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

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UNAM
October 17–21, 2025

Overview

Day 1: The Logic of QCA

- Introductions and discussion of research projects

Day 2: Three Analytic Components of QCA

- Calibration, Necessity Analysis, Sufficiency Analysis

Day 3: Putting QCA into Practice

- Software for conducting QCA

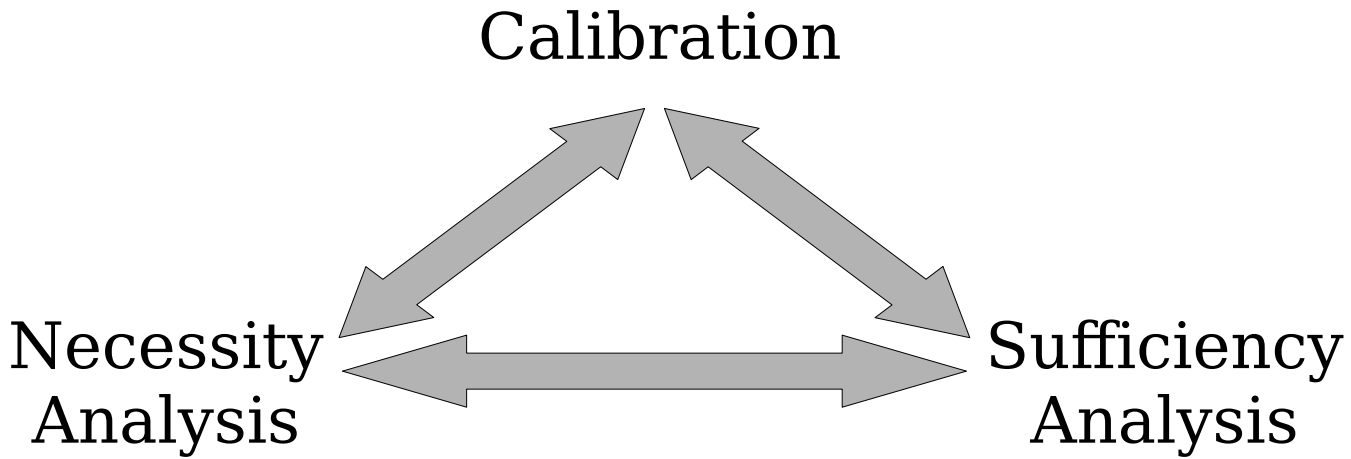
Day 4: Advances in QCA

- Time in QCA, Generalized Analytic Induction

Day 5: Pulling it all Together

- Building robust models, Visualizing and presenting QCA
- Discussion of research projects

Three Analytic Components of QCA



Building Robust Models

Calibration

- Successful calibration demands theoretical and substantive case knowledge.
- Calibrations aren't objective but based on *judgment*.
- Key questions for each calibration: *What is the target set?*
  - Fully-in threshold
  - Fully-out threshold
  - More in than out
  - More out than in
- Calibrations are often simple and straightforward, but can be complex and accommodate time, sequences, and nested designs ("macroconditions"). *Seek deep calibrations.*
- *Provide transparency* via a calibration table that reports rules and justifications for each calibration decision.

Necessity Analysis

- Don’t skip necessity testing.
- Remember that the truth table does not reveal necessary conditions
- Traditionally, comparative researchers have focused on necessity rather than sufficiency. But most QCA projects focus on sufficiency. Why?
- QCA frequently fails to find necessary conditions; alternatively consider Necessary Condition Analysis (NCA) which, while not set-theoretic, is more sensitive than QCA.
- Explore how calibration decisions affect the relationship between necessity and sufficiency.

Sufficiency Analysis

- Most of your time and effort will be spent on constructing a meaningful truth table.
- Remember the *principle of invariance*: start with a simple truth table of two or three conditions and see how it changes as you add and replace conditions.
- Pay special attention to contradictions; they often indicate an under-specified model.
- Be judicious with counterfactual claims; intermediate solutions must make sense theoretically.
- Reveal the story by *factoring and visualizing your results*.
- Tell the story by *returning to your cases*.
  - In small/medium-N research, cases are *observations;* in large-N, cases are *types.*
- Address coverage. What's left to explain? Why?

QCA Protocols

Enhanced Standard Analysis (ESA)

- Selectively exclude remainders in order to avoid incorporating “incoherent” and “untenable” counterfactuals into the Boolean minimization.

Revised Two-Step QCA

- Separate analysis of “remote” and “proximate” conditions.

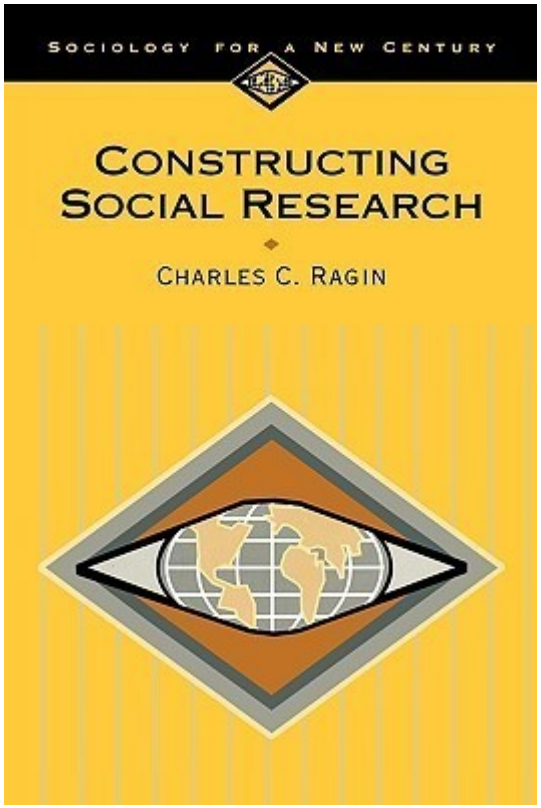
Necessity-guided QCA

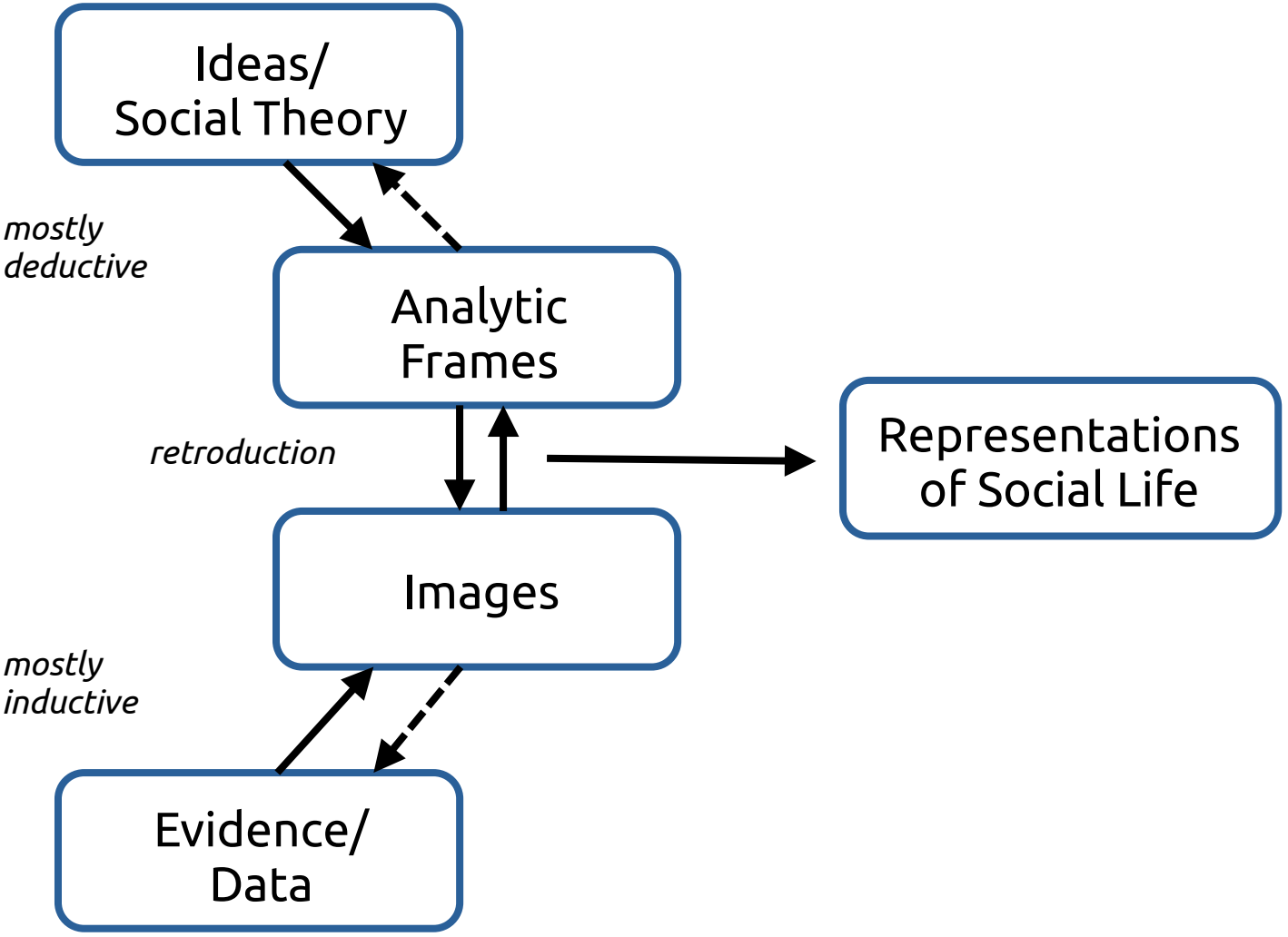
- Conduct the sufficiency analysis only on observations exhibiting the necessary conditions. Optionally conduct a second sufficiency analysis on observations lacking the necessary conditions.

Robustness in QCA

- Robust methods are desirable because they continue to produce reliable and stable results even when assumptions are violated.
- QCA is a descriptive (not inferential) technique and the primary assumption is *perfect measurement*.
  - But real-word data is always imperfect.
- The researcher's calibration decisions and choice of consistency threshold can absorb this measurement error.
- Researchers will sometimes vary calibration and consistency thresholds to assess the stability of results.
  - Is it problematic if *qualitative* results aren't stable?

Building QCA Models





Ragin (1994) *Constructing Social Research: The Unity and Diversity of Method*

Visualizing QCA

Two Uses of Visualization

- Visual analysis seeks to discover relationships among/between observations and conditions.
  - Audience is yourself; what can visualization reveal to you that tabular output misses?
- Presentation graphics are used to convey our findings to others. They are fundamentally rhetorical:
  - What information do you wish to highlight?
  - What story do you want to tell?
  - Two different audiences: those who know QCA well and those who don’t

Objects in a QCA Analysis

- Calibrated data sets
- Truth tables
- Consistency/coverage (concov) solutions

Goals of QCA Visualization

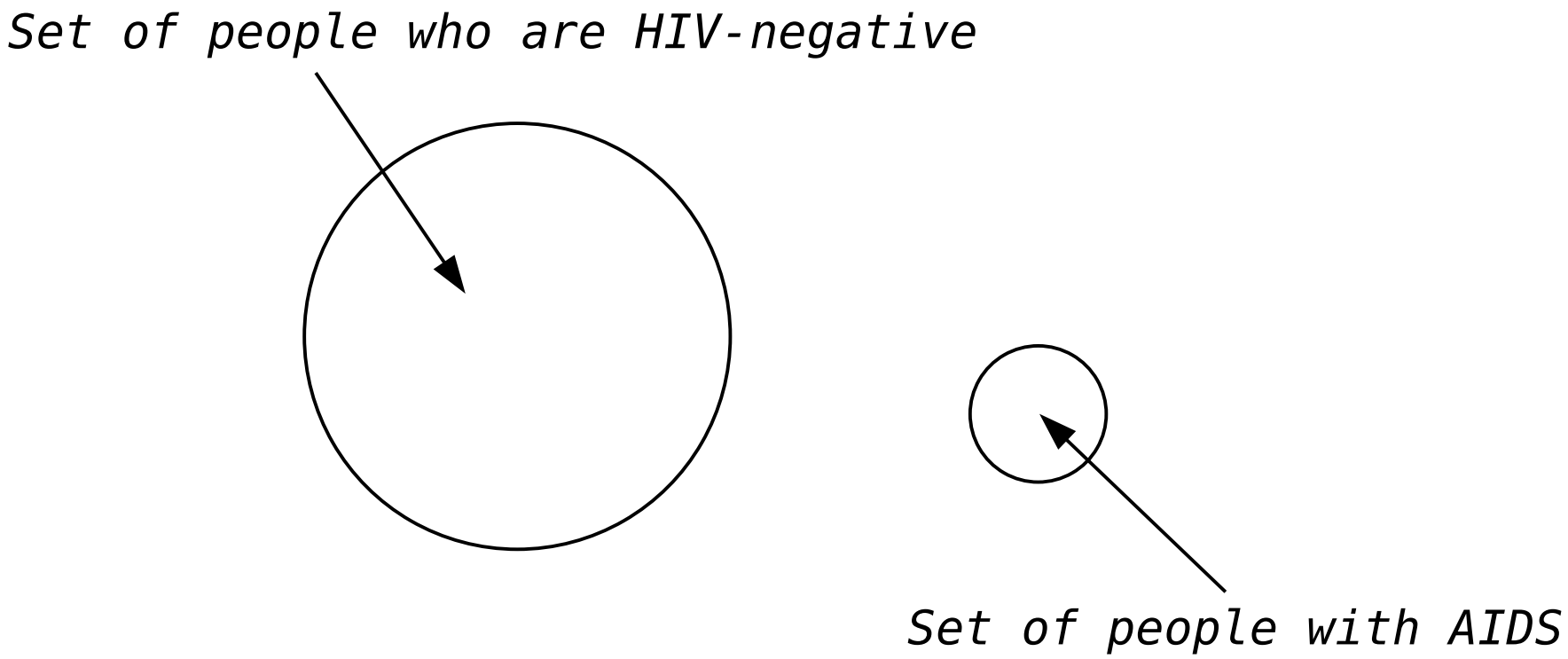
- Present superset/subset relationships
- Preserve case holism and diversity
- Clarify configurations
- Convey the range of solution complexity
- Tell the story

Introducing QCA to New Audiences

- Use Venn/Euler diagrams; people know and like them
- 2x2 tables are effective, especially when audience has a methodological background
- XY plots can be confusing, especially when audience has a strong statistical background
- Boolean expressions are helpful for highlighting QCA's distinctiveness
  - but consider alternatives to [* , + , ~] notation:
    - UPPERCASE/lowercase is easier to read from a distance
    - [& , ||]
    - or just write out "and" and/or "or"

Invariant Relationships: Certain aspects of cases tend to co-occur

- HIV causes AIDS



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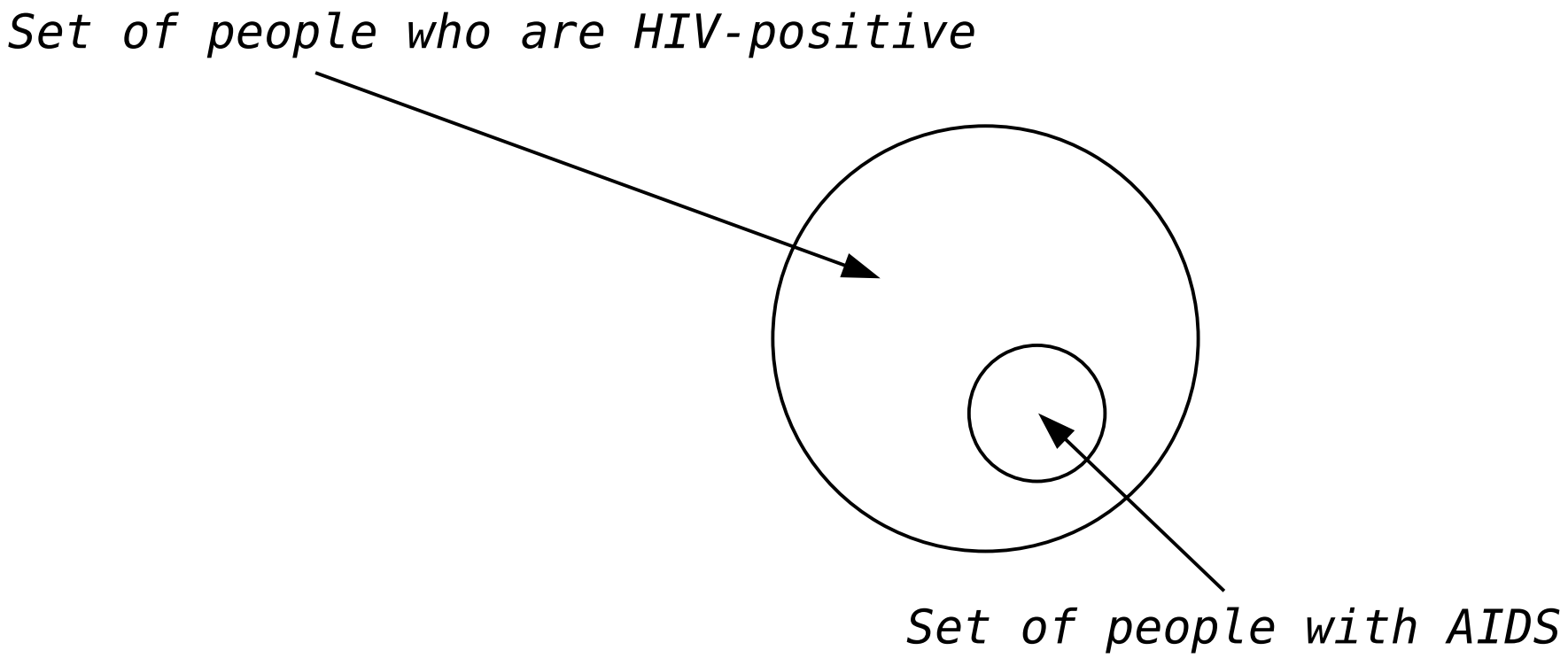
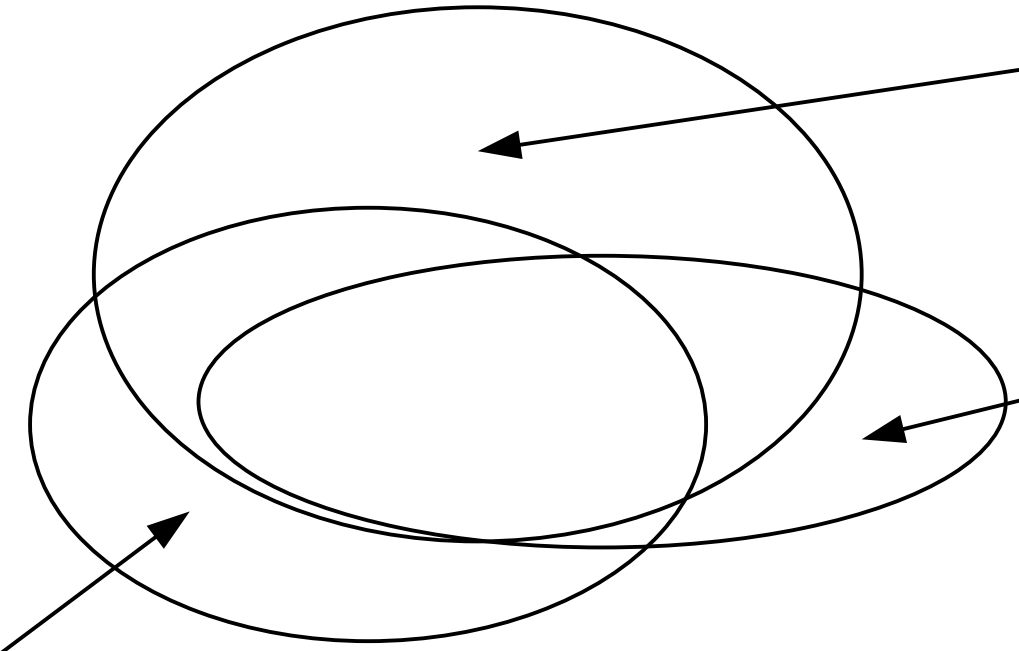


Assessing Sufficient Conditions:
When cause is present, outcome will (almost always) occur



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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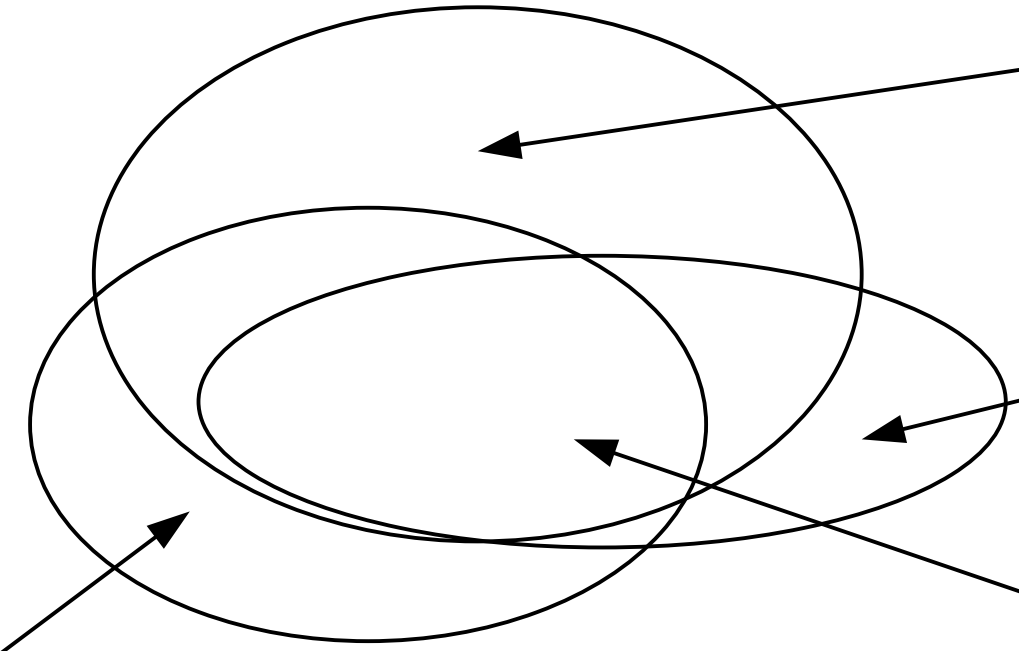

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Women belonging to both sets

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)

(Too) Many Software Options

- Vector graphics (SVG, EPS, PS) permit arbitrary resizing and offer publication quality.
  - Avoid raster graphics (most formats, e.g., BMP, JPEG, PNG)
  - What about PDF?
- Vector graphics editors
  - **Inkscape**, Adobe Illustrator, LibreOffice, MS Office
- Diagram editors
  - Figma, Dia, xfig, MS Visio
- Languages
  - **TikZ, GraphViz, gnuplot**
  - R: **SetMethods**, **Venn**, ggplot2, lattice, etc.
  - programming language of your choice
- QCA visualization suite under development
  - Good visualization usually requires manual intervention

2x2 tables & XY plots

- Easy to construct
- Familiar and accessible
- Must explain interpretation of necessity and sufficiency

	National Literacy Rate (LitCr)	
	Not High	High
Democracy Survival	— *N=0*	BE, CZ, FI, FR, IE, NL, SE, UK *N=8*
Democracy Breakdown	ES, GR, IT, PT, RO *N=5*	AT, DE, EE, HU, PL *N=5*

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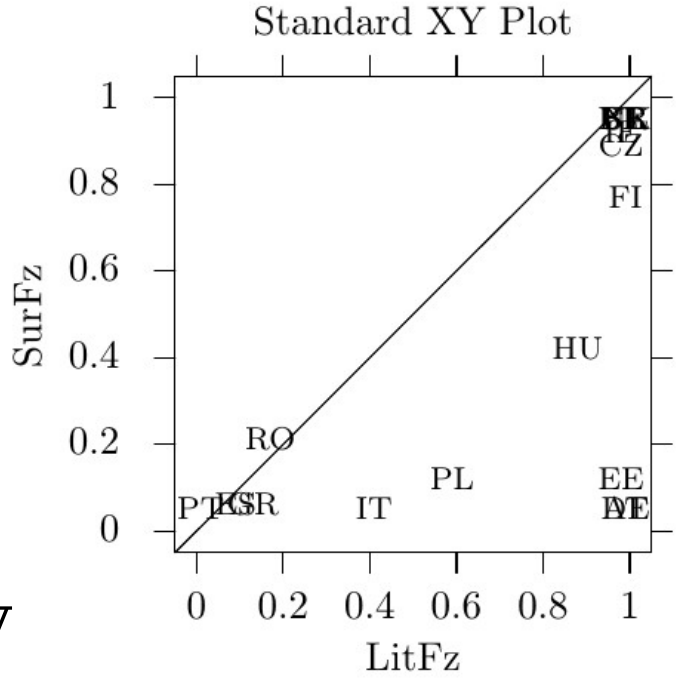
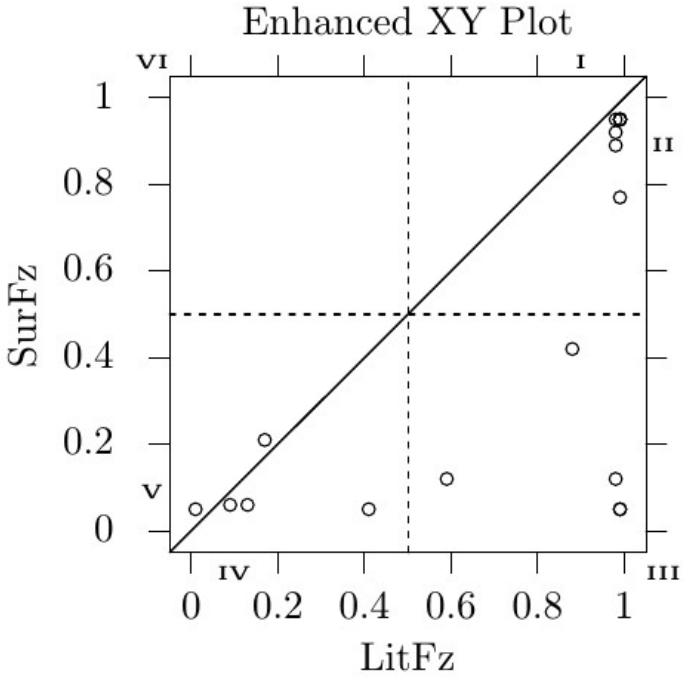
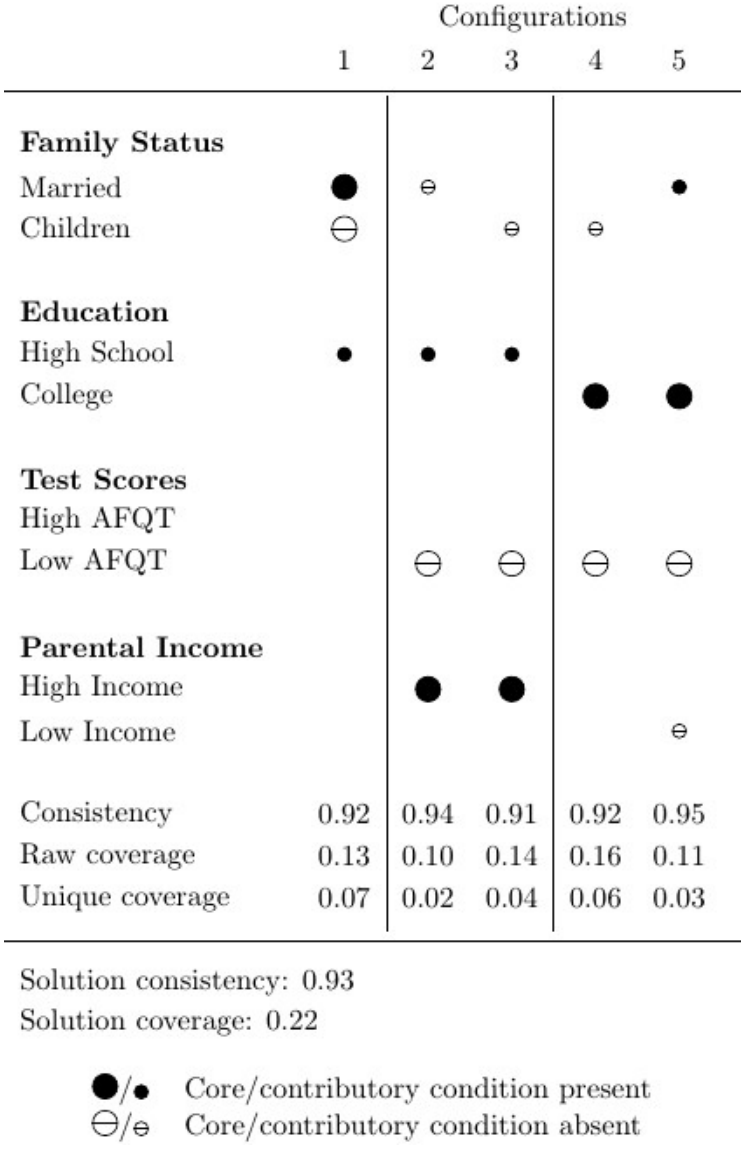


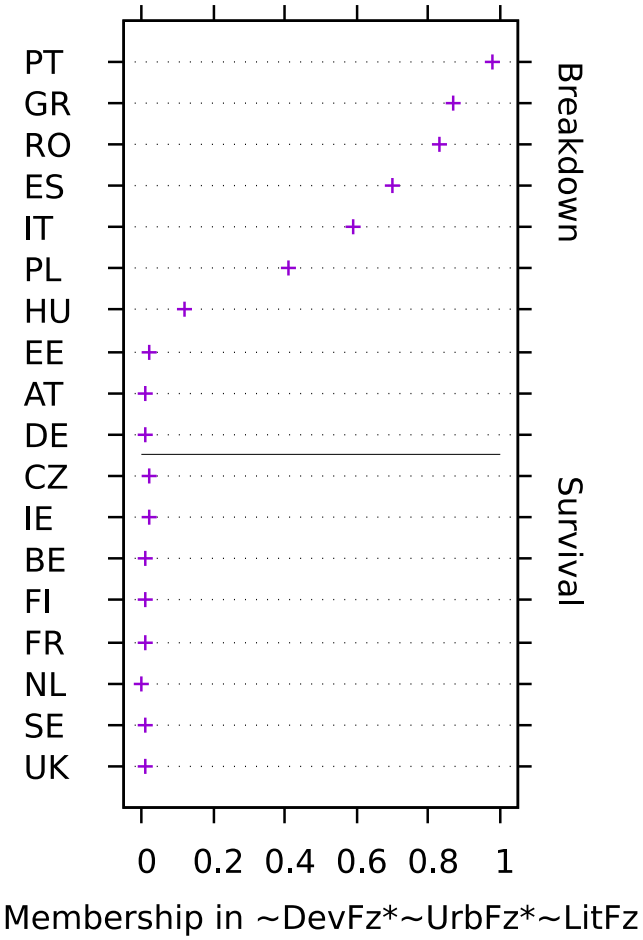


Fiss Configuration Charts

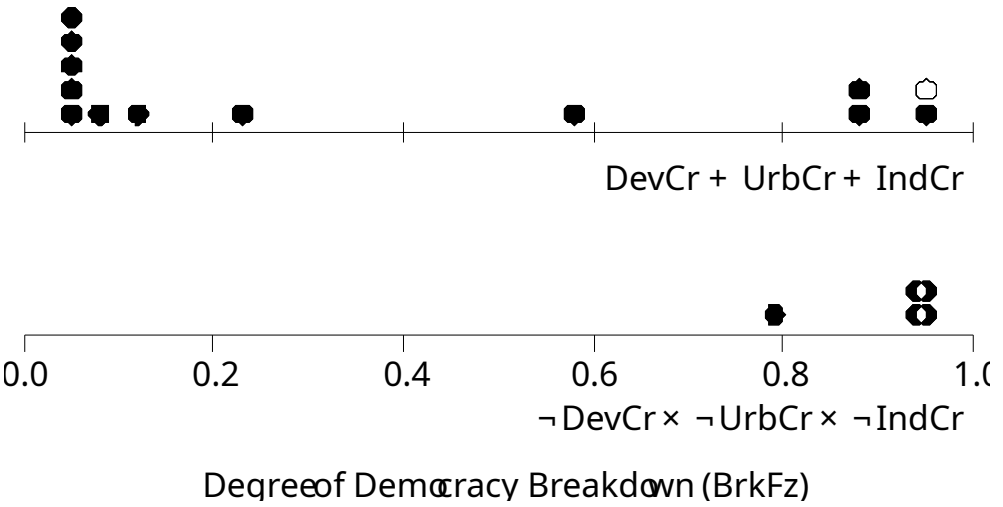
- Displays all configurations and how they relate
- Simultaneously present multiple solutions
- Recommended to group by core conditions, but choice is up to researcher
- Can replace concov tables; same information
- CLI software available; GUI software under development



Biconditional analysis: Crossing a fuzzy-set with a crisp-set

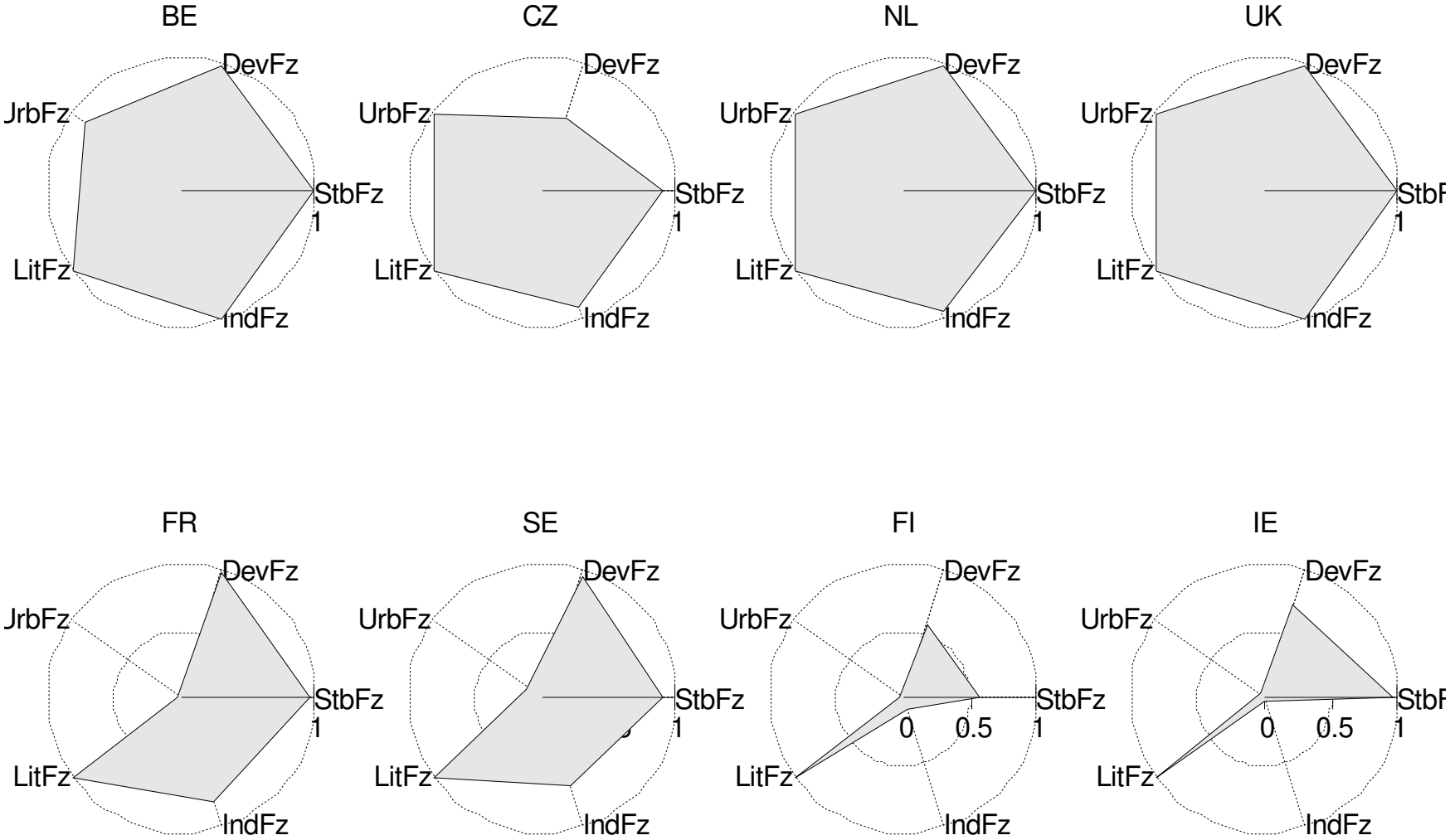


Rank-order plot

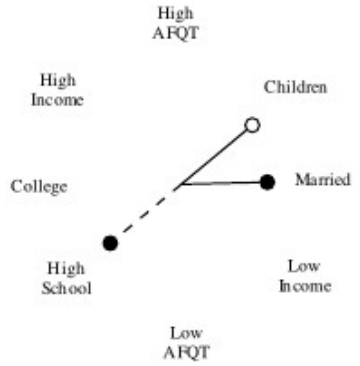


Dot plot

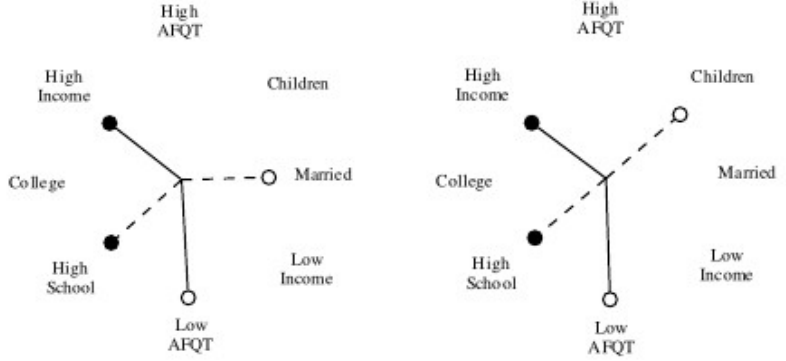
Use radar charts to compare the shapes of observations



Also see Meuer et al. (2015), for radar charts comparing configurations by aggregating observations (e.g., min, mean, max).

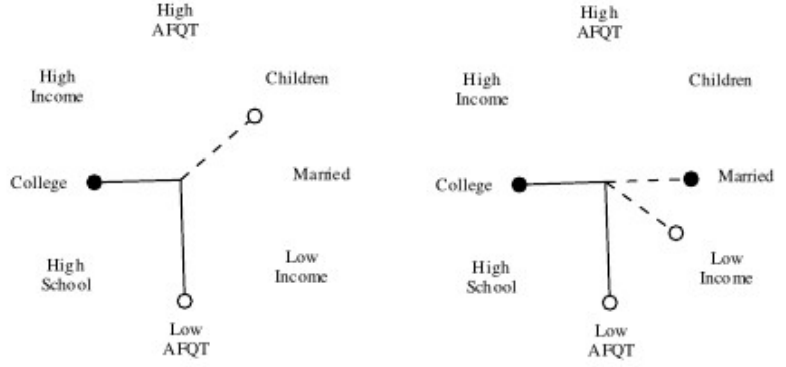


(a) Favorable family situation
(Configuration 1)



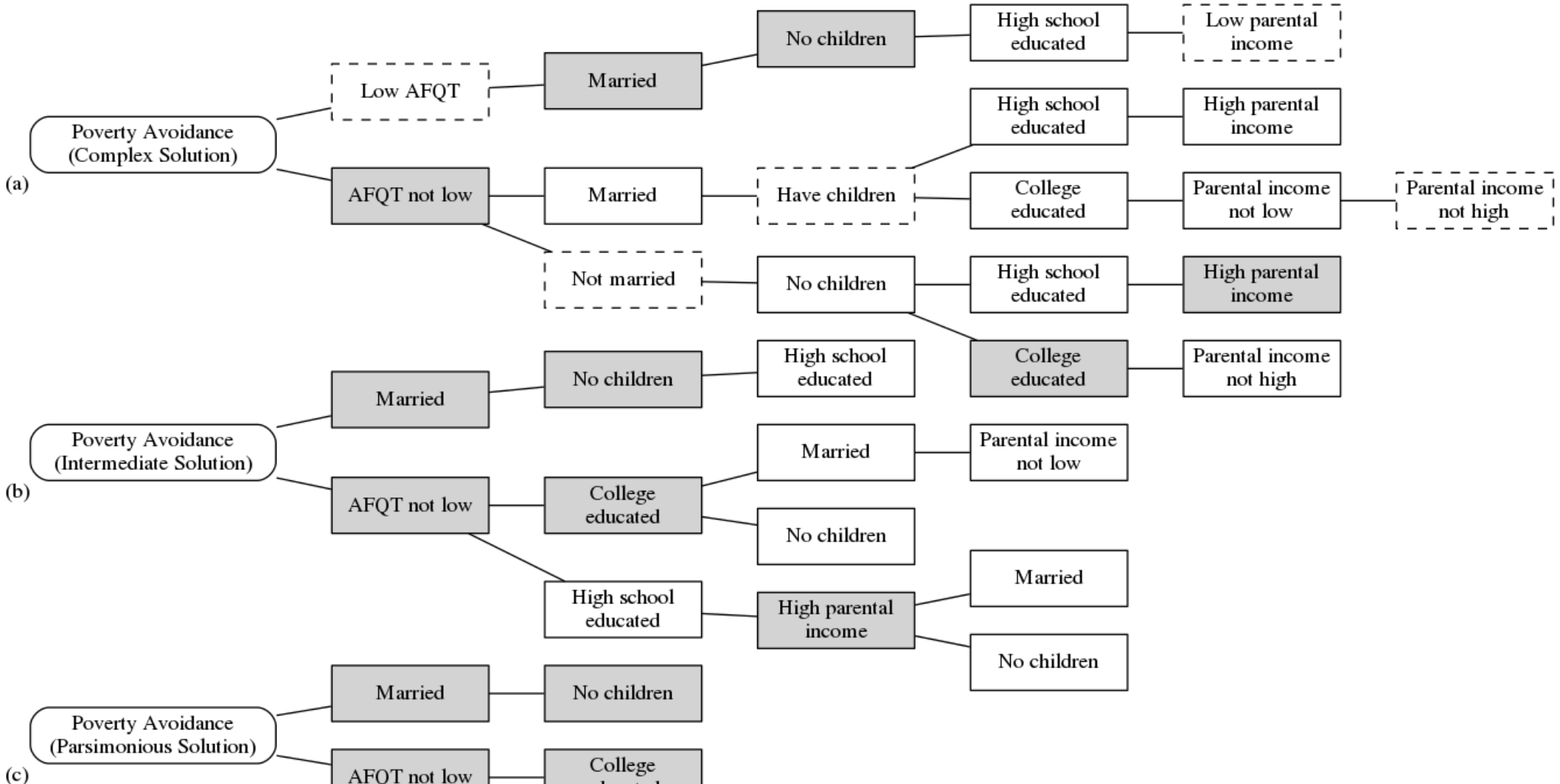
(b) Not-low AFQT score and high parental income
(Configurations 2 & 3)

Use star charts to compare the shapes of recipes

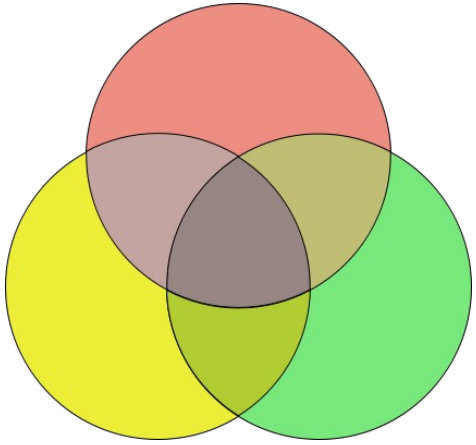


(c) Not-low AFQT score and college-educated
(Configurations 4 & 5)

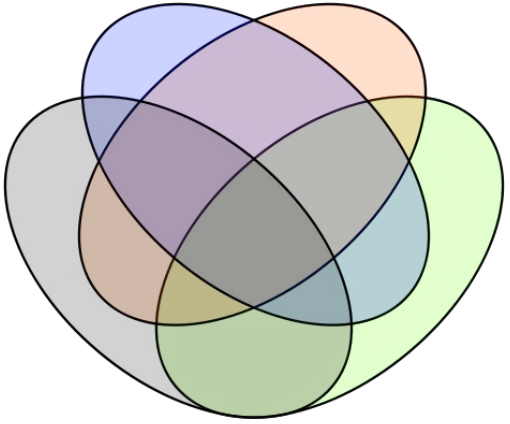
Branching diagrams tell stories



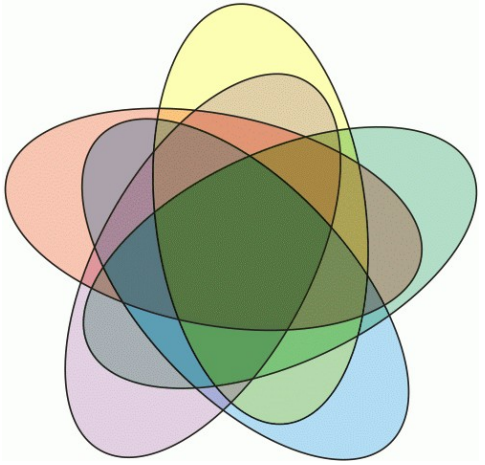
Superset/subset relationships



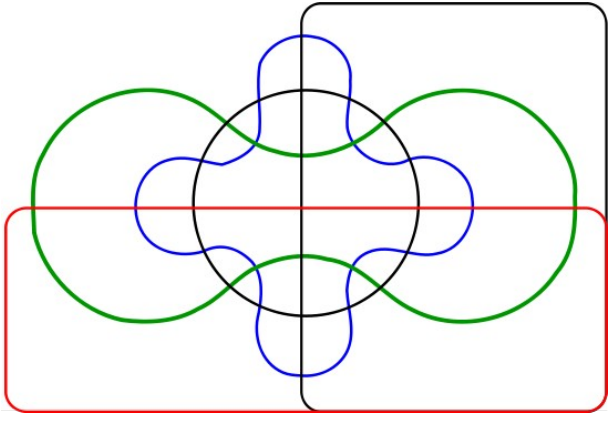
3-set Venn



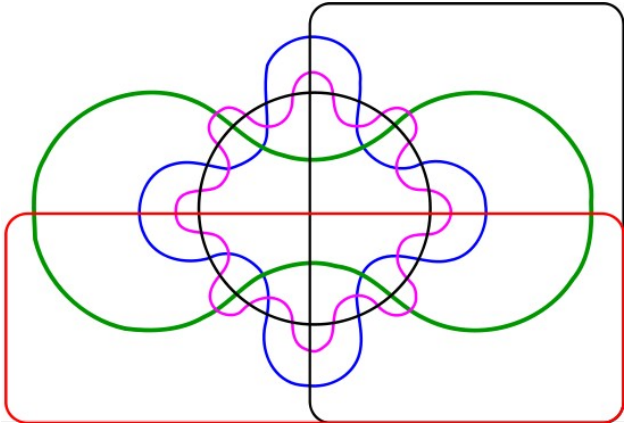
4-set Venn



5-set Venn



5-set Edwards-Venn



6-set Edwards-Venn

Superset/subset relationships

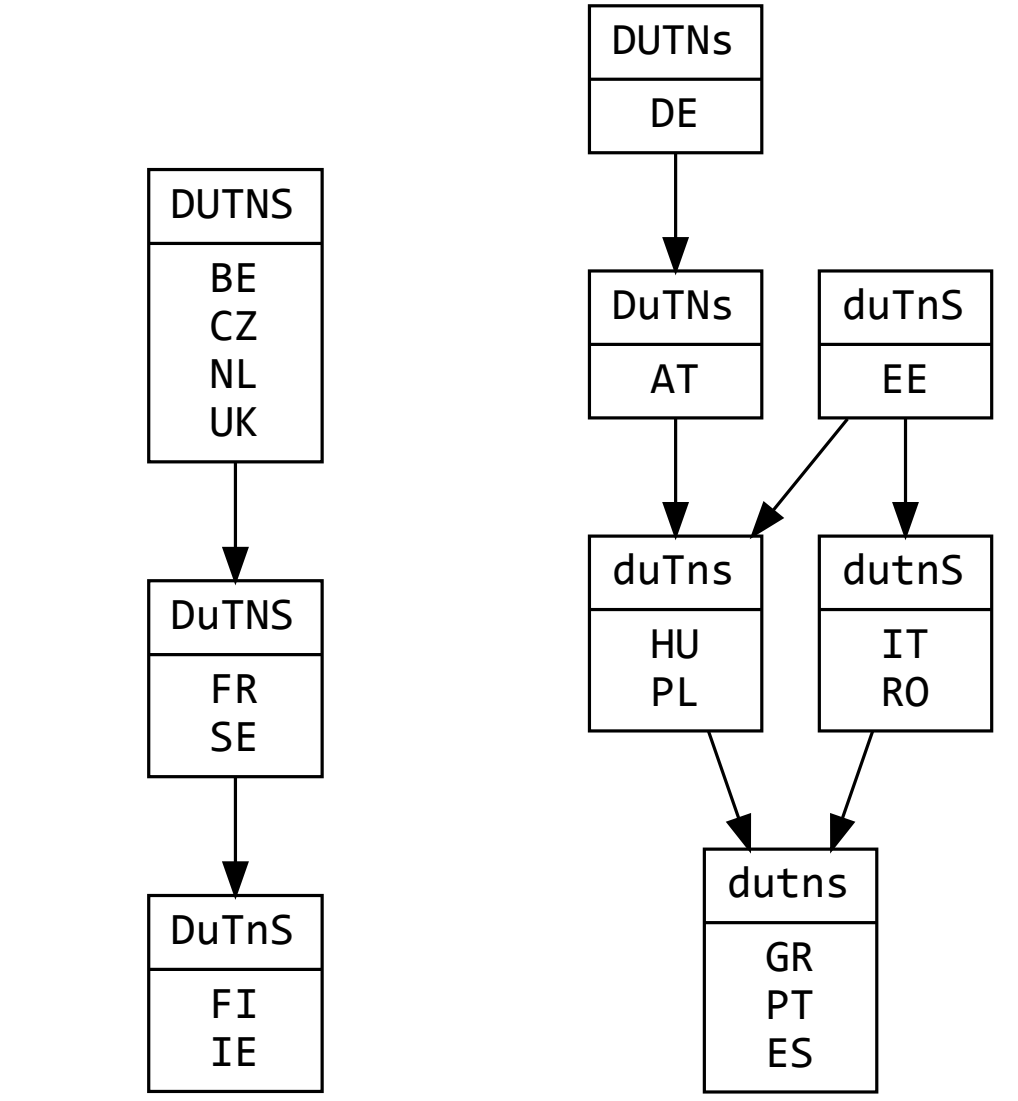
Venn/Euler diagrams are familiar and easy to interpret, but:

- Low information density
- Interpretability decreases as intersections increase
- Difficult to convey proportionality
- Programmatically generating area-proportional Euler diagrams with more than 3 sets is an unsolved problem

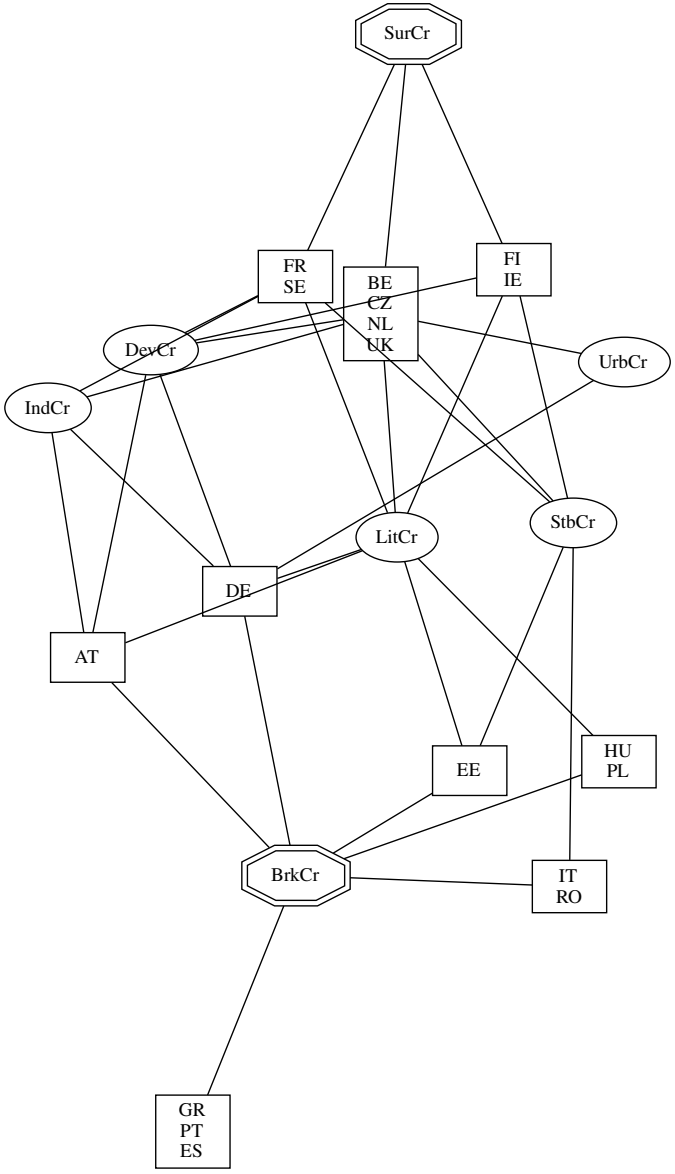
Alternatives:

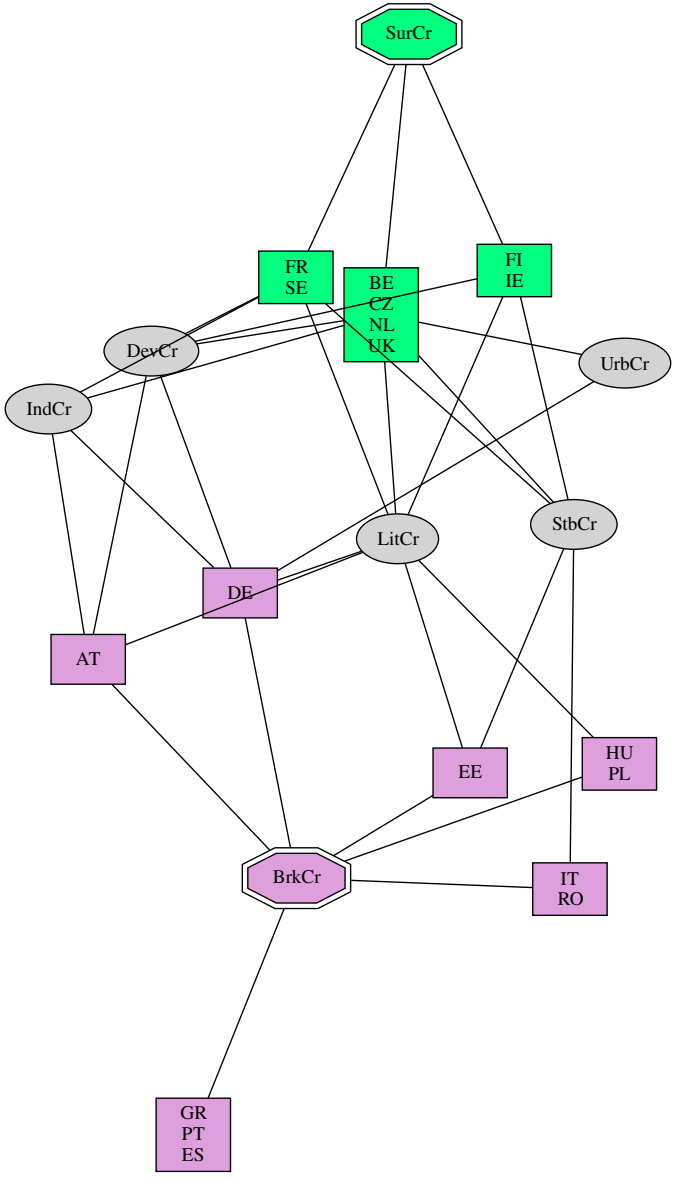
- Hierarchical graphs
- Force-directed graphs
- Galois lattices
- Linear diagrams

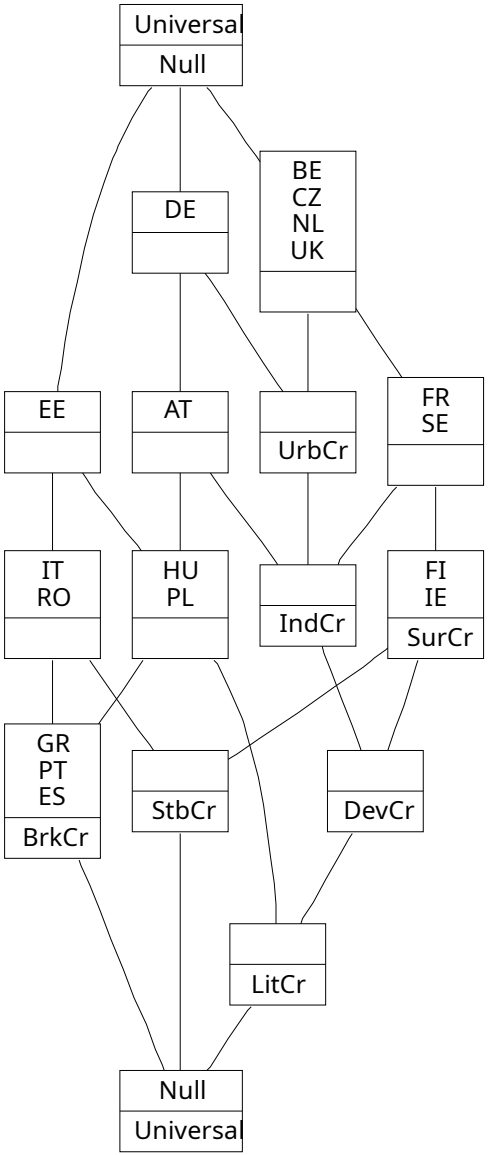
Hierarchical graphs reveal superset/subset relationships among configurations



Force-directed graphs map the logical distances between conditions and observations







Galois lattices reveal the *duality* of conditions and observations

- Easy to construct with software (but not by hand)
- Not intuitive; can be difficult to interpret. Will need to interpret for reader.
- Presents superset/subset relationships simultaneously
- Particularly well-suited for depicting truth tables (optionally including remainders)

Linear diagrams are improved Venn/Euler diagrams