Qualitative Comparative Analysis for Medical and Health Services Research: An Introduction

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Outline

- Day 1: Introduction and Overview of QCA
  - Review of QCA resources, publications, and software
  - QCA as an investigation of invariance
  - Three analytic components of QCA:
    dataset calibration, necessity analysis, and sufficiency analysis
  - Three types of QCA projects:
    identifying causal recipes, uncovering taxonomies, understanding context

- Day 2: The Details of Why, When, and How
  - Dataset calibration
  - Necessity analysis
    - Consistency and coverage measures for necessity
    - Testing for necessary conditions
  - Sufficiency analysis
    - Consistency and coverage measures for sufficiency
    - Constructing and reducing truth tables
    - Interrogating the analysis and deriving solutions

Primary Readings on QCA

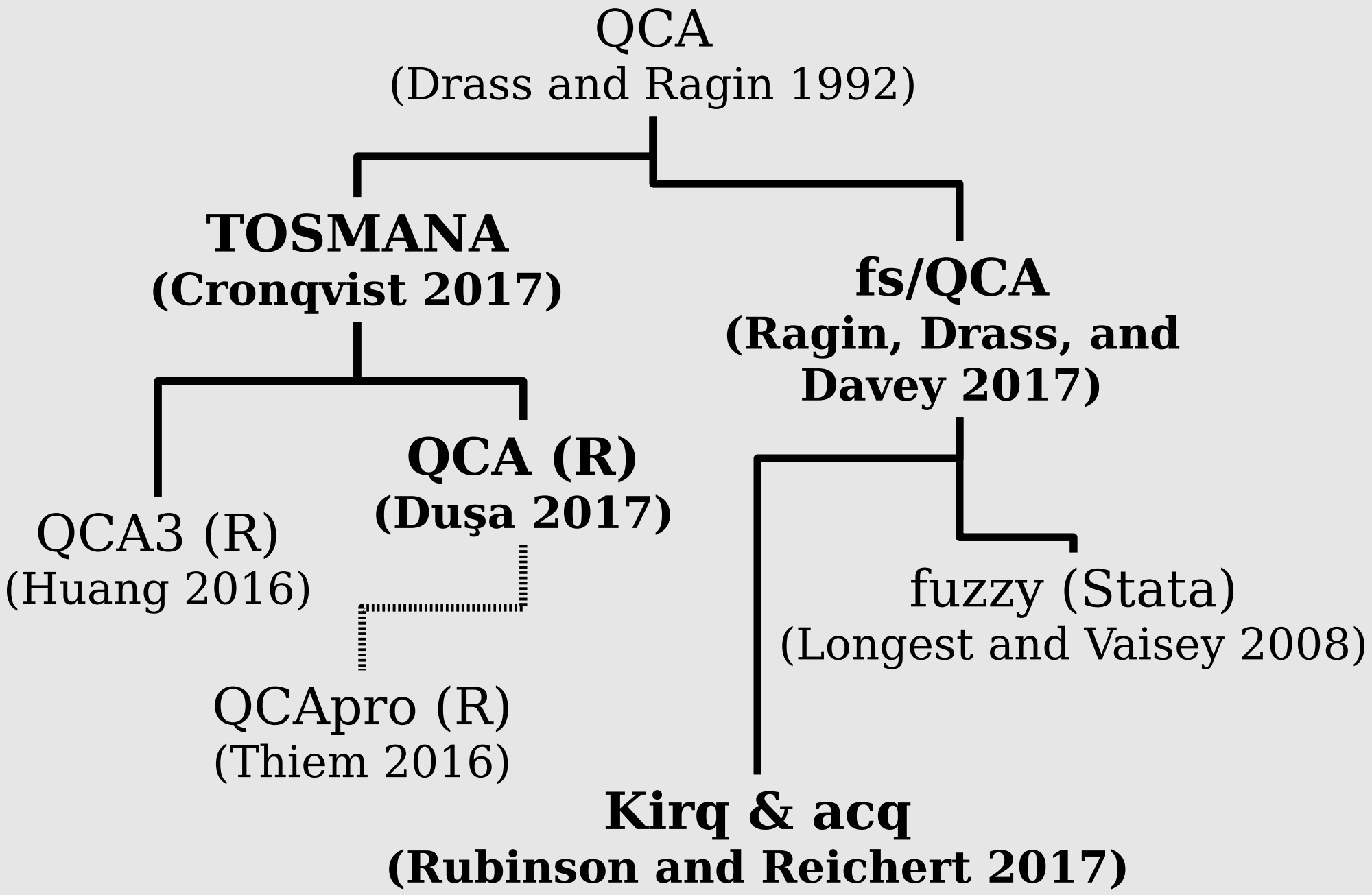
- Ragin (2008) *Redesigning Social Inquiry*
- Ragin (1987) *The Comparative Method*
- Ragin and Rubinson (2009) “The Distinctiveness of Comparative Research”
- Ragin and Rubinson (2011) “Comparative Methods”

Secondary Sources

- COMPASSS web site (http://www.compasss.org)
  - bibliography and working papers series
- Ragin and Fiss (2016) *Intersectional Inequality*
- Ragin (2000) *Fuzzy-Set Social Science*
- Schneider and Wagemann (2012) *Set-Theoretic Methods for the Social Sciences*
- Rihoux and Ragin (2009) *Configurational Comparative Methods*

A Menagerie of QCA Software Packages

(complete list at http://ww.compasss.org)



Varieties of QCA: csQCA, fsQCA, and mvQCA

- *The Comparative Method* (1987) describes “crisp-set QCA”
- *Fuzzy-Set Social Science* (2000) describes “fuzzy-set analysis”
- *Redesigning Social Inquiry* (2008) unifies “crisp-set QCA” and “fuzzy-set QCA”
  - csQCA is a special form of fsQCA
  - *fs/QCA*, *acq/Kirq,* and R package are all based on the RSI algorithms
- What about multi-valued QCA?

What is QCA?

- QCA is a formalization of the comparative method, using Boolean algebra

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What is the comparative method?

- Many names: comparative research, comparative analysis, small-N comparison, small-N analysis, case studies, cross-case studies
- Is a technique for identifying and analyzing invariant (consistent) relationships.
- Characterized by the search for necessary and sufficient conditions.
- Is comparative research necessarily small-N?
- Is comparative research necessarily case-oriented?

Invariant Relationships

- Definition: Certain aspects of cases tend to co-occur.
  - Tenured faculty tend to have many publications
  - Religious fundamentalists tend to be politically conservative
  - Influenza virus causes the flu
  - HIV causes AIDS

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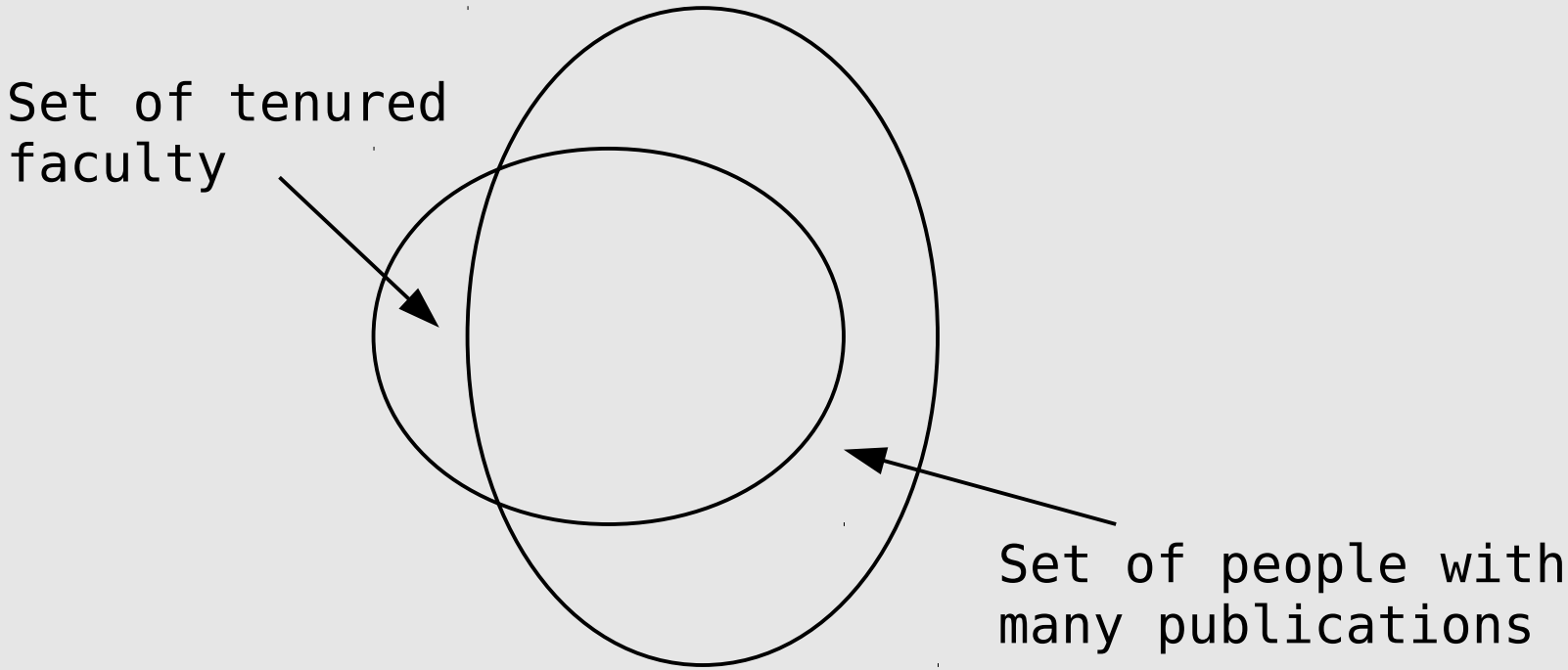

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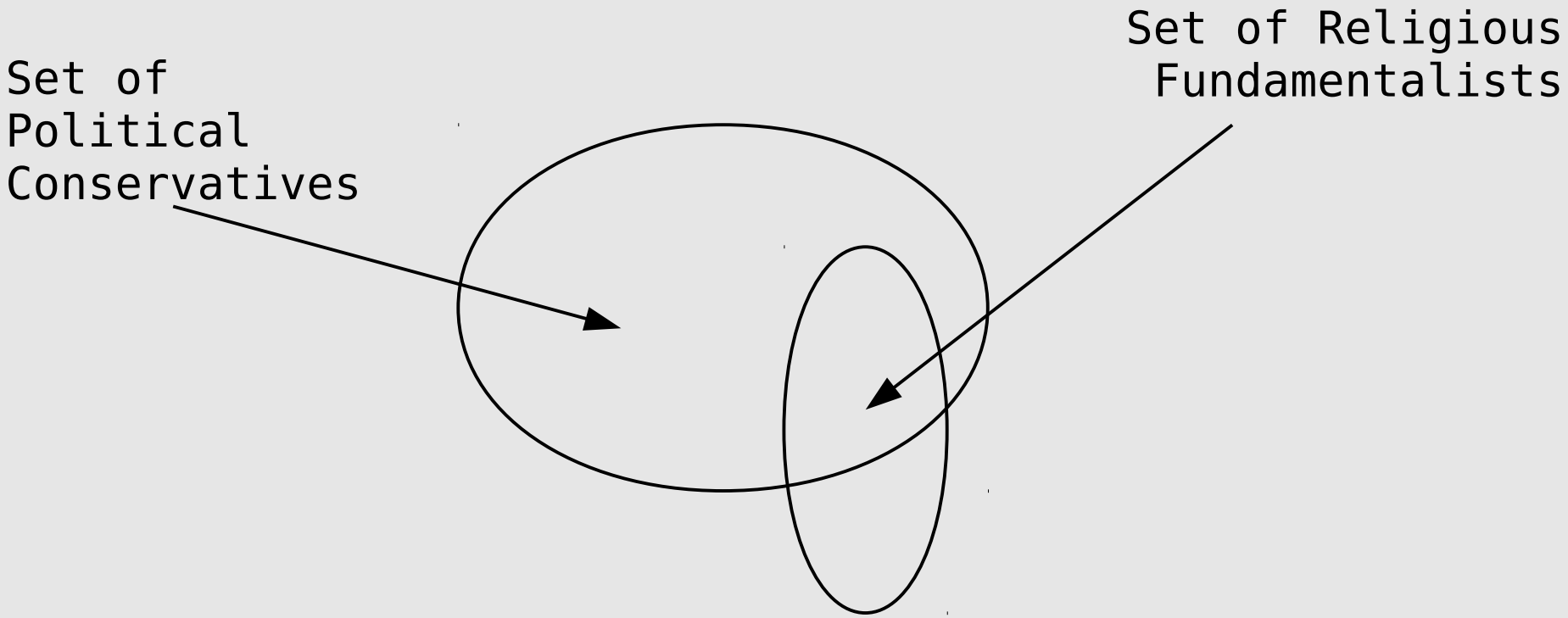

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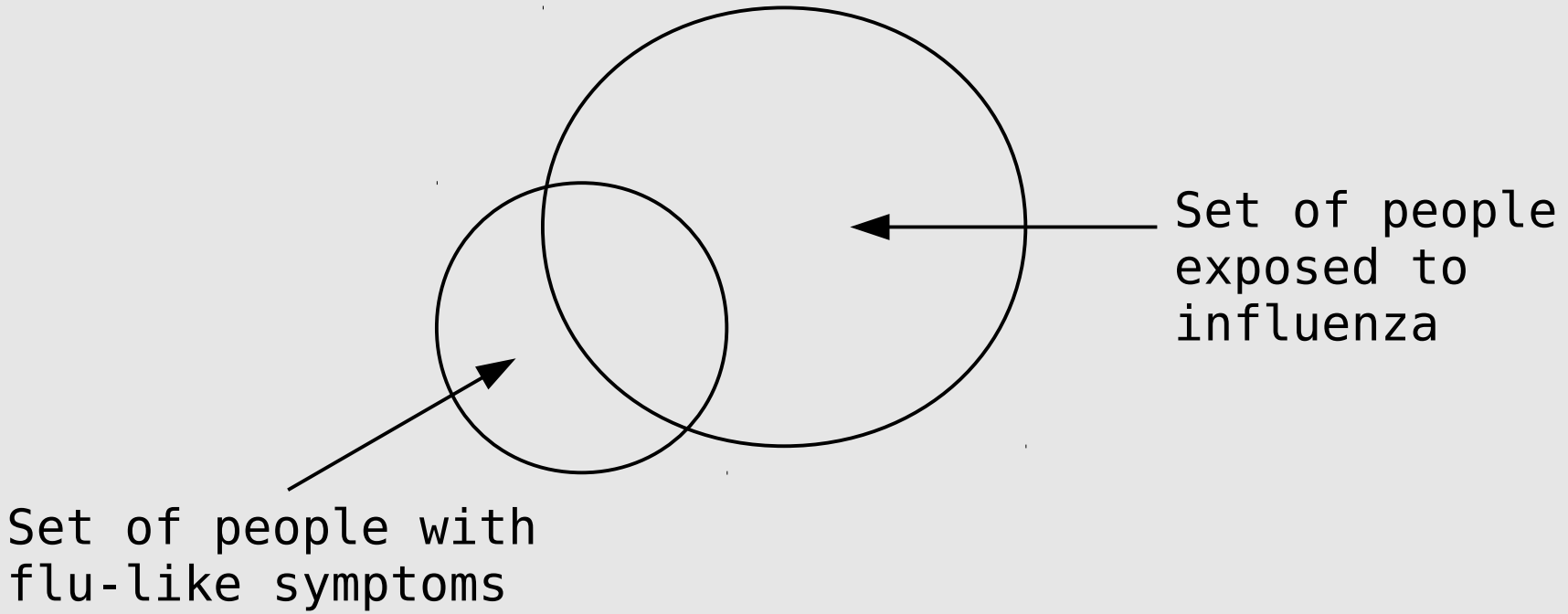

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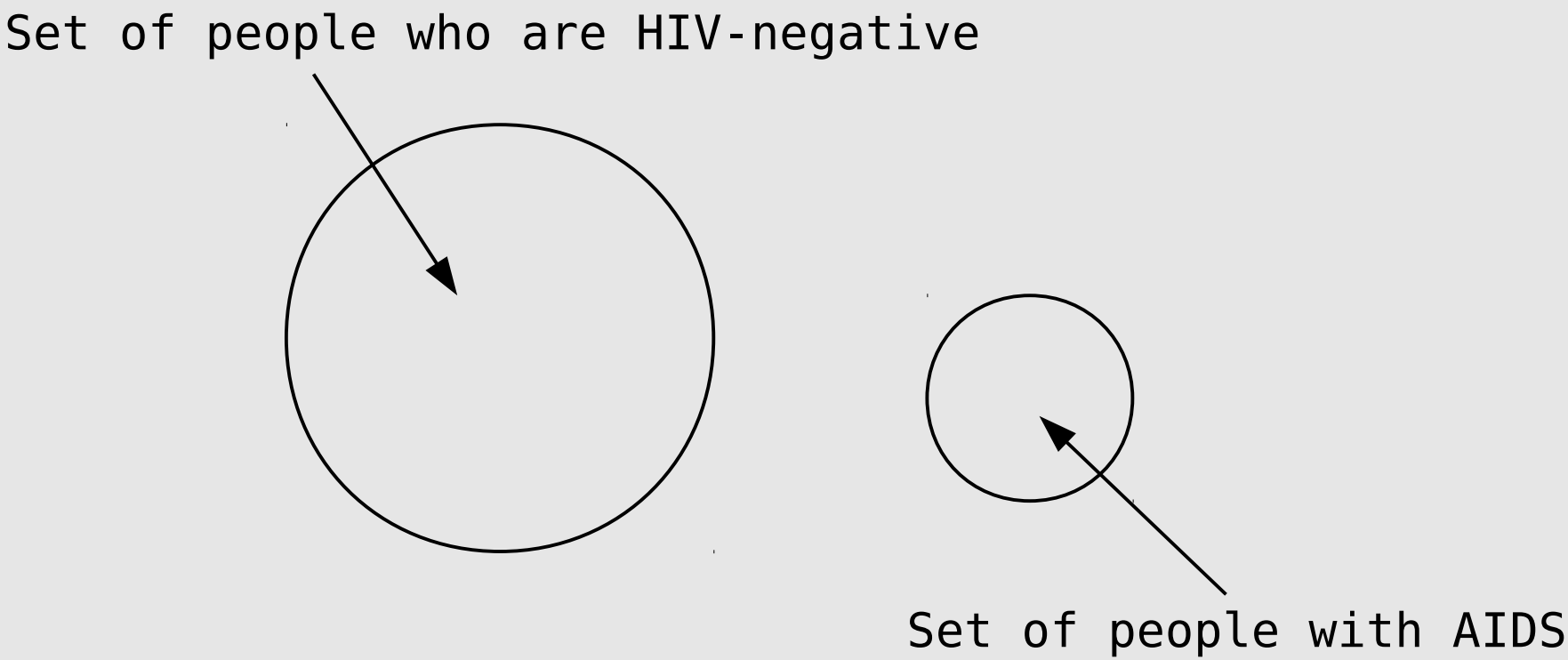

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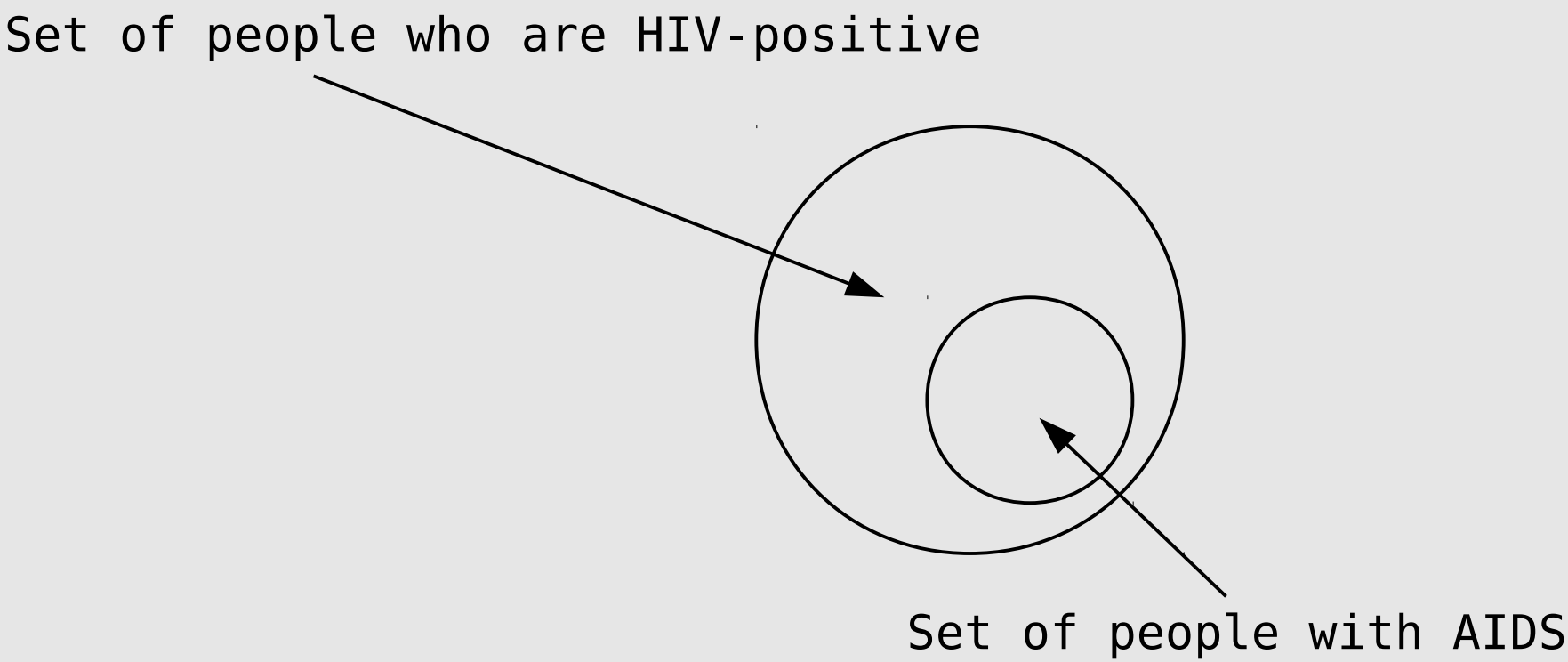

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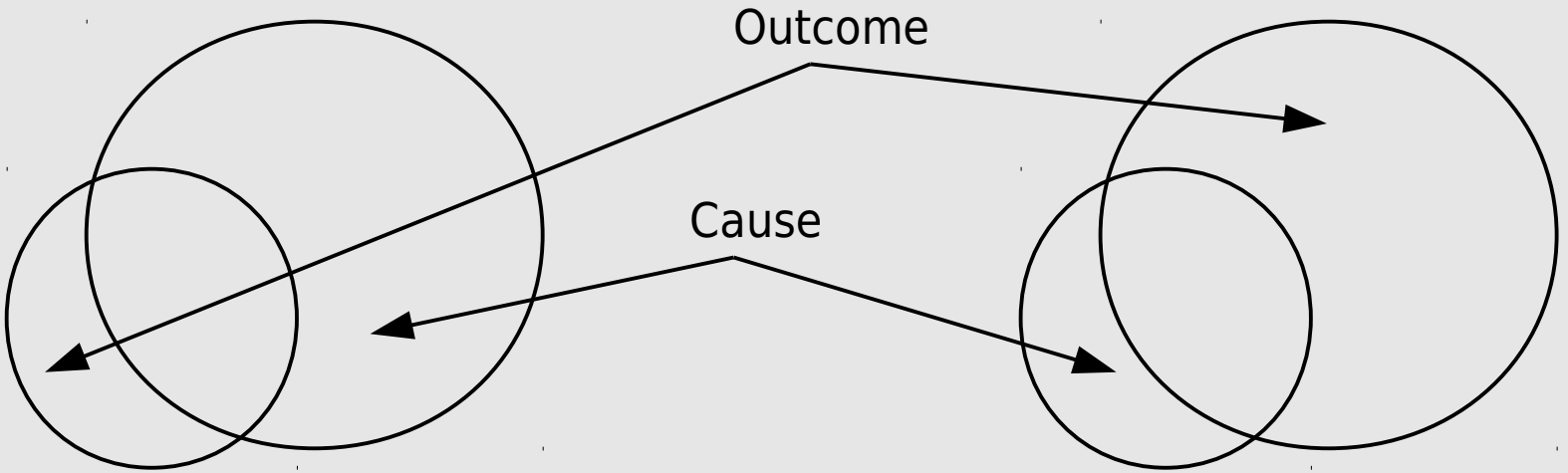
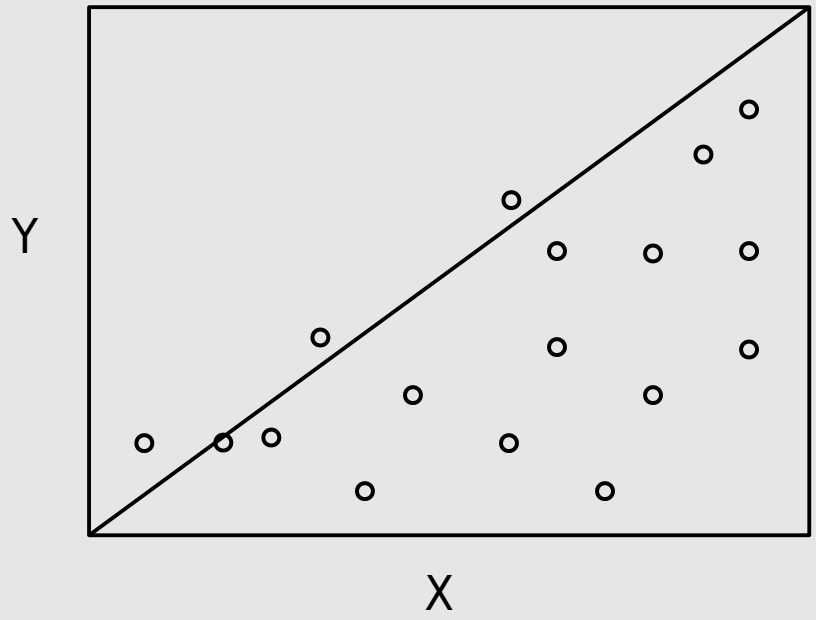
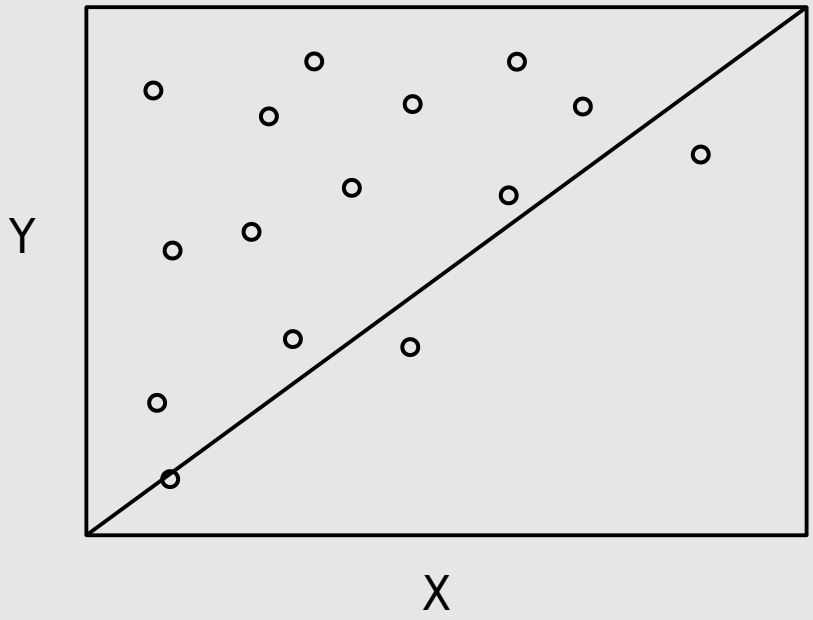




Subset relationship consistent with *necessity* (X≥Y)



Subset relationship consistent with *sufficiency* (Y≥X)

Invariant Relationships

- Definition: Certain aspects of cases tend to co-occur.
  - Does not imply determinism (or stochasticism)
  - Is not vulnerable to a single disconfirming case
  - Is fundamentally set-theoretic
  - Parallels how we typically understand causation:
    - A subset of people exposed to influenza will contract the flu.
    - To avoid getting sick, wash your hands.
    - A particular intervention may work at one type of hospital but not another (e.g., small vs. large; private vs. public)

Distinguishing Features of QCA

- Assumption of invariance
- Assumption of causal complexity
  - Identification of necessary and sufficient conditions
  - There can be multiple paths to the same outcome
- No degrees-of-freedom restrictions
  - Appropriate for small-, medium-, and large-N analysis
- Encourages retroductive analysis (moving back and forth between theory and data)
  - Uses a malleable analytic frame
  - Must identify, measure, and scale (calibrate) your causal conditions and outcome
  - Dataset must include both positive and negative outcomes
  - Identifying and resolving contradictions is key

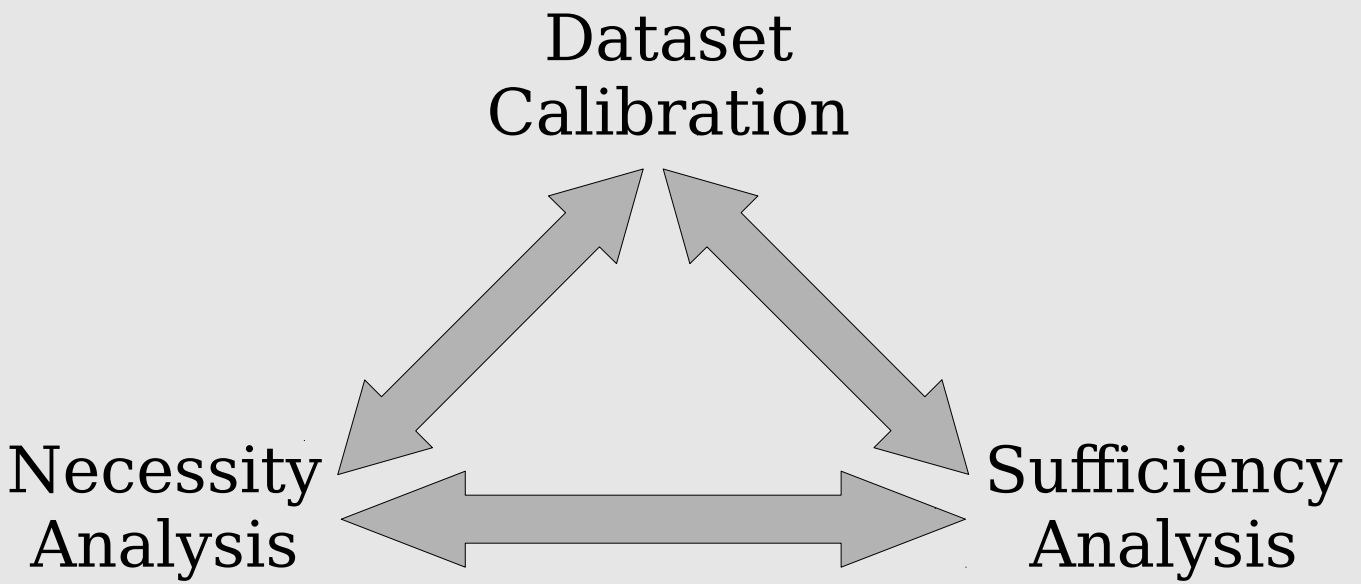
Historical Affinity with Case-Oriented, Small-N Research

- Holistic approach of comparativists encourages "structured, focused comparisons."
- Small number of countries enables in-depth analysis and helps cases to remain in the foreground

But:

- Small-N statistical analysis is possible (e.g., Esping-Andersen)
- Large-N comparative research is possible (e.g., Ragin and Fiss; Franzosi and Rubinson)
- Small-N ≠ Case-Oriented; Large-N ≠ Variable-Oriented

Three Analytic Components of QCA



Retroduction in QCA
Example: Brown and Boswell (1995)

Truth Table with Contradiction (from Table 4 of Brown and Boswell 1995)

Recent Black Migrants	Weak Union	Black Strikebreaking	Observations
T	T	T	East Chicago, Pittsburgh, Youngstown
T	F	Con	Buffalo, Chicago, Gary, Johnstown, [Cleveland]
F	T	F	Bethlehem, Joliet, McKeesport, Milwaukee, New Castle, Reading
F	F	F	Decatur, Wheeling

Retroduction in QCA
Example: Brown and Boswell (1995)

Revised Truth Table without Contradiction (from Table 5 of Brown and Boswell 1995)

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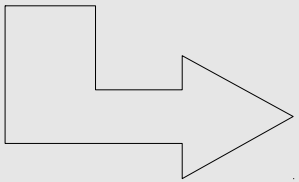

```
RBM *  WU * LGR +
RBM * ~WU * LGR
          = Black Strikebreaking
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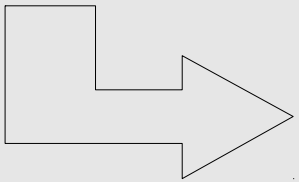

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RBM * LGR   = Black Strikebreaking
```

Boolean Algebra

- UPPERCASE for the presence of a condition
- lowercase or ~ for the absence of a condition
- Negation

  ~A = 1 – A

  a = 1 – A
- Logical and (Boolean multiplication/Set intersection)

  A•b = Ab = min(A,b)
- Logical or (Boolean addition/Set union)

  A+b = max(A,b)

Dataset Calibration

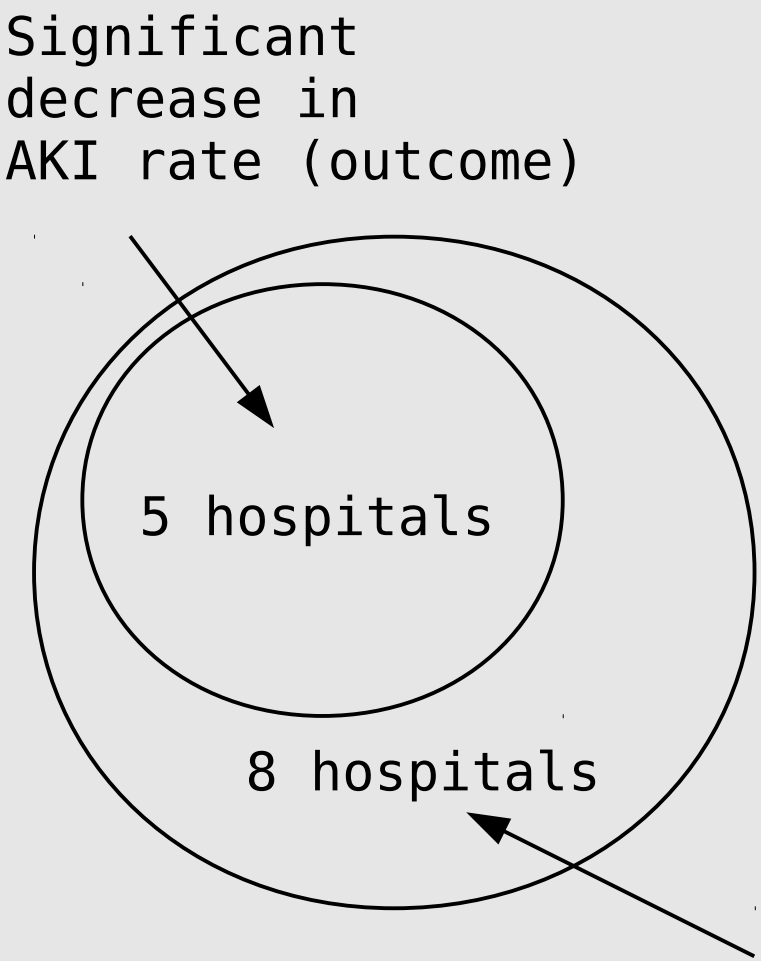
- The process of constructing fuzzy-sets
- May be crisp or fuzzy
- Is about defining set memberships
  - degree of membership in the set of rich people (vs annual income)
  - degree of membership in the set of developed countries (vs GDP/capita)
- Importance of negation and asymmetry
  - degree of membership in the set of *not* rich people
  - degree of membership in the set of *not* developed countries

Analysis of Necessary and Sufficient Conditions

- Necessity analysis is underdeveloped in the literature; QCA development—and applications—have focused on sufficiency analysis
  - but: *Kirq* and *acq* have sophisticated necessity testing
- Sufficiency analysis assumes causal complexity and emphasizes *multiple conjunctural causation*:
  - Intersectionality: combinations of conditions explain empirical phenomena
  - Equifinality: different combinations of conditions can produce the same outcome

Necessary Conditions

Causal condition must (almost always) be present for outcome to occur.



Testing for necessity:

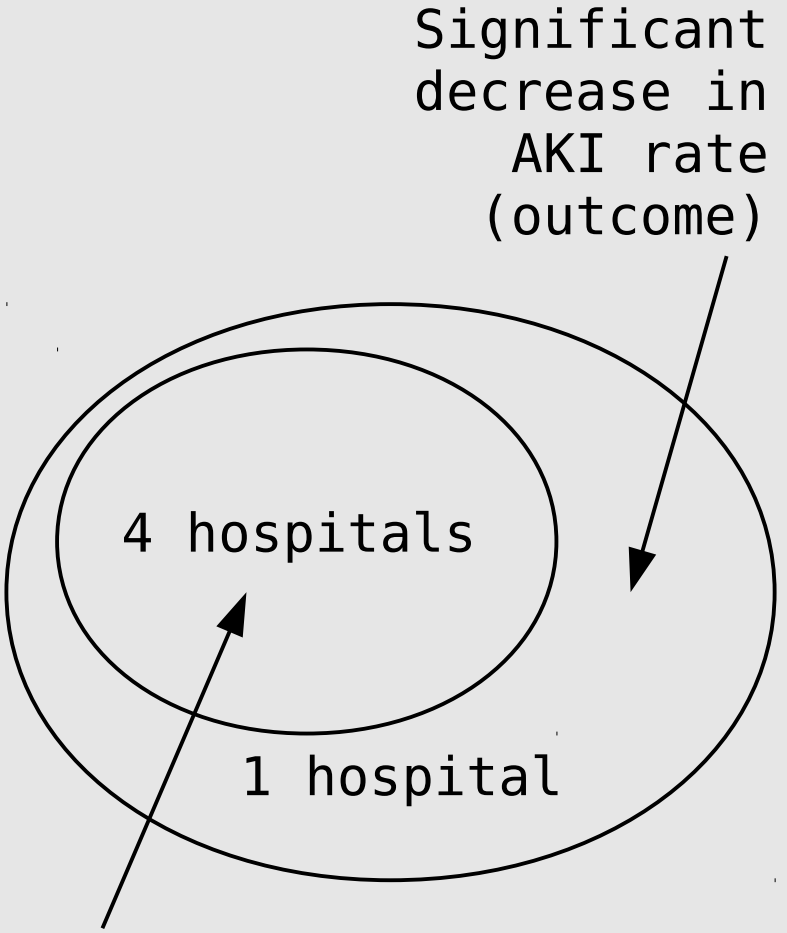
- Outcome is subset of cause
- Assessed by two measures of fit: consistency and coverage
- Use of theory and application of substantive knowledge is crucial

Sufficient Conditions

Outcome (almost) always occurs when causal condition is present.

Testing for sufficiency:

- Cause is subset of outcome
- Again, assessed by two measures of fit: consistency and coverage
- Focus is on configurations of cases (combinations of conditions)
- Multiple solutions are possible



- Pharmacist champion w/hours,
- 2+ pharmacists assigned, and
- Report build in progress

(sufficient condition scon=1.0, scov=0.80)

Three Types of Comparative/QCA Projects

- Uncovering causal recipes
  - The most popular use of QCA, and how we typically describe the method's goal
- Identifying taxonomies and types
  - Based on truth table analysis
  - Often engaged in “along the way” but can be its own end
- Analyzing context
  - What are the conditions under which phenomena do, or do not, occur?