

IKI80050T: Metodologi Penelitian

Research Methods & Design

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Outline

- Some background stuff: research methods, methodology, empirical basis
- Types of research methods
 - Field & lab experiments
 - Surveys
 - Formal methods (e.g. mathematical modelling)
 - Action research
 - Case studies
 - Grounded theory
 - Ethnography
- Which one should be used?



Some background stuff



What is research?

- **Research**: a **systematic** effort to investigate a **problem** and find its **solution**.
- Why does it have to be systematic?
 - Best practices: **harness** shared knowledge
 - Verifiable, falsifiable: **contribute** shared knowledge
- What is the output?
 - Model: understanding of phenomena → predictive power!
 - Sequence of actions/technique
- **Q**: Is system development *per se* a form of research?
- **A**: Depends. In general, research requires **evaluation**.



Research method vs. methodology

- **Research Method/Design**: specific techniques/procedures used to collect and analyse data.
- **Research Methodology** refers to:
 - Frameworks and assumptions used to inform research,
 - The paradigm that dictates which methods are used, and how they are applied and arranged.
- *This distinction is not clear cut, even in established literature!*



Categories of research

- By **purpose**:
 - Basic/fundamental/pure research
 - Applied research
- By **time**:
 - Cross-sectional
 - Longitudinal
- By **methodology**:
 - Quantitative vs. Qualitative
 - Exploratory vs. Experimental



The changing face of IS/IT research...

- During the '70s and '80s, IS/IT research was predominantly technical. Thus, methodologies were primarily scientifically based (c.f. natural sciences)
- With newfound maturity ('90s, '00s), more focus on social issues:
 - Productivity, efficiency
 - Usability, acceptance, user satisfaction
- Cue philosophical debates (a.k.a. *positivist-bashing!*).
- How valid is IS research based on methods taken from social sciences? (Potentially,) very!



Epistemological basis

- **Epistemology**: theory of knowledge and belief (nature, methods, limitations)
- Relevant towards social research
- With respect to research (Chua '86):
 - *Positivist*: verify/uncover apriori “truths” about phenomena
 - *Interpretive*: knowledge is subjective → contextualize!
 - *Critical*: challenge the status quo
- IS/IT research is predominantly positivist (Orlikowski & Baroudi)



Ways of acquiring knowledge

- Tenacity, force of habit, exposure
- Intuition: making informal claims
- Authority: trusting highly respected sources
- Rationalism a.k.a deductive methods: reasoning, inference
- Empiricism a.k.a inductive methods a.k.a. **Scientific Method™**



Pseudoscience (a.k.a. bogus research)

- **Characteristics:**
 - Unfalsifiable statements
 - Emphasis on confirmation rather than refutation
 - Absence of self-correction
 - Overuse of anecdotal evidence
- Examples: handwriting analysis, astrology



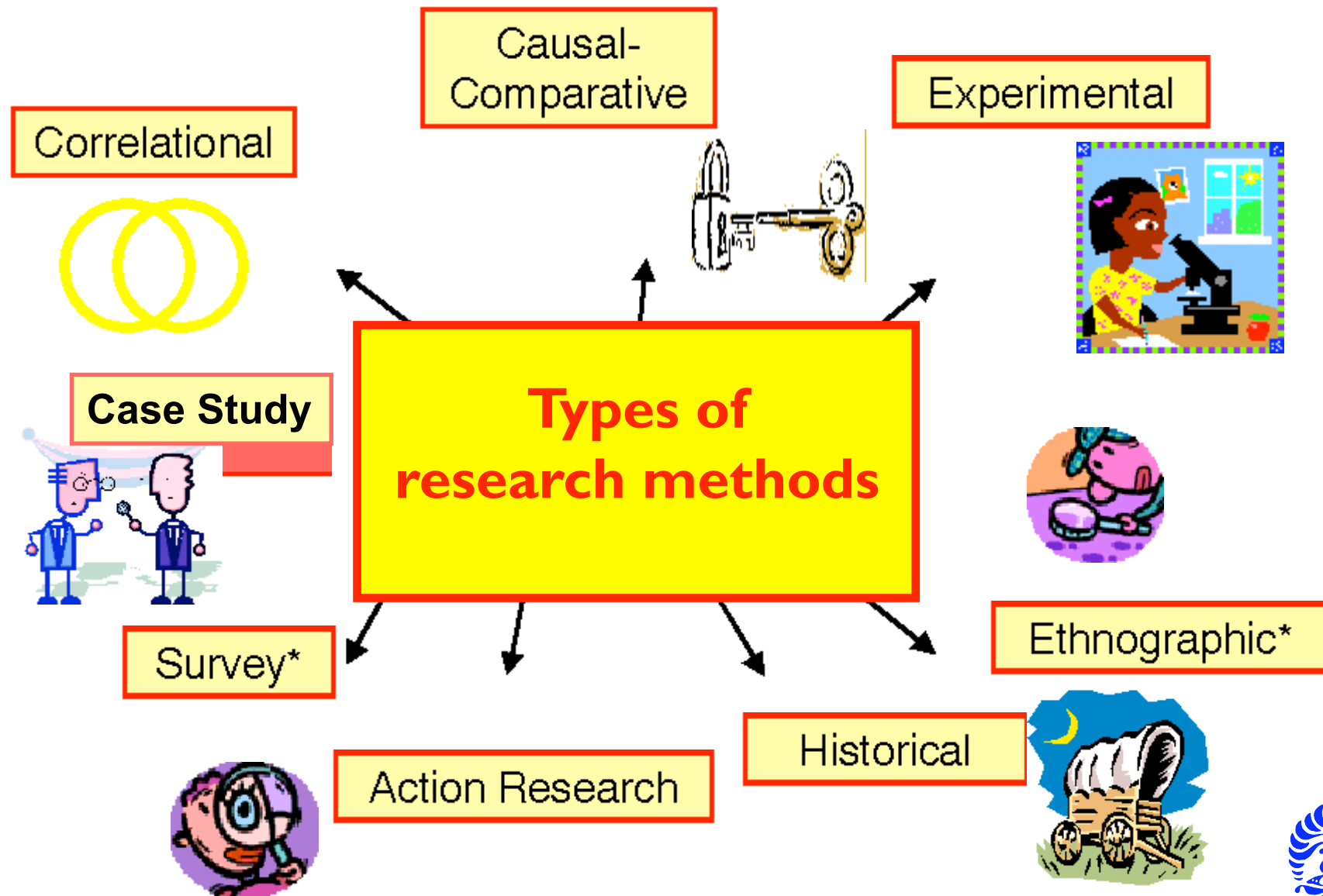
Categories of research methods

- **Quantitative**: answers are found through numerical data
 - Field & lab experiments
 - Surveys
 - Formal methods (e.g. mathematical modelling)
- **Qualitative**: answers are found through textual data
 - Action research
 - Case studies
 - Grounded theory
 - Ethnography
- Differentiate between **data gathering** & **data analysis!**

These methods are not orthogonal / mutually exclusive.



Research Methods (upon which methodologies can be built)



Research Method: Experiments



Experimental Research

- **Experimental Research:** research that allows for the **causes** of **behaviour** to be determined
- **Experiment:** a carefully regulated procedure where one or more factors are **deliberately manipulated** and all other factors are **held constant**.
- Cause-effect relationship occurs if:
 - The cause is correlated with the effect.
 - The cause occurred before the effect.
 - We can rule out other plausible explanations of the causal relationship
- **Example:** Learning effectiveness of e-Learning system



Experimental Research: Factors

- **Independent Variable (IV)**: factor that is manipulated
- **Dependent Variable (DV)**: factor that is measured
- **Experimental condition**: subjects that are manipulated
- **Control condition**: subjects that are not manipulated
- **Confounding variable**: an extraneous variable that should be controlled, but is not. Can lead to false/spurious conclusions!

- **Anecdote**:
 - Day 1: drink water + beer. Result? Drunk!
 - Day 2: drink water + wine. Result? Drunk!
 - Day 3: drink water + whiskey. Result? Drunk!
 - Conclusion?



Quasi-experimental research

- Quasi-experimental research
 - Almost but not quite real experiments
 - No manipulation of the variables (so no IV)
 - Compare groups biased on naturally occurring variables
- Two types of natural variables
 - Subject variable: Characteristics that vary between participants, but can not be manipulated
 - Time variable: Comparing individuals at different points in time (age 3 and 6)
- One-shot post-test, no control group
- Example: The impact of marketing strategy

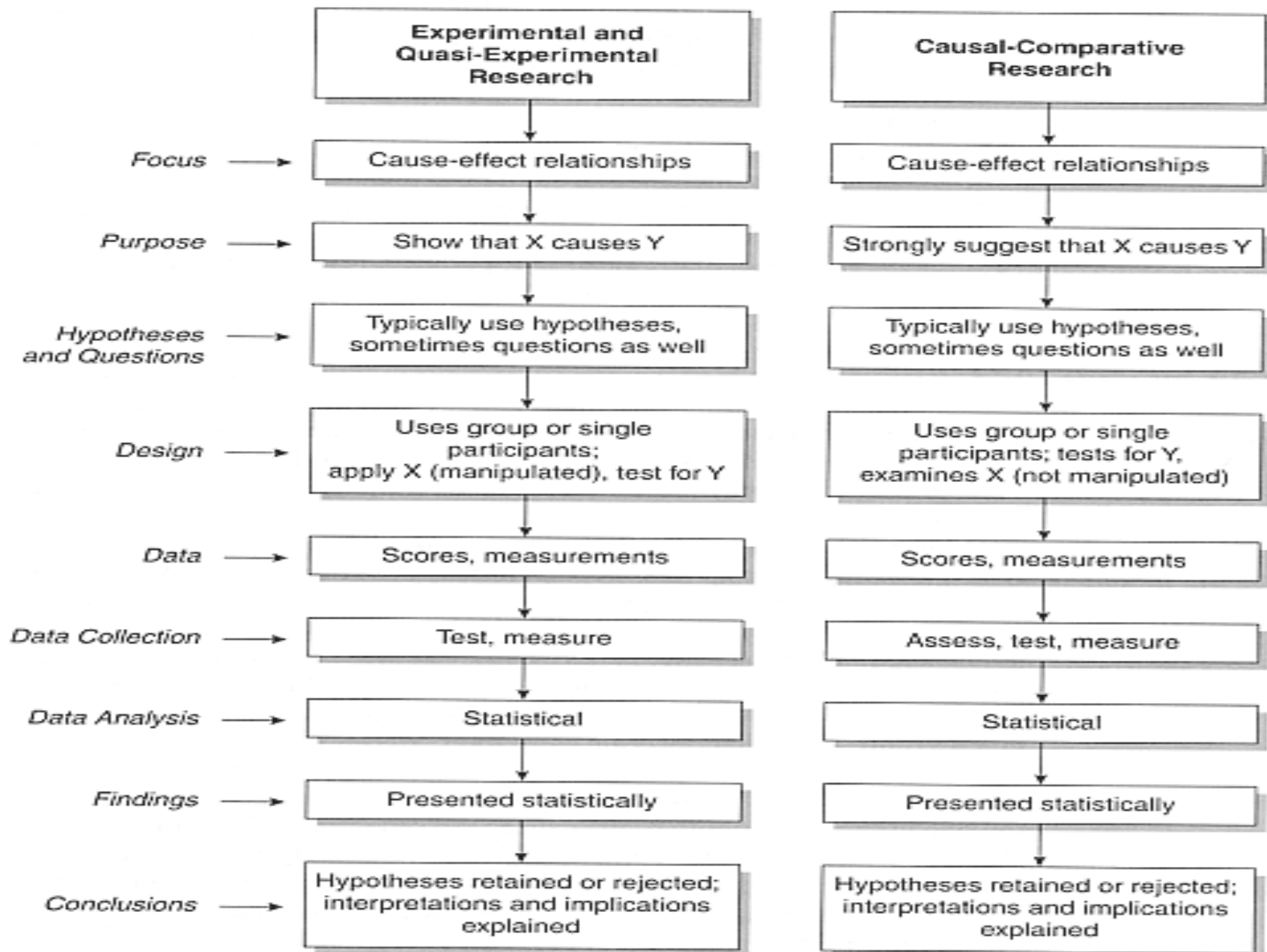


Causal-comparative research

Ex Post Facto = Causal-Comparative Research

- Explores possible causes and effects
- The independent variable is not manipulated, it has already been applied
- Focuses first on the effect, then attempts to determine what caused the observed effect.
- Seeks to explain differences between two groups that have occurred
- Example: Why are IT multinational companies are more innovative than local firms?





Research Method: Surveys



Survey Research

- The survey is a group of research methods commonly used to determine the present status of a given phenomenon
- A survey is a systematic method of collecting primary data based on a sample
- Survey may be used for exploratory, descriptive and causal studies
- Unlike case study, the purpose of a survey is not to consider a specific case in depth but to capture the main characteristics of the population at any instant
- For example: We want to explore the opinion of top executives on IT Manager

Powell, 1999



Survey Research

- Collecting standardized information from people using an interview or self-report format.
- Typically survey knowledge or opinions.
- To standardized the information one uses a questionnaire with set questions.
- Ideally the questionnaire has been validated.
- Representativeness of the sample is very important.



Survey Methods

■ Interviews

- **Advantage** - Comprehensive, ensure participant understands the question, minimizes missing data, enables clarification of unclear responses
- **Disadvantage** – expensive, people more like to refuse participation, can be risky for interviewer, interviewer may bias the responses.



Types of Survey Methods

- Face-to-face interviews
 - Expensive and time-consuming
- Telephone interviews
 - Need to use random-digit dialing to reach both listed and unlisted numbers.
- Mail
 - Return rate is usually low (20-30%).



Types of Questions

- Open-ended
 - E.g., Can you tell me about your typical experience with dating?
- Close-ended
 - E.g., How do you typically meet someone to date?
 - Introduced by someone
 - Social event
 - In university class or place of work
 - At a bar
 - Through sports or other athletic events



Research Method: Action Research



Action Research

- "Action research is a form of *collective* self-reflective enquiry undertaken by participants in social situations in order to improve on the rationality and justice of their own social or educational practices, as well as their understanding of their own social or educational practices and the situations in which these practices are carried out.
- The approach is only action research when it is *collaborative*, though it is important to realize that the action research of the group is achieved through the *critically examined action* of individual group members."



Action Research: How it works

■ **Diagnostic stage:**

- Collaborative analysis of the social situation by researcher + (consenting) subjects.
- Hypotheses are formulated.

■ **Therapeutic stage:**

- Collaboratively, changes are introduced.
- Effects are studied



Action Research: Properties

- Researcher is actively involved as a participant (an *interventionist* approach).
- Emphasis on collaborative effort.
- Two objectives:
 - Effecting (positive) change (i.e. **practical**)
 - Contribute to body of knowledge (i.e. **theoretical**)
- Good fit with IS research, hence recent popularity.
- **Warning:** potential lack of objectivity! Jargon to look out for:
 - “*Post-positivist*”
 - “*Interpretive research*”



Research Method: Historical Research



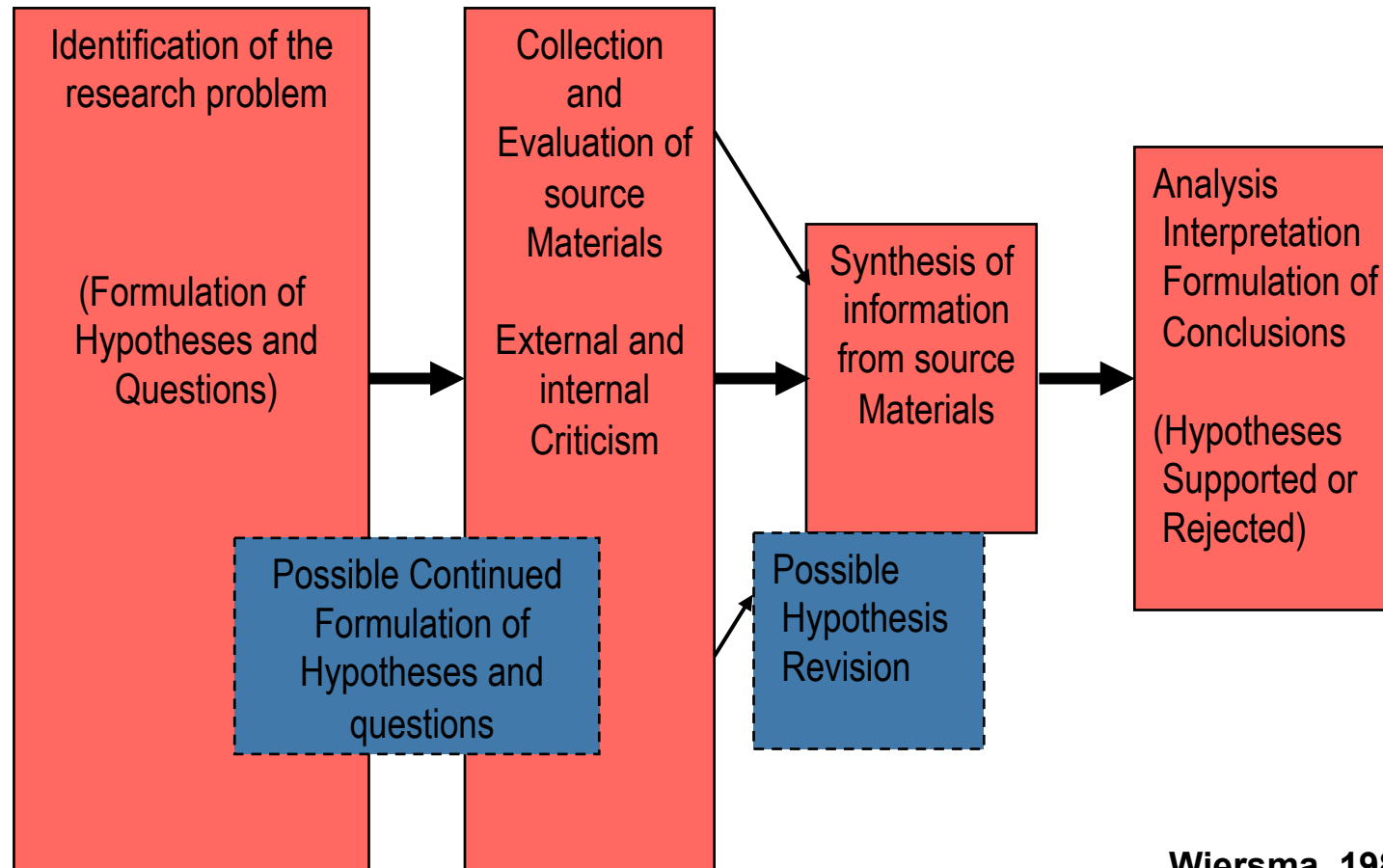
Historical Research

The conduct of historical research entails the following steps:

- The recognition of a historical research problem or the identification of a need for certain historical knowledge
- The gathering of as much pertinent information about the problem or topic as possible
- If appropriate, the forming of hypotheses that tentatively explain relationships between historical factors (variables)
- The selection, organization, and analysis of conclusion
- The recording of conclusions in a meaningful narrative



Four Steps of Historical Research



Wiersma, 1986



Research Method: Ethnography



Ethnographic Research

- Ethnographic research involves **field research** and requires contextualization - the interpretation of result in the data collection.
- **Holistic approach**: a system's properties cannot be understood independently of each other (i.e. as in experiments)
- Ethnographic studies focus on organizations, which consist of defined groups of people who interact in regular and structured ways.
- Useful for understanding (corporate) culture, business process.
- Arose from field of anthropology.



Typical Ethnographic Studies In Education:

- A study of life in urban classroom
- A study of decision making in an inner-city high school
- A study of student life in law school
- A study of student relations in an integrated school
- A study of peer interaction in racially mixed classroom of a suburban high school



The Process Of Ethnographic Research

- Identification of the phenomenon to be studied
- Identification of subjects
- Hypothesis generation
- Data Collection
 - Observation
 - Interview
 - Reviewing other sources
 - Triangulation
- Analysis of Data
- Drawing Conclusion



Research Method: Case Studies



Case Studies Research

- Empirical investigation of particular phenomenon (“unit”)
- Unit of analysis could be individual, group, organization, community, country, etc.
- Purpose is more **exploratory**, i.e. hypothesis *development*
- Single vs. Multiple cases:
 - Multiple cases are suggested to compare and contrast different cases
 - Certain single cases are warranted: revelatory / critical / extreme / unique



Doing Case Study Research

- Use qualitative and quantitative data:
 - Documentation, archives
 - Interviews
 - Direct observation (cf. ethnography)
- Analysis:
 - Heavily dependent on researcher's aptitude
 - Group of researchers are beneficial
 - Multiple data affords triangulation.



Which method should be used?

- Can the phenomenon be studied outside its setting?
- Must the study focus on contemporary events?
- Is control or manipulation of subjects/events necessary?
- Does the phenomenon have an established theoretical base?

