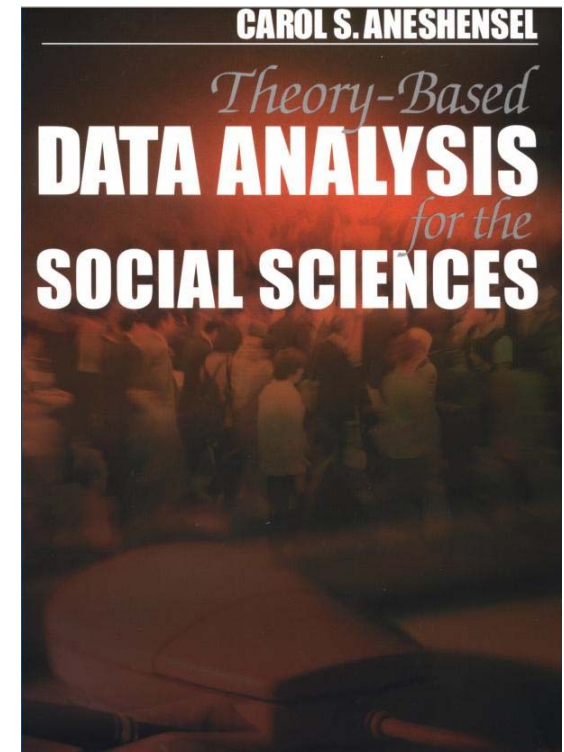
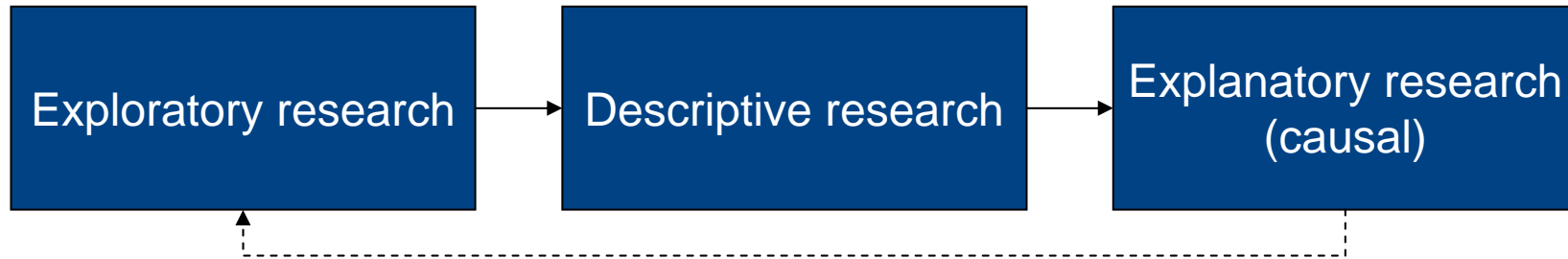


**Quantitative Research Methods**  
**09/10**  
**Topic 1**  
**Supplement**

*Thomas Salzberger*



# Types of Research

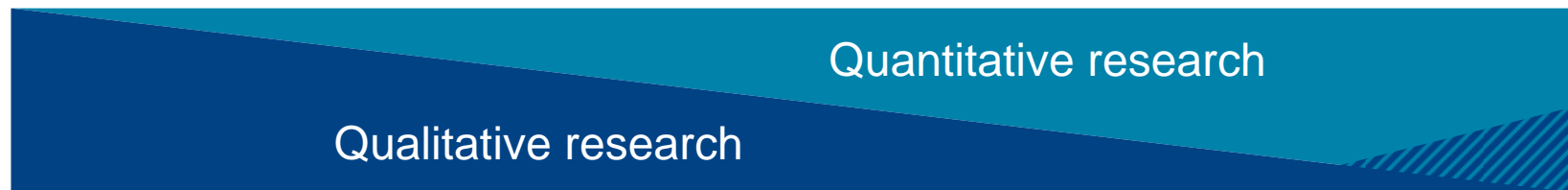
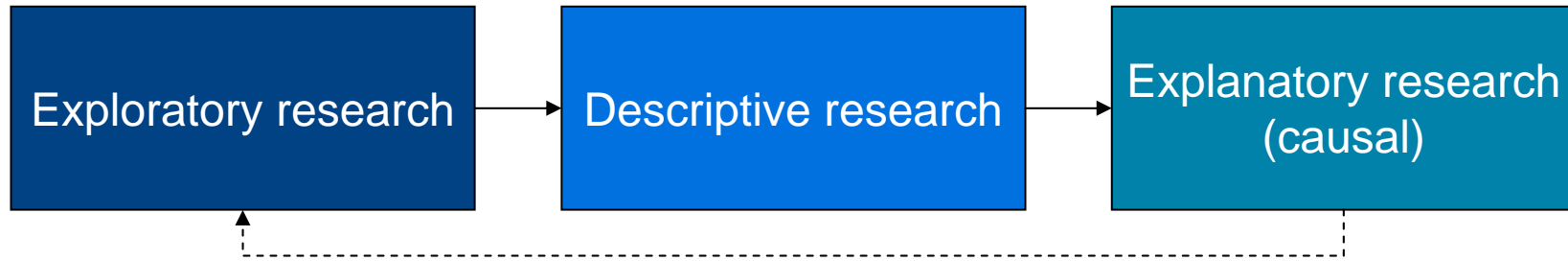


- Identification of phenomena
- Exploration of phenomena

- Whether phenomenon is a common occurrence or a rare event
- Identification of important areas of inquiry

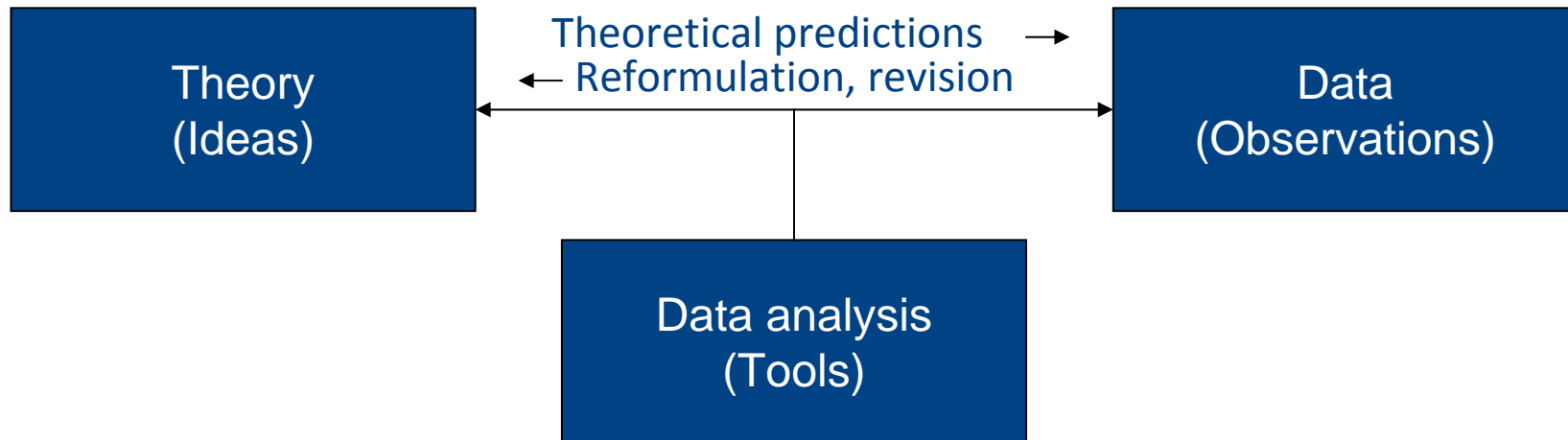
- Why phenomena occur
- Estimate associations among variables
- Ascertain whether associations can be interpreted as relationships (dependency)
- Focal relationship

# Types of Research



# Data Analysis

- Data analysis can be thought of as a systematic arrangement of information into meaningful patterns (Aneshensel 2002, p.2).
- Quantitative data analysis is as much a logical enterprise as it is a statistical one (Aneshensel 2002, p.1).
- Data (observations, “facts and figures”) into information (inferred meaning)
- Intersection of theory and data



# Inherent Subjectivity of Data Analysis

- Data analysis is never entirely objective
- Data analysis conducted within the context of theory (= statement of what one expects to find)
- Theory shapes the questions that are asked
- Data never speak for themselves

# The Logic of Theory-Based Data Analysis

- Theory: theoretical universe
  - Constructs, relationships, populations
- Data: observed realm
  - Measured variables, empirical associations, finite samples
- Theory -> testable theory
  - Translation of abstract ideas into concrete statements
  - Hypothesis: what should be observed if the theory is correct
    - *cautious predictions versus bold conjectures* (Popper 2002)
    - Seeking evidence in favor of the theory versus trying hard to disprove the theory (and hope to fail)
- Abstract -> concrete
  - Constructs -> measured variables
  - Relationships -> associations
  - Population -> finite sample

Measurement theory, data analysis

Design, data analysis

Sampling

# The Logic of Theory-Based Data Analysis

- Operationalization: Formulation of hypotheses = deductive reasoning
- Attributing the qualities of the general class to the particular case
- What is true for the general class is also true for the particular case (logical statement)
  
- *If it is not true for a particular case, it cannot be true for the general class.*
- *If it is true for a particular case, it may be true for the general class.*
  
- Induction: deriving general principles by extending what is observed for a specific case to other cases of the same class.
  
- Theory -> *Deduction* -> Observation -> *Induction* -> Theory
- Relationships among constructs in a population -> *Operationalization* -> Associations among measured variables in a sample -> *Assessment of fit* -> Relationships among constructs in a population

# The Logic of Theory-Based Data Analysis

- Theory -> *Deduction* -> Observation -> *Induction* -> Theory
- Observation -> *Induction* -> Theory -> *Deduction* -> New observation\* -> *Induction* -> Theory -> *Deduction* -> New observation -> *Induction* -> Theory
  - \* *Cross-validation*
- Observation -> *Induction* -> Theory -> *Deduction* -> New observation -> *Induction* -> Revised theory -> *Deduction* -> New observation -> *Induction* -> Theory

