# Qualitative Comparative Analysis: A Cross-Disciplinary Methodology for Studying Similarities and Differences

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# Overview

- Review of QCA readings, resources and software
- Varieties of QCA
- What is QCA?
  - QCA as a formalization of the comparative method
  - QCA as an investigation of invariance
  - Software demonstration
  - Distinguishing features of QCA
- Three analytic components of QCA
  - Data calibration
  - Necessity analysis
  - Sufficiency analysis
- Interpreting solutions
- Types of QCA projects

# Readings and Resources

- Ragin (2008) *Redesigning Social Inquiry*
- Ragin (1987) *The Comparative Method*
- Mellow (2021) *Qualitative Comparative Analysis: An Introduction to Research Design and Application*
- Oana, Schneider, and Thomann (2021) *Qualitative Comparative Analysis with R: A Beginner's Guide*

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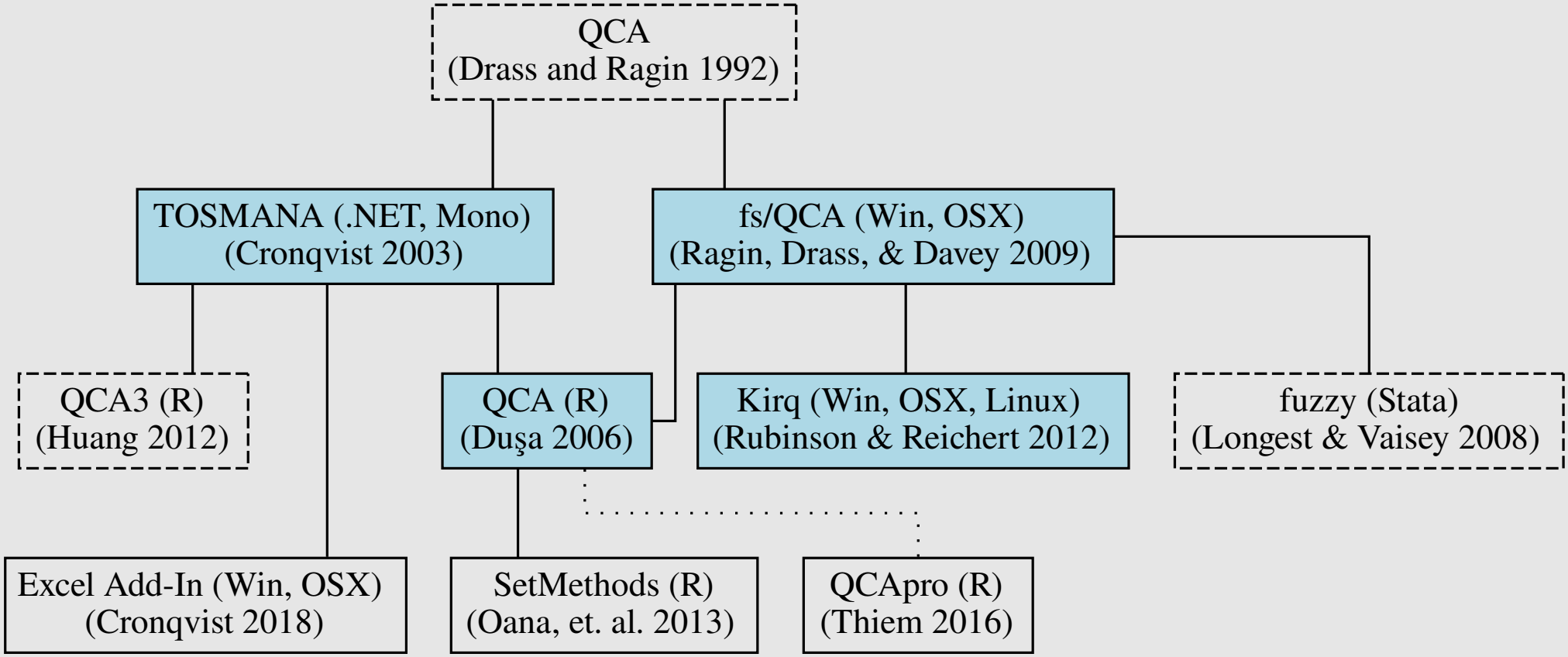
- Rubinson, et. al. (2019) "Common Errors in QCA"
- Ragin and Rubinson (2009) "The Distinctiveness of Comparative Research"
- Ragin and Rubinson (2011) "Comparative Methods"
- Ragin and Fiss (2016) *Intersectional Inequ*ality
- COMPASSS web site (http://www.compasss.org)
  - international, inter-university QCA consortium
  - news, events, resources, bibliographies, working papers series

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

# What is the comparative method?

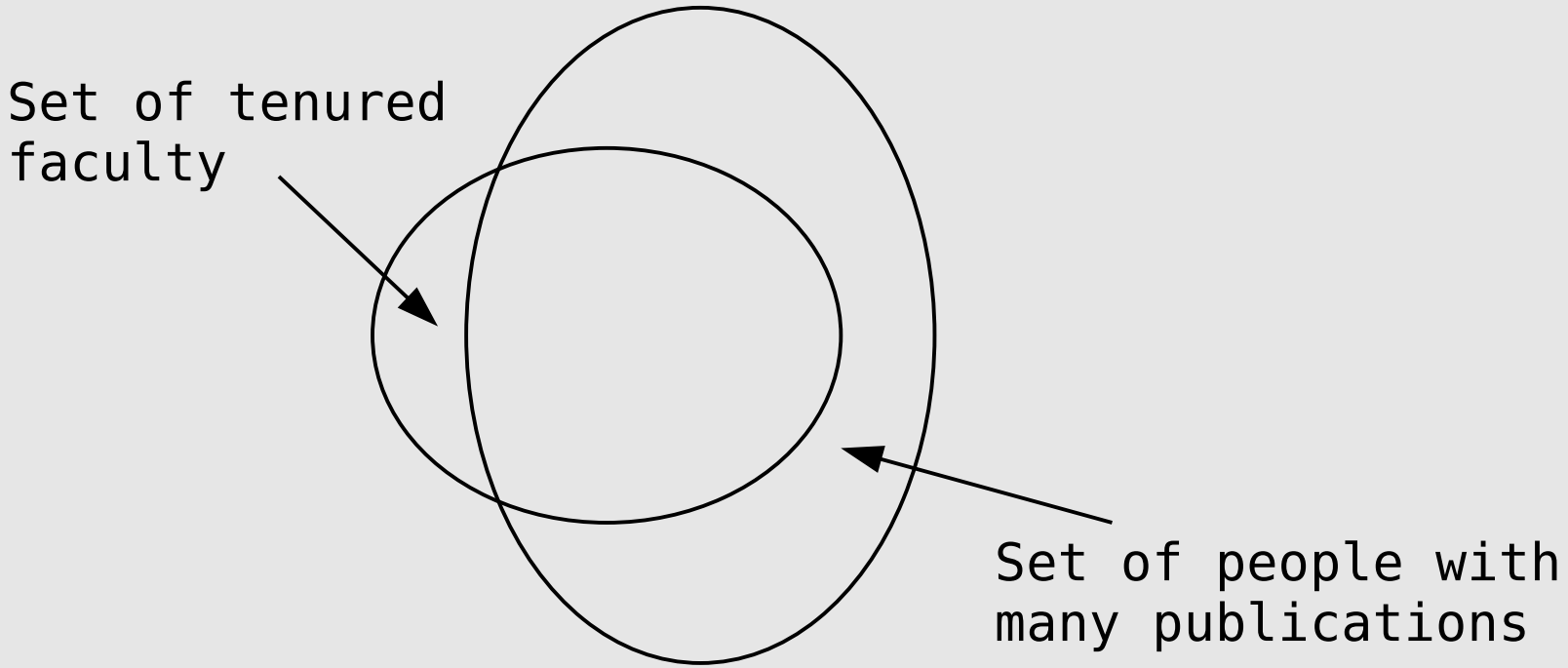
- Many names: comparative research, small-N analysis, comparative case studies, cross-case studies
- A cross-disciplinary technique used to:
  - study diversity, clarify similarities and differences among cases.
  - identify and analyze invariant relationships.
  - search for necessary and sufficient conditions.
- Is comparative research necessarily small-N?
- Is comparative research necessarily case-oriented?

# Invariant Relationships
## Certain Aspects of Cases Tend to Co-occur

- “All happy families are alike; each unhappy family is unhappy in its own way” (Tolstoy, *Anna Karenina)*
- Tenured faculty tend to have many publications
- Religious fundamentalists tend to be politically conservative
- HIV causes AIDS;
  Smoking causes lung cancer;
  SARS-CoV-2 causes COVID-19

# Invariant Relationships

## Certain Aspects of Cases Tend to Co-occur



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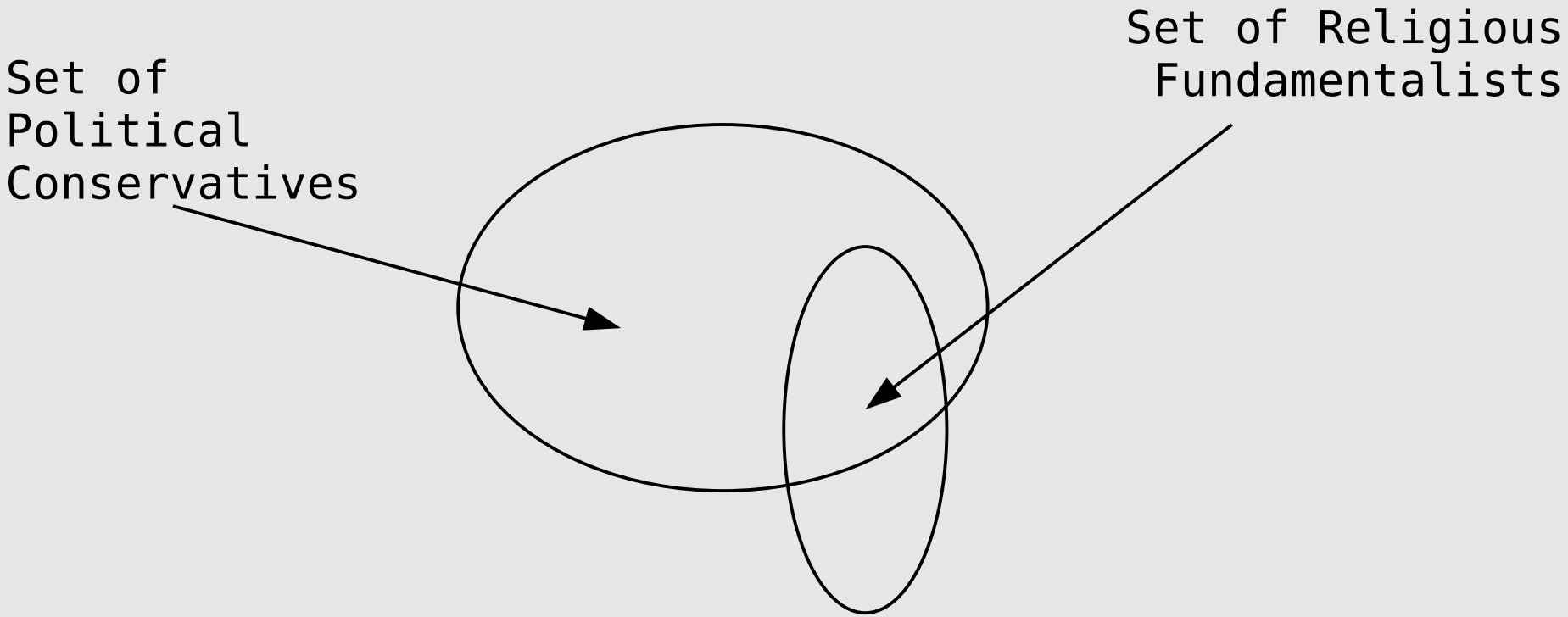

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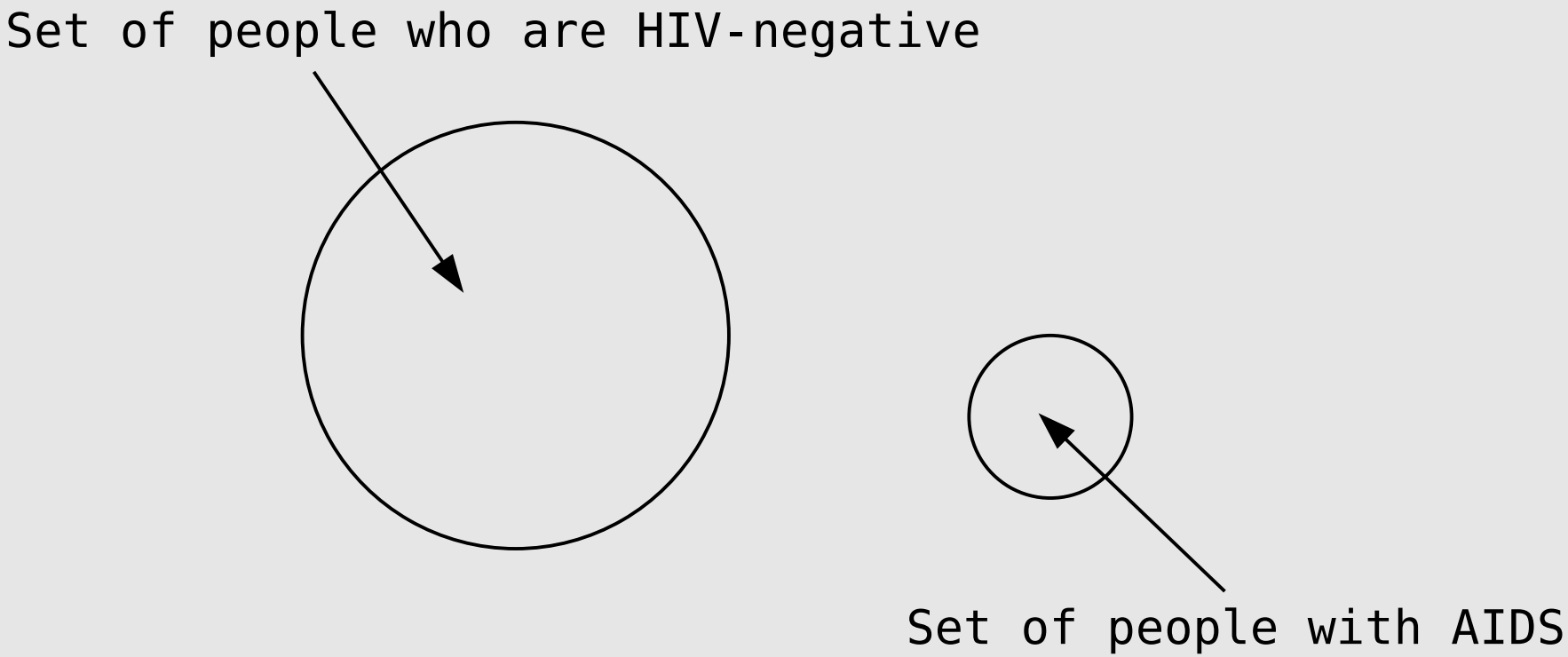

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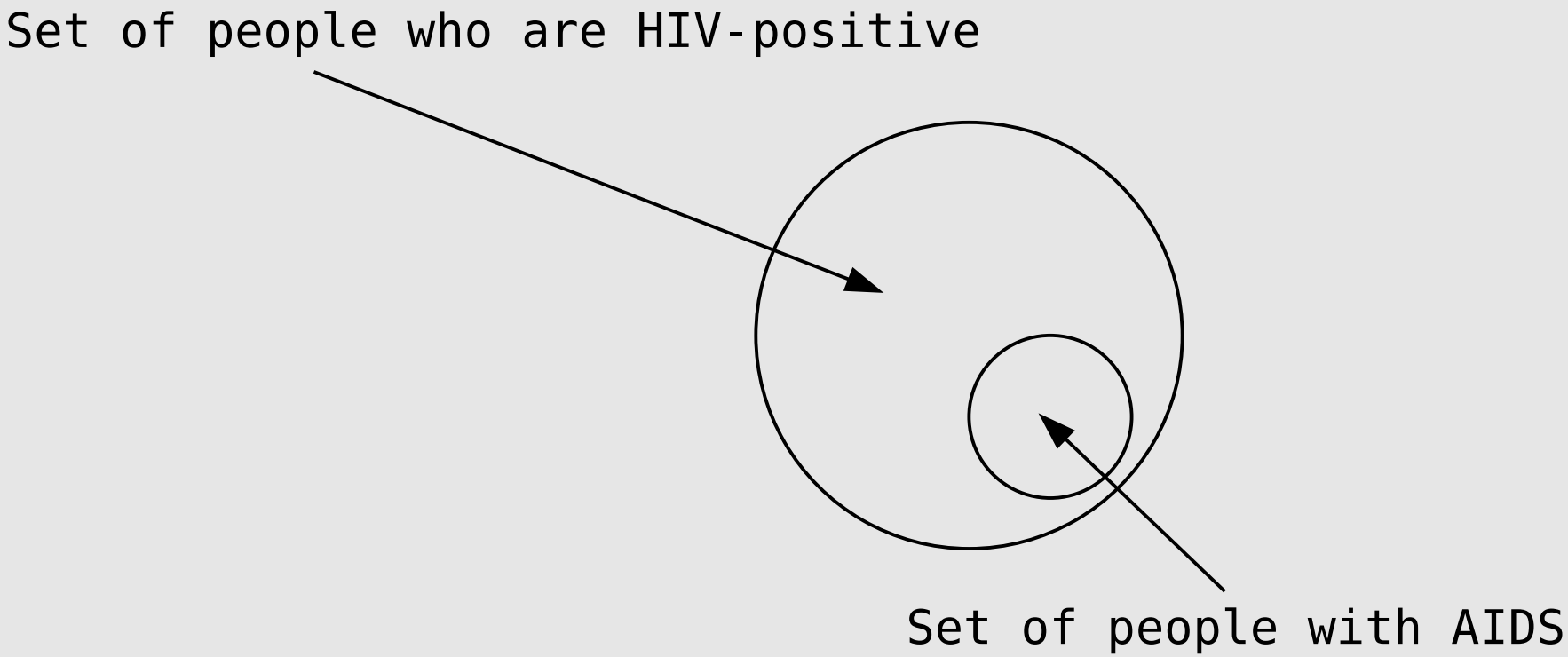

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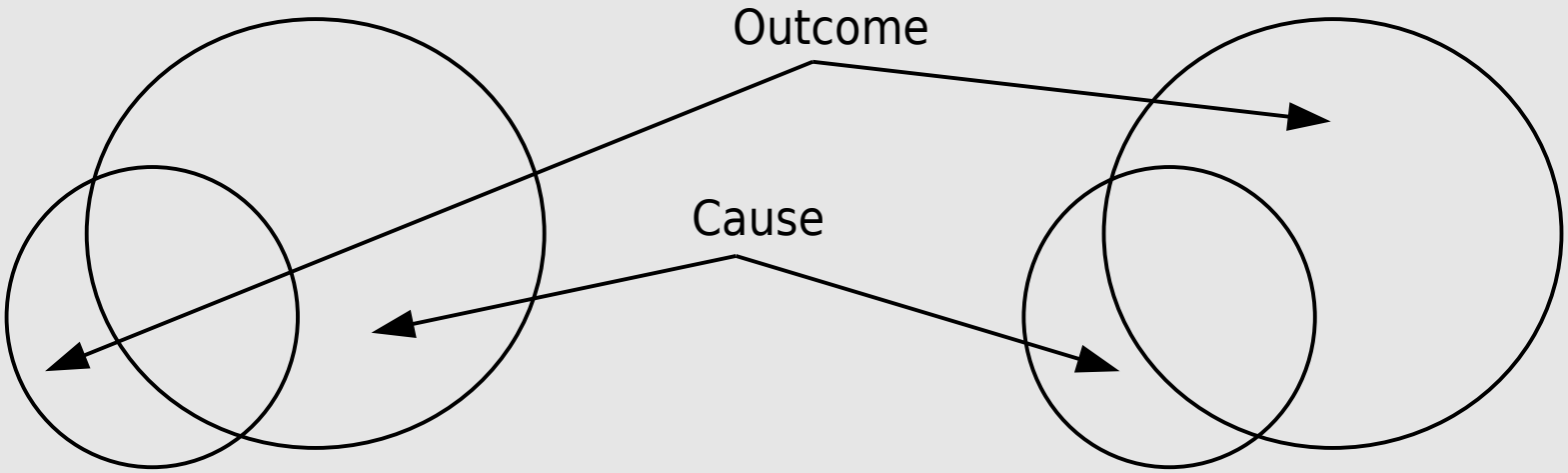
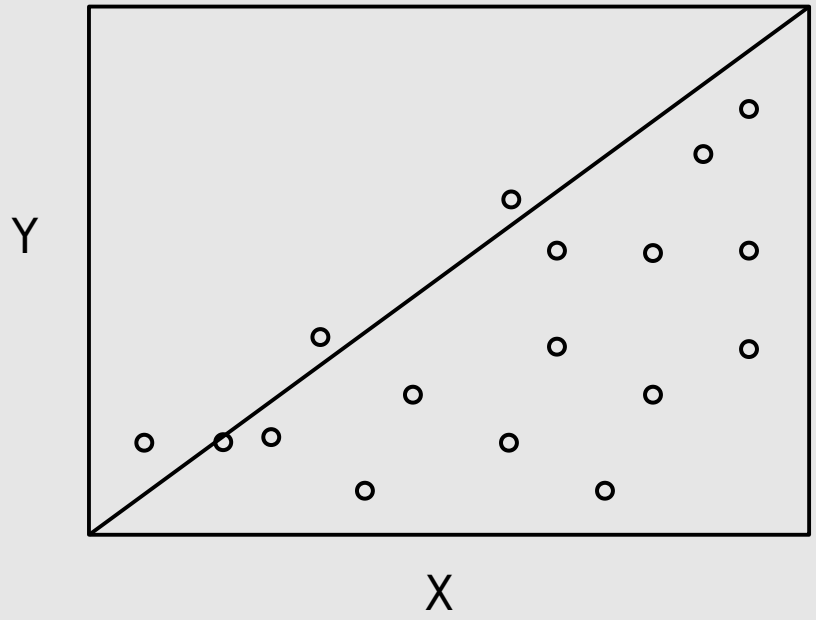
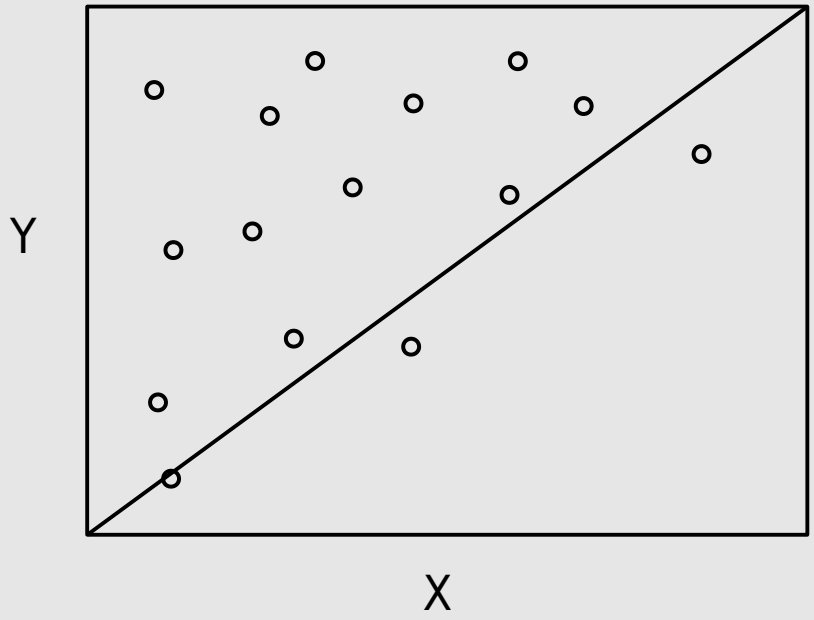



Subset relationship consistent with *necessity* (X≥Y)




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

# Invariant Relationships
## Certain Aspects of Cases Tend to Co-occur

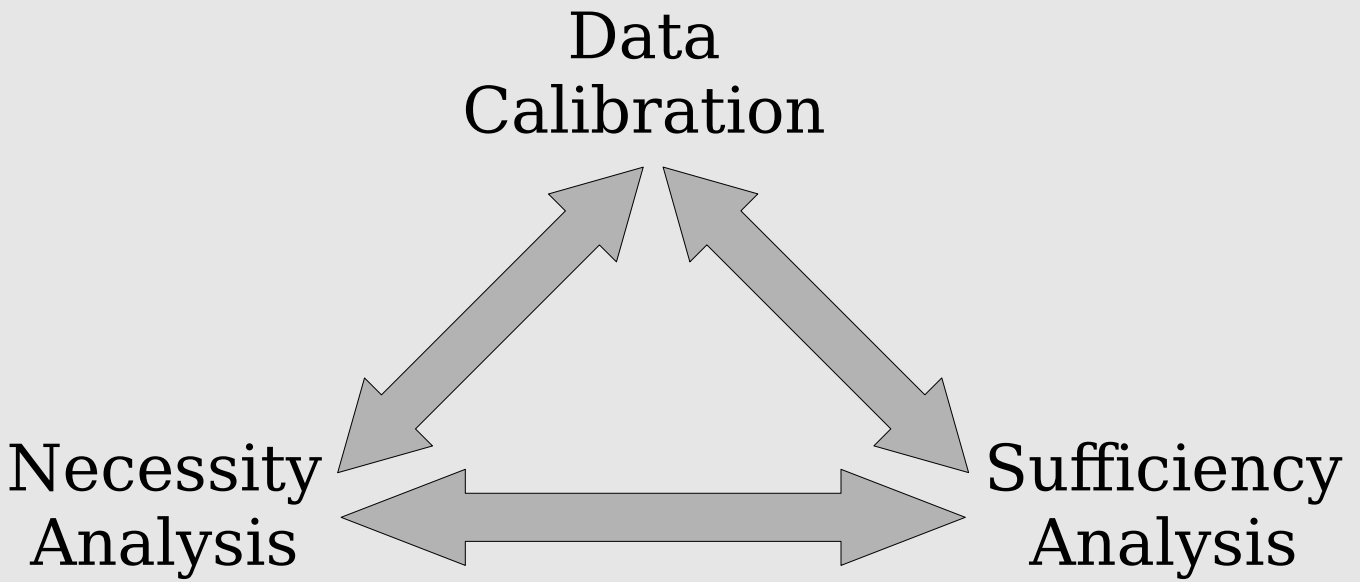
- Does not imply determinism (or stochasticism) and is not vulnerable to a single disconfirming case.
- Parallels how we typically understand causation, which is fundamentally set-theoretic:
  - A subset of people exposed to SARS-CoV-2 will contract COVID-19, whether vaccinated or not. But the overwhelming majority of serious illnesses and deaths occur among the set of unvaccinated individuals.
  - Don’t smoke to avoid lung cancer; wear condoms to avoid STDs.
  - Academy Awards are awarded to films that are both popular *and* critically-acclaimed.
  - A particular intervention may work in one context but not another (e.g., small vs. large city; public vs. private university)

# Software Demonstration
# Example: Brown and Boswell (1995)

# Distinguishing Features of QCA

- Fundamentally set-theoretic
- 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 explanatory conditions and outcome
  - Data set must include both positive and negative outcomes
  - Identifying and resolving contradictions is key

# Three Analytic Components of QCA



# Data Calibration

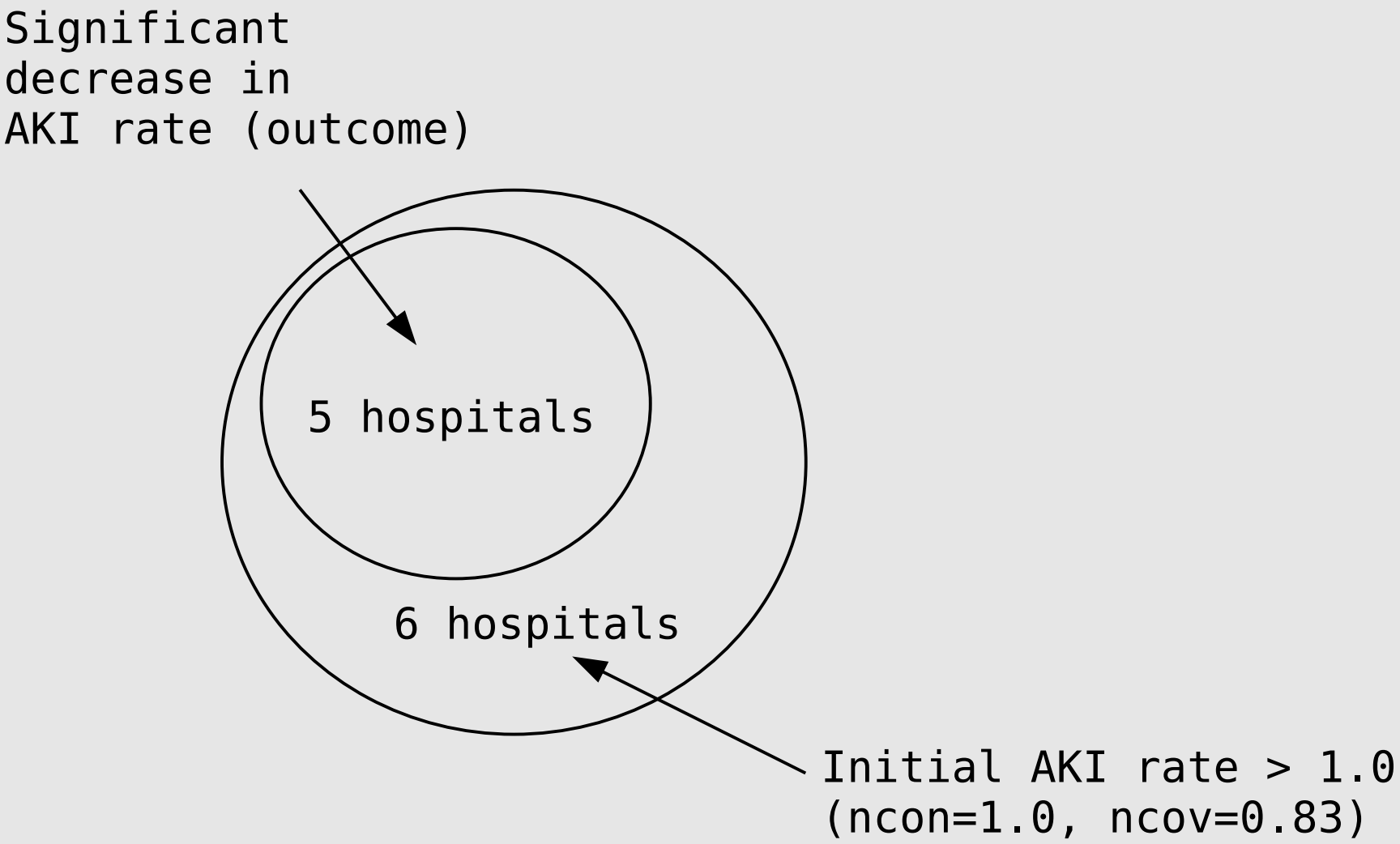
- The process of constructing fuzzy-sets
- May be crisp {0,1} or fuzzy $\{0.0 \leq x \leq 1.0\}$
- Is about defining set memberships
  - degree of membership in the set of rich people (vs annual income)
  - degree of membership in the set of developed countries (vs GDP/capita)
- Importance of negation 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
  - but: *Kirq* and *acq* have sophisticated necessity testing; see also: necessary condition analysis (NCA)
- 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
- Measures of model fit:
  - *Consistency* measures the strength of a superset/subset relationship (a perfect subset relationship=1.0)
  - *Coverage* measures the empirical importance of a particular solution (explaining all instances of the outcome=1.0)

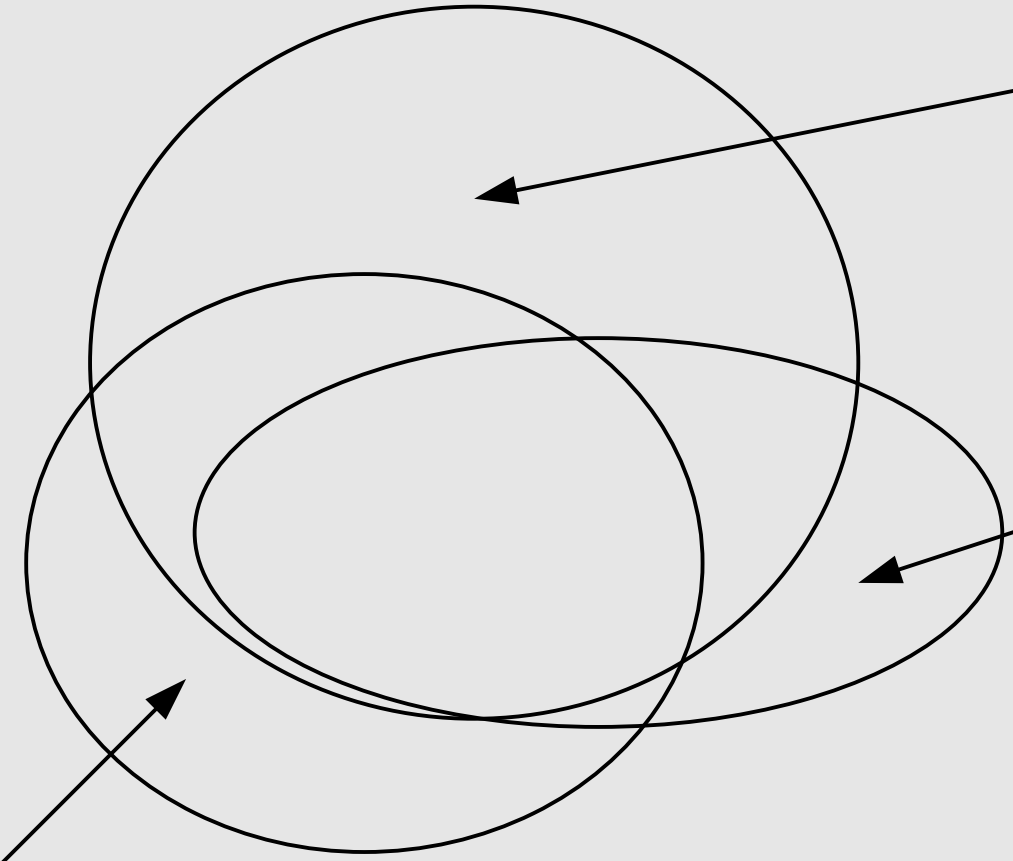
# Assessing Necessary Conditions

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



# Assessing Sufficient Conditions

## When causal condition is present outcome will (almost always) occur.



Recently deported women who do not plan to cross again (Outcome)

Women who aren't strongly connected to the U.S. and have at least a high school education. (scon=0.88, scov=0.37, ucov=0.15)

Women who aren't strongly connected to the U.S., had a lengthy crossing, and encountered bandits. (scon=0.91, scov=0.55, ucov=0.06)

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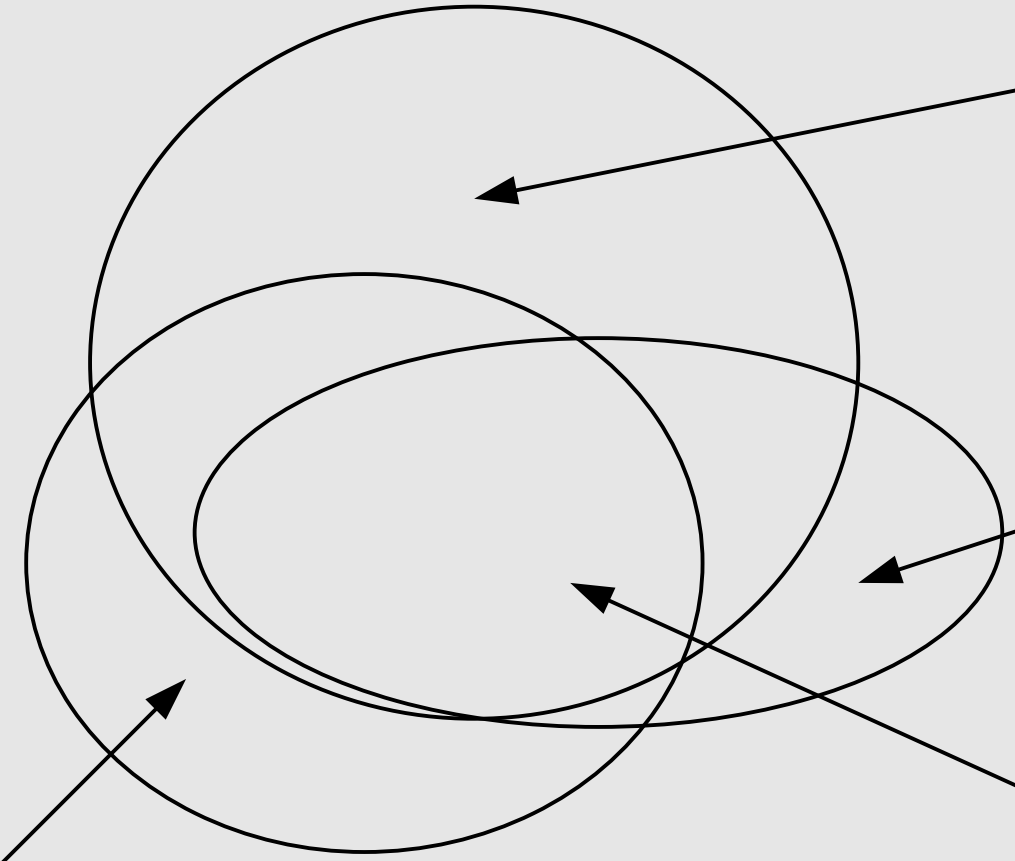

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Women belonging to both sets

Women who aren't strongly connected to the U.S., had a lengthy crossing, and encountered bandits. (scon=0.91, scov=0.55, ucov=0.06)

# A Range of Solutions are Possible

*More Complex*

(a) Acsir *or* ACSir *or* ASIR

(b) Air *or* ACSi *or* ASIR

(c) Air *or* ASIR

(d) Ai *or* ASR

(e) i *or* SR

*More Parsimonious*

Intermediate solutions constructed manually, or via directional expectations

*Outcome: Successful shaming of targeted regimes*

*Explanatory conditions: (A)dvice, (C)ommittment, (S)hadow of the future, (I)nconvenience, (R)everberation*

# Three Types of QCA Projects

*Uncovering causal recipes*

- The most popular use of QCA, and how we typically describe the method's goal
- Seeks to identify invariant relationships, necessary and sufficient conditions

*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?