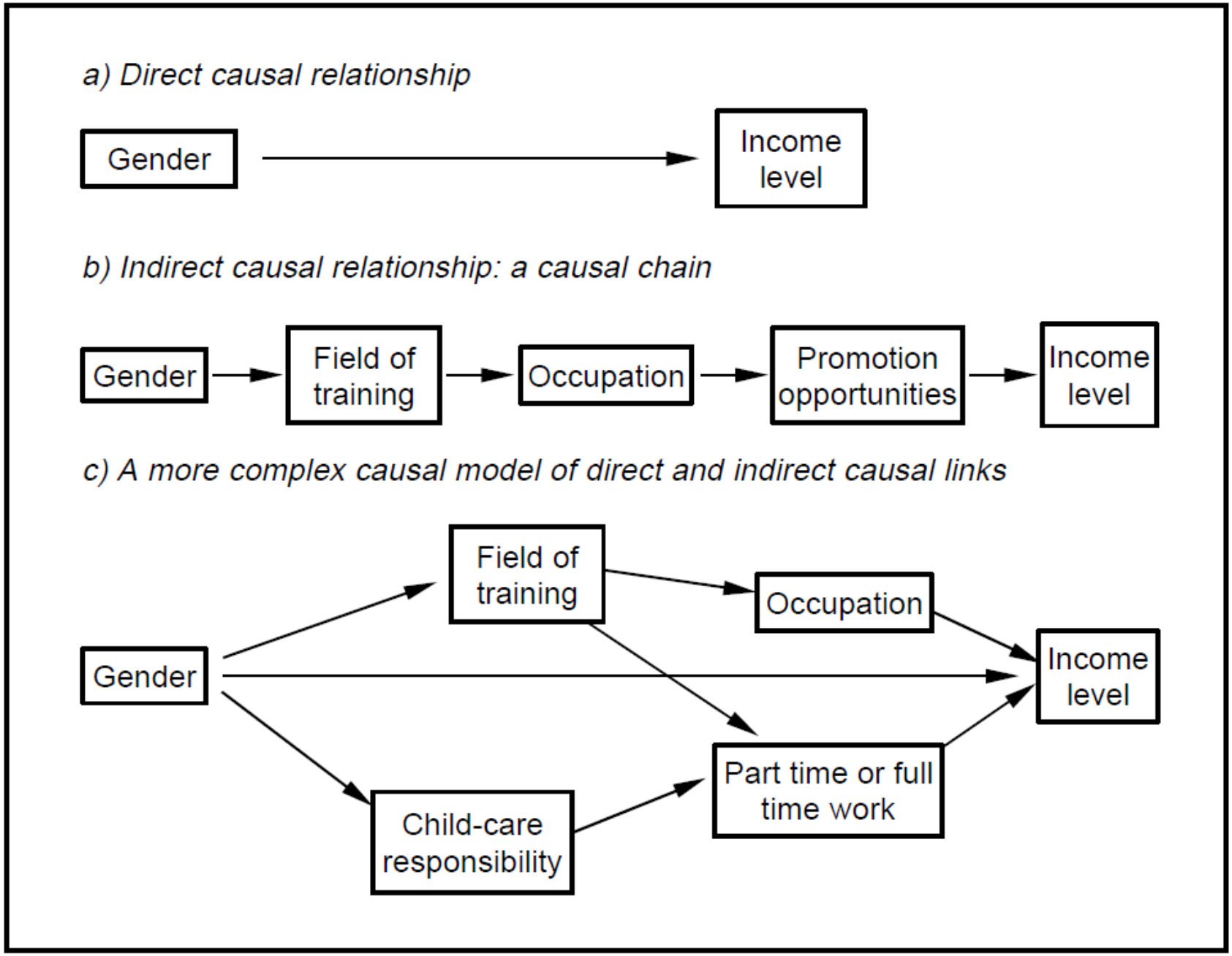


Figure 1.1 *Three types of causal relationships*

Understanding the Difference between Qualitative and Quantitative Research

- Quantitative research generates statistics through the use of large-scale survey research, using methods such as questionnaires or structured interviews.
- A researcher has stopped you on the streets, or you have filled in a questionnaire.
  - If you extract the information and analyse it with statistical method, then it is quantitative research.
  - Otherwise, it is qualitative research.

- Do not think that quantitative research is ‘better’ than qualitative research.
- Neither is better than the other – they are just different and both have their strengths and weaknesses.

Examples of Qualitative Research

Action research

- In action research, the researcher works in close collaboration with a group of people to improve a situation in a particular setting.
- The researcher does not ‘do’ research ‘on’ people, but instead works with them, acting as a facilitator. Therefore, good group management skills and an understanding of group dynamics are important skills for the researcher to acquire.
- This type of research is popular in areas such as organisational management, community development, education and agriculture.

- Action research begins with a process of communication and agreement between people who want to change something together.
- Obviously, not all people within an organisation will be willing to become co-researchers, so action research tends to take place with a small group of dedicated people who are open to new ideas and willing to step back and reflect on these ideas.
- The group then moves through four stages of **planning, acting, observing and reflecting**. This process may happen several times before everyone is happy that the changes have been implemented in the best possible way.
- Various types of research method may be used,
  - for example: the diagnosing and evaluating stage questionnaires, interviews and focus groups may be used to obtain opinion on the proposed changes.

Examples of Qualitative Research

Grounded theory

- Grounded theory is a methodology which was introduced in 1967 by two researchers named Glaser and Strauss. It tends to be a popular form of inquiry in the areas of social science research.
- Method:
  - develop a theory which offers explanation about
  - the main concern of the population of your substantive area and
  - how that concern is resolved or processed.

Examples of Qualitative Research

Grounded theory

- The emphasis in this methodology is on the generation of theory from data
  - Discovery of emerging patterns in data.
  - Different from other types of research which might seek to test a hypothesis that has been formulated by the researcher.
- Data collection
  - Methods such as focus groups and interviews tend to be the preferred data collection methods,
  - A comprehensive literature review which takes place throughout the data collection process.

Examples of Ground Theory

- From data,
  - the main concern of online learners is finding the time to study and temporal integration is the theory which explains how the concern is resolved or processed.
  - For a group of computer users, their concern was GPU power and the changing equipment is the theory which resolved the concern.

Scientific Research

- Some of scientific research can be classified into quantitative research.
- Some of them do not have data collection process, mainly in computer science, maths and engineering
  - AI
  - Cryptography
  - Database systems
  - Computer graphics
  - …

Developing a Research Plan

- Help to organize ideals in a form whereby it will be possible to look for flaws and inadequacies, if any
- Provide an inventory of what must be done and which materials have to be collected as a preliminary step
- It is a document that can be given to others for comments

Research plan

- Research objective: clearly stated in one/two lines of what the researcher expects to do
- Problem: explicitly stated so that one may know what information is to be obtained for solving the problem
- Major concepts (want to measure) should be defined
- Method to be used in solving the problem
- Details of techniques to be adopted
- Methods of sampling and processing data
- Results of pilot test, if any, should be reported
- Time and cost budgets should be planned


Thank you!

The remaining slides are for your references only.

Highlights of
Qualitative vs Quantitative Research

Qualitative Research
Contrast on Qualitative & Quantitative Research

Introduction to Qualitative Research

Methods, Design, & Data Analysis

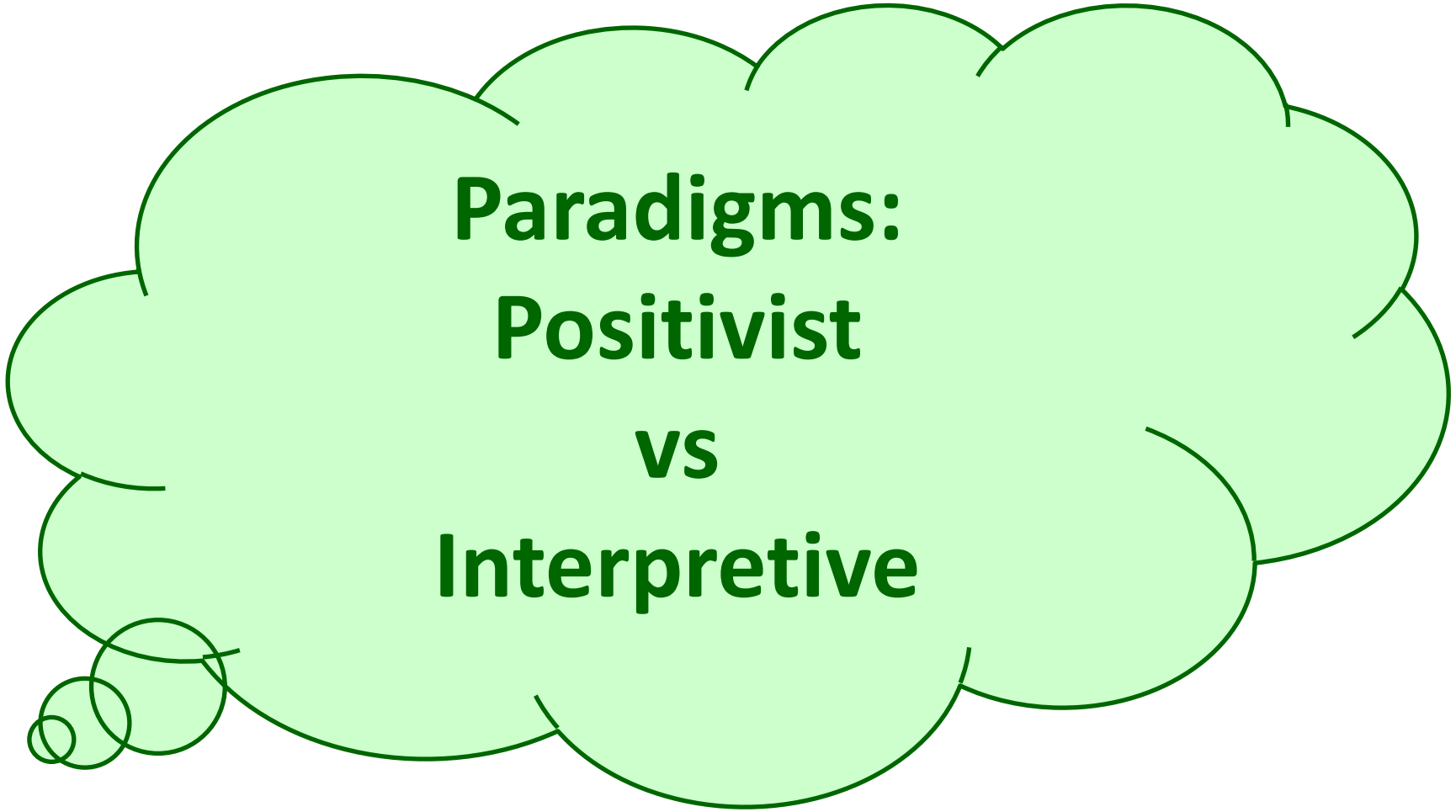
Qualitative Research

"You can learn a lot just by watching"

Qualitative research is a situated activity that locates the observer in the world. Qualitative research consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them. (Denzin & Lincoln, 2011, p. 3)

Origins of Qualitative Approaches

- Developed as a reaction to positivist philosophy (实证哲学) which had overrun all sciences, even philosophy itself
- Recognition that the lived world of humanity requires a different research approach to the natural world


Paradigms:
Positivist
vs
Interpretive

Scientific Paradigms for Research

Quantitative and qualitative research may largely be seen as existing within two separate ***scientific paradigms***.

Quantitative Research is rooted in the ***Positivist*** paradigm.

Qualitative Research is rooted in the ***Interpretive*** paradigm.

Several Basic Concepts On Research

A ***scientific paradigm*** connects and categorises a variety of research techniques through underlying philosophical assumptions surrounding appropriate research practice.

Within each paradigm the nature of knowledge is assumed to be different.

Epistemology **(认识论)** is the philosophical debate about the nature of knowledge. <the philosophical theory of knowledge>

Methodology – specifies how the researcher may go about practically studying whatever he or she believes can be known (the theory informing the practice of research).

THE POSITIVIST PARADIGM

Positivism argues that research should act "… as an organised method …" surrounding precise **empirical observations** of individual behaviour in order to discover and confirm a set of probabilistic **causal laws** that can be used to **predict** general patterns of human activity" (Neuman, 1997: 63)

Empiricism argues that only that which can be experienced through the senses may be known to be real.

Positivist research gained dominance in the natural sciences and was later adopted in social sciences.

THE INTERPRETIVE PARADIGM

The **interpretive** approach argues that research should explore "…socially meaningful action through the direct detailed observation of people in natural settings in order to arrive at **understandings** and **interpretations** of how people create and maintain their social worlds" (Neuman, 1997:68).

We use "… methods that try to **describe** and **interpret** people's **feelings** and **experiences** in human terms rather than through quantification and measurement" (Terre Blanche & Kelly, 1999: 123).

POSITIVIST	INTERPRETIVE
Discovery of *universal laws* governing social world.	Discovery of how people make sense of their social worlds.
A fixed social reality exists that may be measured and described.	Many social realities exist due to varying human experience.
Human behaviour is both rational and predictable.	Human behaviour is context bound and variable.
Positivist science is capable of uncovering ‘truth’.	Common sense provides insight into social realities.

POSITIVIST	INTERPRETIVE
Discovery of social fact is achieved through reason.	Understanding of social reality is achieved through rich contextual description.
Empirical observation serve to illuminate social facts.	Contextual understanding exposes a social reality.
Objective, value-free study is crucial in social research.	Recognition of subjectivity in social research is important.

Elements of the Research Process

DEDUCTIVE & INDUCTIVE REASONING

Deductive thinking (Quantitative)

THEORY

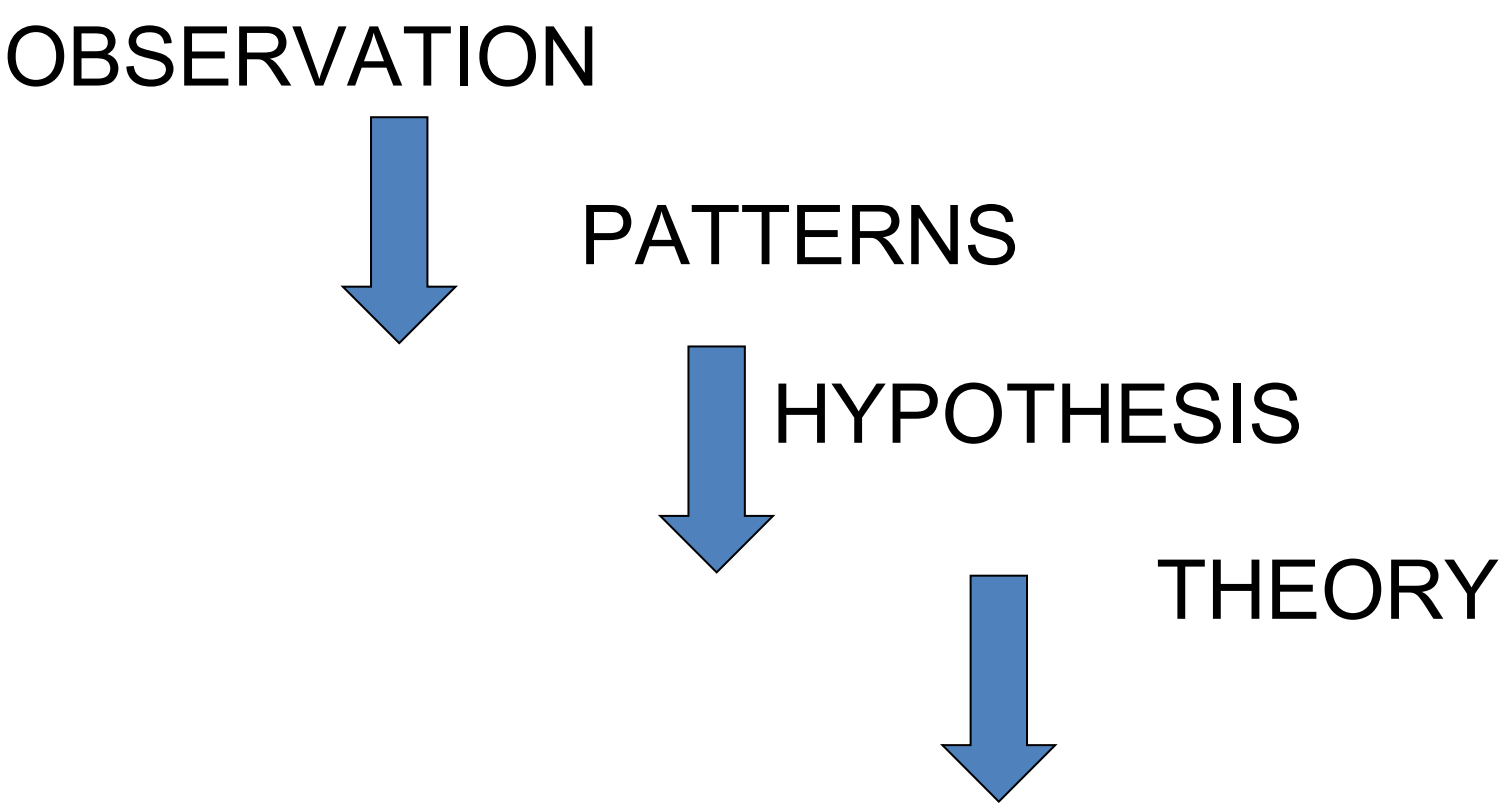
HYPOTHESIS

OBSERVATION

CONFIRMATION

Elements of the Research Process (Cont.)

Inductive thinking (Qualitative)



QUANTITATIVE	QUALITATIVE
Research process is deductive.	Research process is inductive.
Measure objective facts.	Social reality, meaning is constructed.
Focus on variables.	Focus on in-depth meaning.
Value-free research.	Values are present & explicit (empathy).
Independent of context.	Contextual importance.
Many cases, subjects.	Few cases, participants.

QUANTITATIVE	QUALITATIVE
Statistical analysis	Thematic analysis
Objective instruments of data collection.	Researcher as the central tool for data collection.
Highly structured research process.	Loosely structured research process.
Researcher is detached (outsider).	Researcher is immersed (insider).

(Adapted from Neuman, 1997: 14)

QUANTITATIVE	QUALITATIVE
result oriented	process oriented
particularistic and analytical	holistic perspective
objective “outsider view” distant from data	subjective “insider view” and closeness to data
generalized by population membership	generalization by comparison of properties and contexts of individual organism

Although **positivist approach** attempts to understand social phenomena through largely quantitative means, and the **interpretive approach** mainly through qualitative techniques.

it is important not overemphasise the difference between these methods.

Some Quotes on Qualitative Research (Esp for social science and business research)

Qualitative research...

Commonly called “interpretive research”

…its methods rely heavily on “thick” verbal descriptions of a particular social context being studied

Qualitative research...

It is useful for describing or answering questions about particular, localized occurrences or contexts and the perspectives of a participant group toward events, beliefs, or practices

…a helpful process for exploring a complex research area about which little is known

Qualitative research...

- Interpretation, as the core of qualitative research focuses on the meaning of human experience.
- The focus is on **understanding human experience** rather than explaining and predicting behaviour.
- It is acknowledged that meaning and behaviour occurs within particular social, cultural and historical contexts.

"**Qualitative Research**"
a definition by Van Maanen (1979)

"An umbrella term covering an array of interpretive techniques which seek to describe, decode, translate, and otherwise come to terms with the meaning, not the frequency, of certain naturally occurring phenomena in the social world" (p. 520)

"**Qualitative Research**"

a definition by (Banister et al., 1994)

Qualitative research is "…the interpretive study of a specified issue or problem in which the researcher is central to the sense that is made"

"Qualitative Research"

a definition by (Banister et al., 1994)

"The goal of qualitative research is the development of concepts which help us to understand social phenomena in natural (rather than experimental) settings, giving due emphasis to the meanings, experiences, and views of all the participants."

Pope & Mays.
BMJ 1995; 311: 42-45.

Essential Characteristics of Qualitative Research

concerned with understanding a phenomenon
assumes multiple realities
data is in the form of rich verbal descriptions
researcher is immersed and in direct contact during the data collection
the data collection is highly interactive
data collection methodology evolves and is flexible; a "tentative" approach to the methodology

Essential Characteristics of Qualitative Research

emphasizes the holistic perspective
research is context sensitive
illuminate the invisibility of everyday life; “make the familiar strange”
construct meaning from the participant’s point of view (“informants” rather than “subjects”)
explores open questions rather than testing hypothesis
employs purposive sampling and “gate keepers”

Appropriateness of Qualitative Research

When variables cannot be quantified
When variables are best understood in their natural settings
When variables are studied over time
When studying roles, processes, and groups
When the paramount objective is “understanding”

What to Observe or Study

Behaviors or practices
Episodes, common events (death, birth, etc.)
Encounters –when groups or people interact
Roles
Relationship roles – mother/daughter; wife/husband, therapist/disabled,… etc.

Qualifications of Investigators

(Kuh & Andreas, 1991)

Must have requisite knowledge and skills about methodology, setting and nature of the issue.
Must be familiar with own biases, assumptions, expectations, and values.
Must be empathic, intelligent, energetic, and interested in listening
Must be open to embracing multiple realities.
Must be prepared to produce detailed, comprehensive, and sometimes lengthy reports.

The Qualitative Research Design

"*a rough working frame*" --(Whitt, 1991)

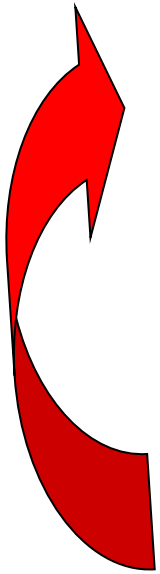
An initial focus (problem, phenomenon, question)
Phases of the study (background, entry, exploration, closure)
Plan for identifying setting and data sources
Plan and logistics for data collection and analysis
Plan for ensuring trustworthiness


Phases in
Qualitative Research

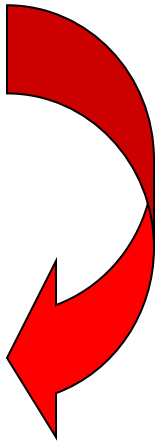
Phases in Qualitative Research

Conceptualize and plan study
Use literature,formulate study purpose or question, identify study site,settings where/how data collection will occur, participants and entrée to setting

Start study with concurrent data collection and analysis. Analysis focused on identifying themes and categories-- similarities in data. Question or purpose may emerge and be refined. Data collection strategies may change



Goal: Access the participants world & meanings. Researcher is the instrument



Sampling and data collection determined by theoretical saturation. Analysis based on narrative description

Selecting participants...

The goal is to get the deepest possible understanding of the setting being studied

Requires identifying participants who can provide information about the particular topic and setting being studied

Selecting participants...

It is fraught with difficulties in identifying and selecting an appropriate number of participants who can provide useful information about the particular topic and setting being studied

Utilizes purposive sampling

Differences Between Random & Purposeful Sampling

Random "Quantitative" Sampling

Select Representative individuals

- To generalize from sample to population
  - To make claims about the population
  - To build/test "theories" that explain the pop'n

Purposeful "Qualitative" Sampling

Select people/sites who can best help us understand our phenomenon

- To develop detailed understanding
  - That might be "useful: information
  - That might help people "learn" about the phenomenon
  - That might give voice to "silenced" people

Sampling in Qualitative Studies

Sample size is **always** determined by the analysis. It is part of the design and so is influenced by the nature of the inquiry, quality of the informants, the quality of the data.

The researcher is looking for **saturation**—the point at which there is no new cases coming from each new participant and redundant information keeps coming up.

This must be differentiated from participant saturation where the researcher cannot drag anything new out of the umpteenth interview with that particular person.

Types of Data Collection
(or “fieldwork”)

Observation

Interviewing

Focus Groups

Document Analysis

The Three-Interview Series

(Seidman, 1998)

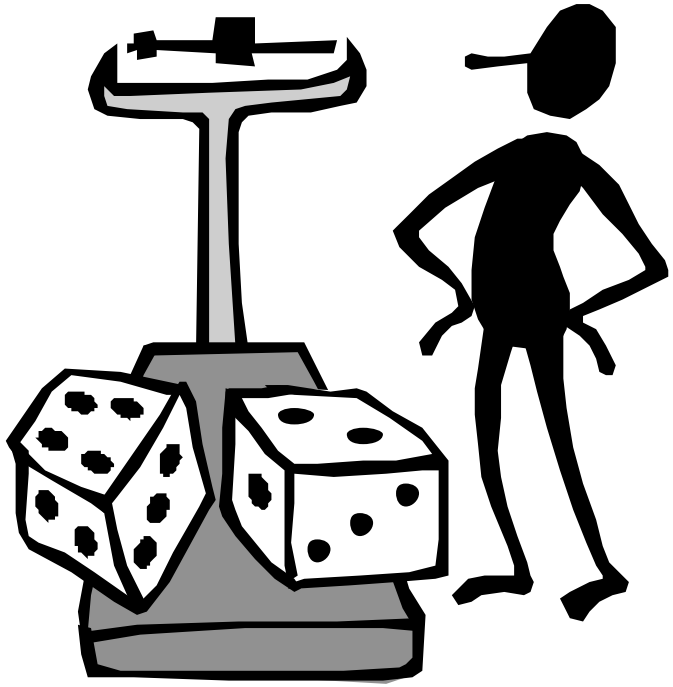
Interview One: Life History

Interview Two: Details of the Experience

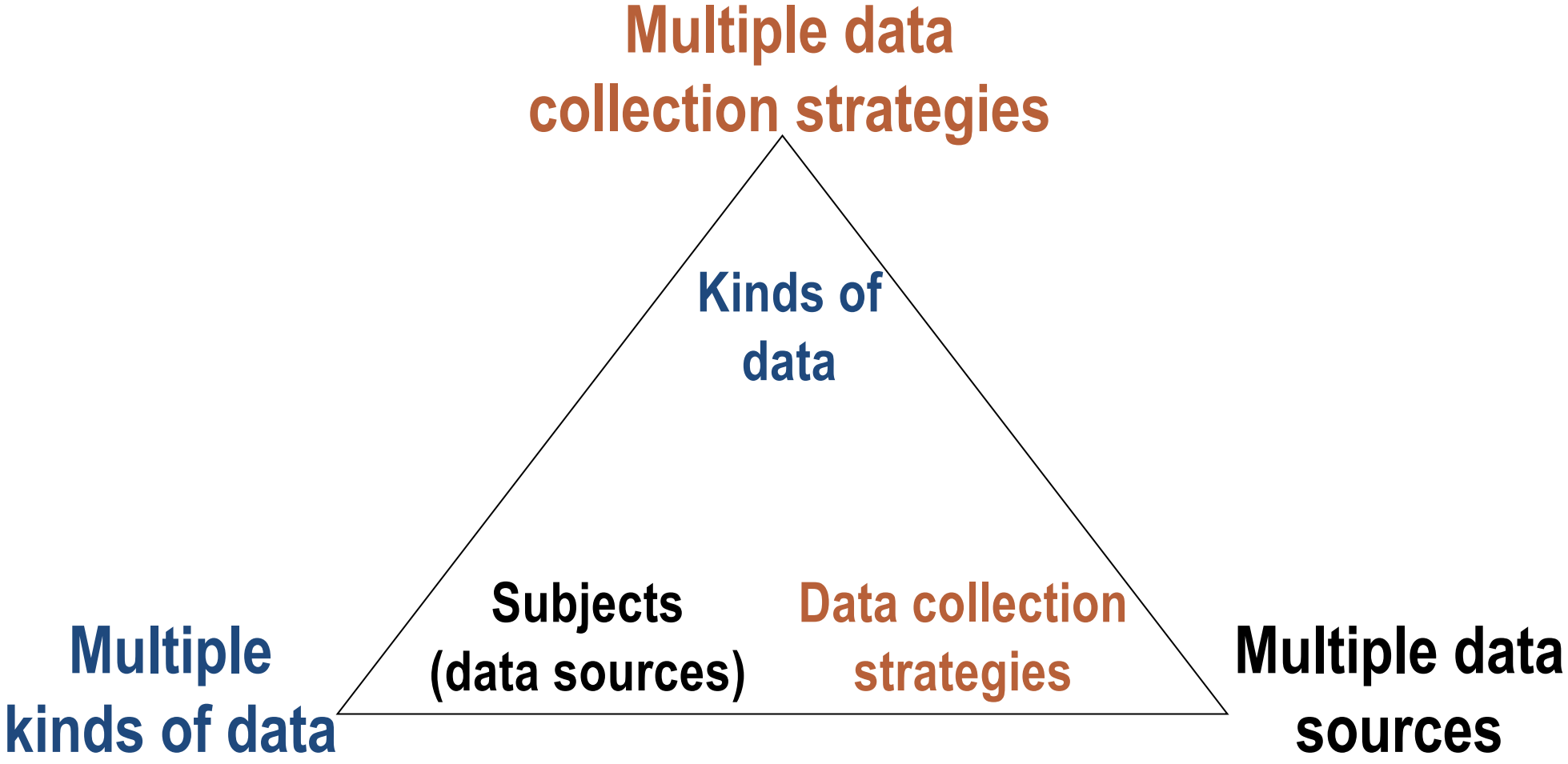
Interview Three: Reflection on the Meaning

Qualitative Research Methods: **Triangulation**

- Method to enhance the validity & reliability of qualitative research
- Enhances accuracy of interpretation
- Confirms that the data collected is not due to chance or circumstances



Qualitative Research Methods:
Triangulation



Resources

(Kuh & Andreas, 1991)

- Recording devices
- Transcribing equipment
- Software packages for analyzing
- Member checks participants
- Space
- Time

Qualitative Research:
Data Analysis

The Data

Generally collected in the form of…

- **field notes,**
- **diaries**
- **audio & video tapes,**
- **copies of documents,**
- **narrative descriptions**

Analysis

Some form of analysis usually takes place at the same time data is being collected

Researcher seeks to identify *patterns* or *trends*

Qualitative Research:
Data Analysis

Qualitative data may be analyzed by a 3-part strategy:

❶**reducing the data**

❷**coding the data**

❸**synthesizing the data**

Qualitative Research:
Data Analysis

- Read and re-read data, become engrossed in it.
- Identify themes: common, conflicting, minority
- Test themes across the data set, where are they common, under what circumstances are they found, not found.
- This sets the parameters on the interpretation and generalisation of data
- Get more than one person to analyse the data independently then together
- Demonstrate trustworthiness in data analysis

Common Qualitative Research Approaches

- Case study
- Ethnography
- Grounded theory
- Phenomenology
- Historical
- Action Research