Workshop

COMPARATIVE RESEARCH DESIGNS

An Introduction to Configurational Methods and Fuzzy-Set Qualitative Comparative Analysis

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COMPARATIVE RESEARCH DESIGNS

- Introduce participants to set-theoretic and comparative configurational methods - Fuzzy set Qualitative Comparative Analysis
- Provide an overview of research designs, methods and analytical techniques for systematic comparative analysis (small Ns + complexity)
- Revisit the notions of sets and set relations.
- Learn how to use the fsQCA package (afternoon)

Morning - QCA essentials + examples

Afternoon - hands on, using fsQCA 2.0 package (GEM data)

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Charles Ragin

Chancellor's Professor of Sociology at the University of California, Irvine

http://www.u.arizona.edu/~cragin/cragin/index.shtml

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“Any inquiry in social sciences research involves some kind of comparison”

Benoit Rioux

“A key goal of social research is to make sense of the diversity of empirical cases in ways that resonate with the researcher’s theoretical ideas about social phenomena. Configurational methods are especially well suited for this task.”

Charles Ragin (1987)

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DIVERSITY ORIENTED RESEARCH

Tension between the general and the particular

- > 2 approaches
Different ways of constructing representations of social life:

Complexity
Particular behavioural systems
Qualitative, case-oriented and intensive - Small Ns
Case-oriented research

Generality
Universal behavioural systems
Quantitative, variable-oriented and extensive - Large Ns + broad patterns + correlation
Variable-oriented research

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DIVERSITY ORIENTED RESEARCH

Dissimilarities

- Small-Ns research is rich yet subjective and soft
- Although large-Ns research offer generalizable results it is sterile and oppressive

Differences have been exaggerated…

There is a middle path capable of resolving the divide between the two methodological strategies!

Challenge: how to preserve the integrity of cases as complex configurations while examining similarities and differences across many cases.

DIVERSITY ORIENTED RESEARCH

This middle ground focuses on the study of diversity

Emphasizes the need of seeing cases as configurations of aspects and disaggregating populations into types.

Diversity-oriented research

Diversity bridges complexity and generality, and provides the basis for a more sophisticated cross-case analysis.

It understands every case as a unique whole and then compares similarities and differences.

It sees social phenomena in terms of ‘types and kinds’, allowing for middle range generalizations (Aus 2009)

DIVERSITY ORIENTED RESEARCH

When N is just 5, 8, 10 or 23, we cannot use inferential methods.

Single Case Study	fsQCA	Large N Study
One case	A few or more cases	Many cases
Qualitative	Qualitative and quantitative	Quantitative
Intensive, case oriented	Cross-case comparison	Extensive, variable oriented

Linear Additive Model	fsQCA
Assumes normality and linear relationships	Applicable to non-normal, non-linear data
Assumes a single explanatory model	Allows for multiple explanatory models
Assumes factor independence	Allows for factor interdependence

A middle path

Given its roots in diversity-oriented research, one of the most salient aspects to QCA is its ability to bridge the split between qualitative and quantitative research.

This method is often presented as a third way between quantitative statistical techniques and case study methodology

It permits overcoming both the limited external validity of a case study and the limited internal validity of quantitative studies.

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COMPARATIVE RESEARCH AND QCA

Most empirical social research involves comparison of some kind…

Generally, studies (qual and quant) causally compare causal variables (degree of presence) to a particular outcome (degree of presence) = patterns of commonalities or covariation

QCA is a set-theoretic approach and a family of (case-oriented) analytical techniques. It allows for:

- Inductively - build theory based on systematic comparison of causal and outcome conditions (identify key ingredients that in combination explain a given outcome)
- Deductively - Test models or theories (configurational hypotheses) in a systematic way
- Keeping a full view of complexity all along (within- and across-case complexity)
- Obtain parsimony solutions (simplification) : key combinations of conditions leading to an outcome of interest
- These are transparent, replicable, iterative, analytic *and* holistic methods

COMPARATIVE RESEARCH AND QCA

Small-N QCA (12 ~50 cases)		Large-N QCA (50+ cases)
Inductive		Deductive
Focus on theory development		Focus on theory testing
In-depth knowledge of cases		Patterns across cases
Intensive		Extensive

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COMPARATIVE RESEARCH AND QCA

Case-based research implies

- Each individual case is considered as a complex entity
- QCA compares whole cases with each other, which necessary entails comparing configurations
- Given its roots in Boolean algebra, it requires that each case be reduced to sets of variables (i.e. conditions and an outcome)

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FUZZY SET QCA

Case selection

In case-oriented research (small and intermediate Ns) case selection is guided by explicit theoretical concerns and the underlying research questions.

Once the conceptual framework is established, two considerations:

Area of homogeneity: cases must parallel each other and be comparable in terms of their background characteristics.

Within this conceptual space, maximum heterogeneity over a minimum number of cases needs to be achieved. The sample requires cases with both positive and negative outcomes

The non-parametric nature of fsQCA as a method of analysis should further alleviate concerns about sample bias, since fsQCA is not based on the assumption of a representative random sample (Fiss 2009)

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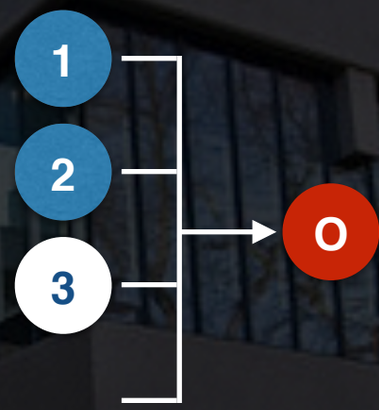
COMPARATIVE RESEARCH AND QCA

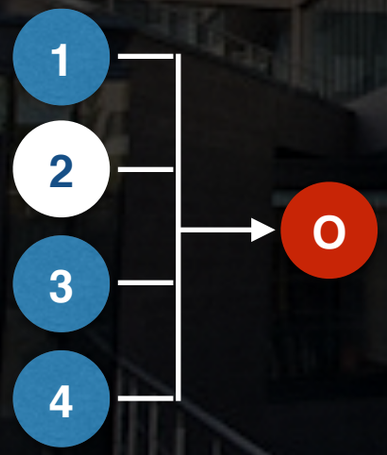
Causal complexity

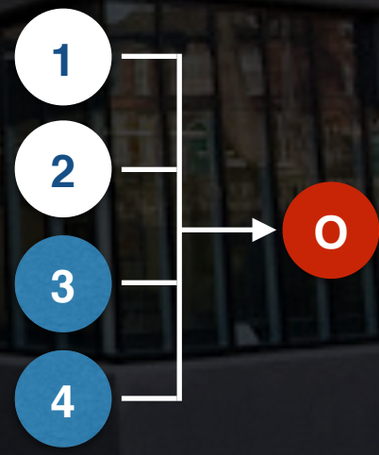
QCA offers a systematic comparison of causal and outcome conditions to visualize and analyze complexity and multiple-conjunctural causation

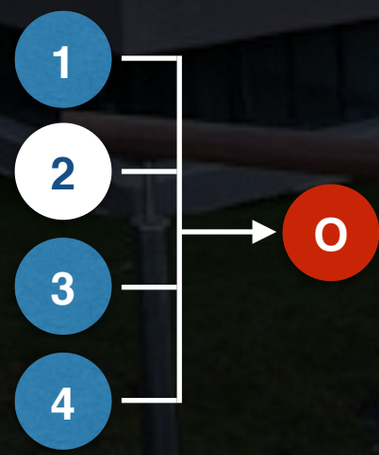
Multiple-conjunctural causation



Conjunctural causation







Condition is present

Condition is absent

O Outcome

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COMPARATIVE RESEARCH AND QCA

QCA focuses on and allows for the possibility that the same outcome can follow from different constellation of conditions

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COMPARATIVE RESEARCH AND QCA

Set-theoretic approach implies

Data consist of set membership scores

Relations between social phenomena are modelled in terms of set relations (all new ventures are organisations, not all organisations are new ventures)

These set relations are interpreted in terms of sufficiency and necessity as well as forms of causes that can be derived from them.

The assessment of necessary conditions is central in social research

In contrast to studying net effects of independent variables as in regression analysis, QCA methods work forward from causal conditions and seek to identify necessary and/or sufficient causal conditions or combinations of conditions that lead to an outcome

NECESSITY AND SUFFICIENCY

A condition X can be considered necessary if, whenever the outcome Y is present the condition is also present. Y cannot be achieved without X, no case with Y displays ~X; on the presence of ~X, Y is impossible. **Y is a subset of X.** Whenever the outcome is present the necessary condition is also present.

A condition Xi can be considered sufficient if, whenever the condition Xi is present the outcome Yi is also present. There should not be a single case that shows the condition but not the outcome. **Xi is a subset of Yi.** Whenever the condition is present the outcome is also present.

Set relations are asymmetric (Causal and conceptual asymmetry)

X -> Y does not imply not-X -> not-Y
X is necessary, but not sufficient: X*R -> Y
Xi is sufficient, but not necessary: Xi -> Yi + Zi -> Yi

Diagram A. Venn diagram - necessity

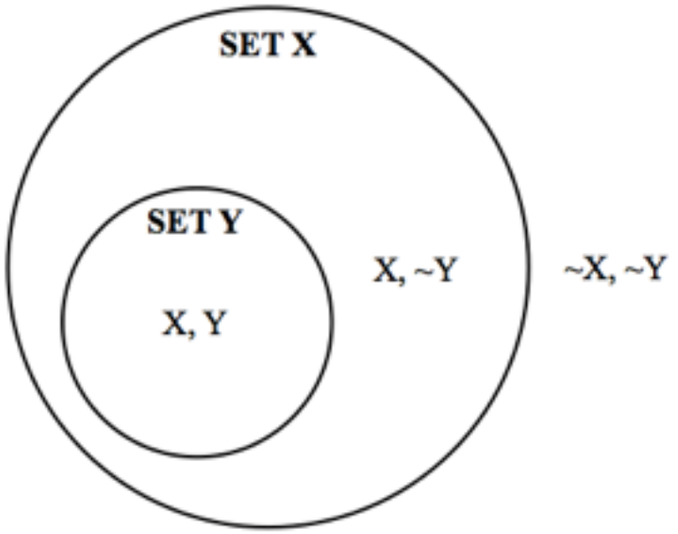
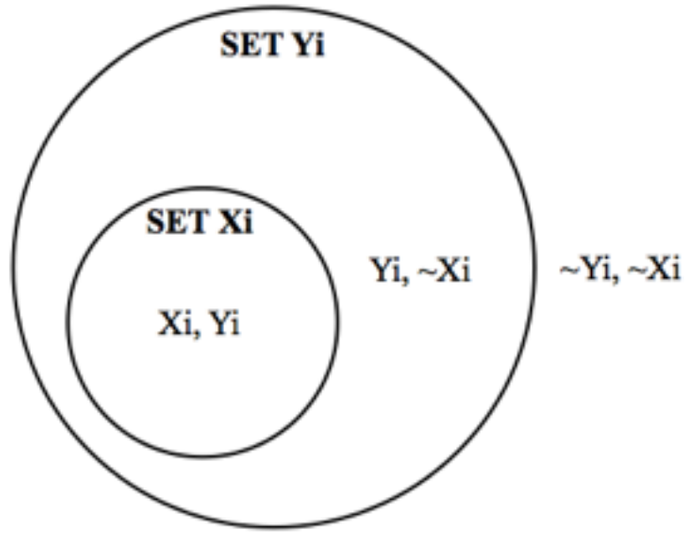


Diagram A. Venn diagram - sufficiency



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FUZZY SET QCA

fsQCA also draws upon Boolean algebra, counterfactual analysis and logical minimization to visualize and analyse complex causality.

It permits calibrating partial membership in sets using values in the interval between 0, i.e. non-membership and 1, i.e. full-membership

FsQCA thus enables the evaluation of the degree of set membership of specific cases in a conceptual category and the estimation of joint membership in different combinations of categories

It allows for making causal interpretations regarding relationships between different simplified configurations of conditions and a specific outcome, and then testing the necessity and sufficiency of conditions and combination of conditions

Analysis 1

Condition 1	Condition 2	Condition 3	Outcome
1	1	1	1
1	1	0	1

Analysis 2

Condition 1	Condition 2	Condition 3	Outcome
0	1	1	1
1	1	0	0

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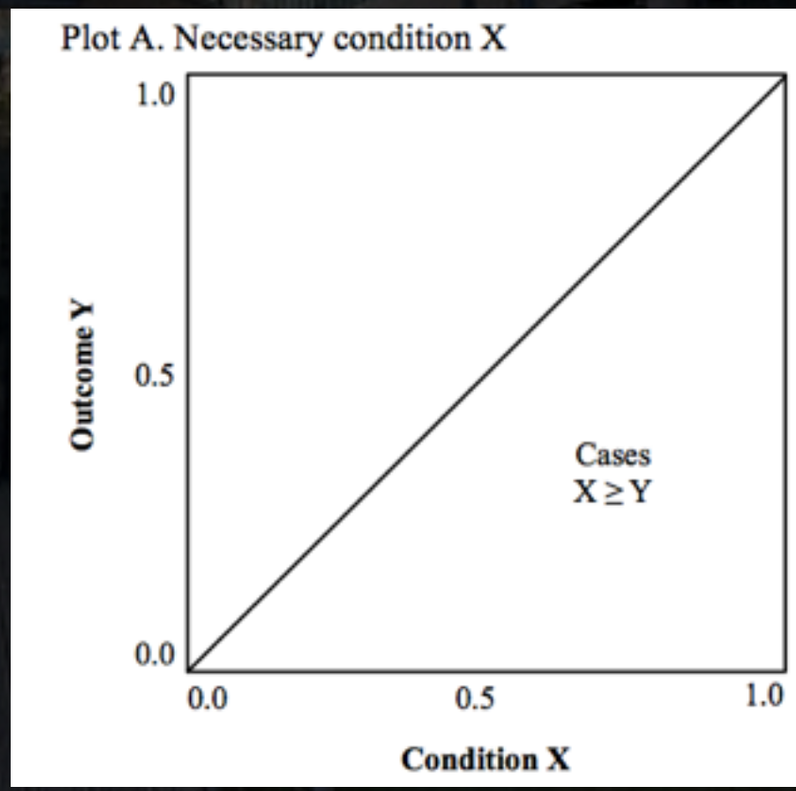
FUZZY SET QCA

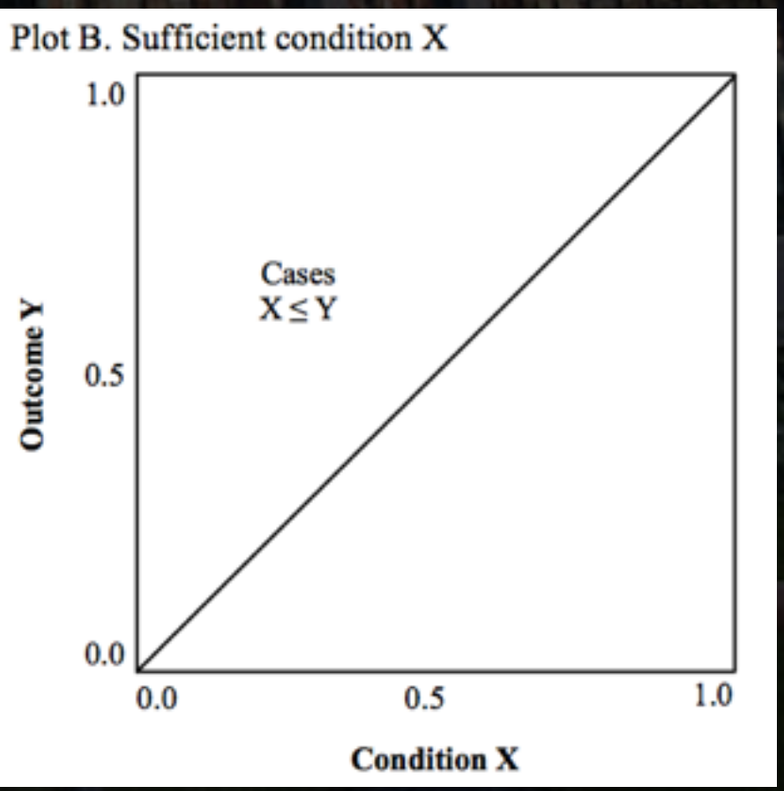
Fuzzy Set and necessary and sufficient conditions

Mere presence / absence of a condition leads to 4 types of possible combinations X,Y; X,~Y; ~X,Y; ~X,~Y

Degrees of set membership (0.0 to 1.0) allows for partial necessity and partial sufficiency.

Open property space where cases can be anywhere in the area of an XY plot that displays fuzzy set membership scores for the outcome Y and the condition X.





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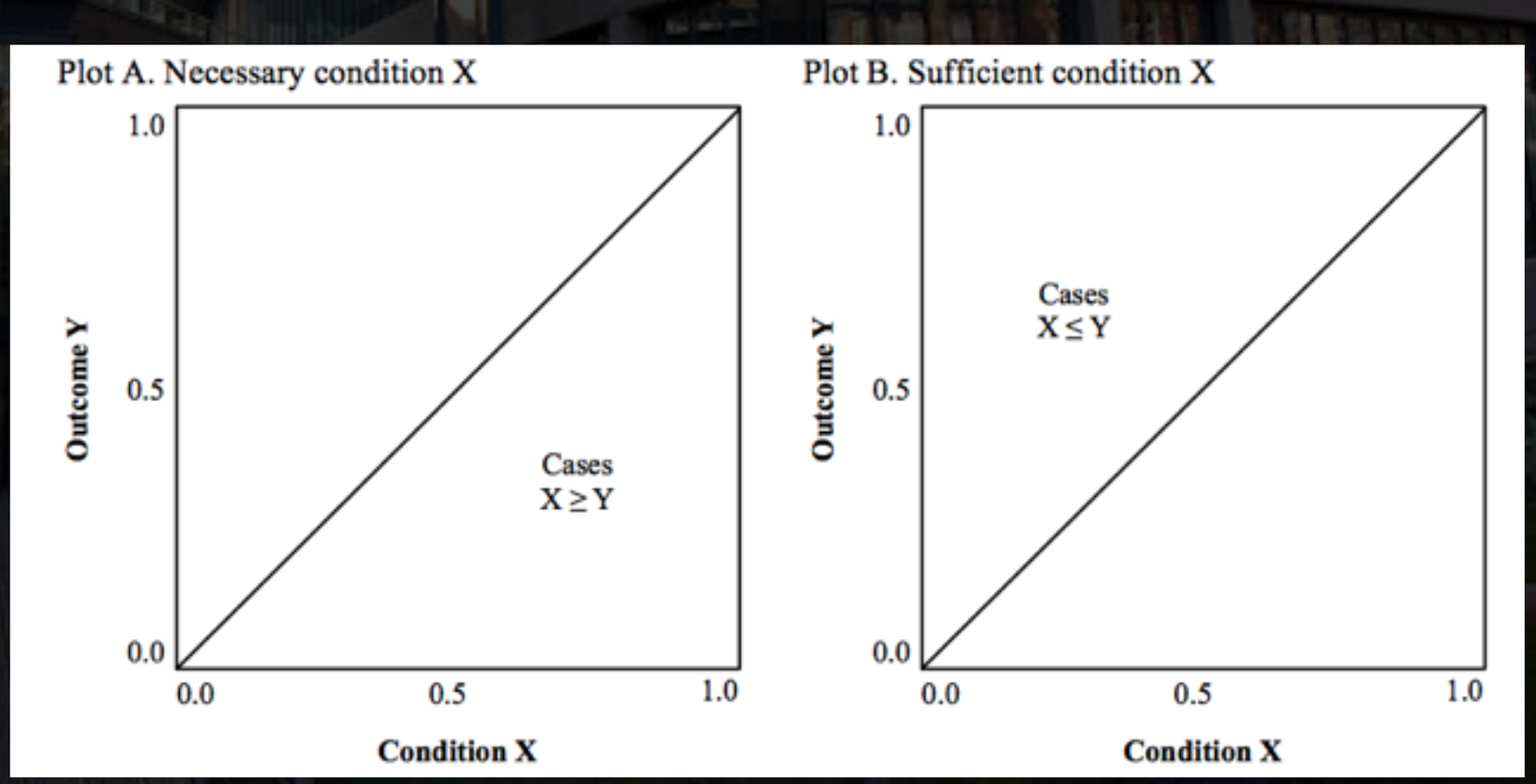
FUZZY SET QCA

Fuzzy Set and necessary and sufficient conditions

Given that partial necessity and sufficiency is permitted, the analysis must define a minimum level of consistency (i.e. necessity and sufficiency benchmarks and significance levels) whereby a certain condition can be deemed to be almost always necessary / usually necessary or almost always sufficient / usually sufficient for the outcome under examination.



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FUZZY SET QCA

Calibration and irrelevant variation

Calibration is an essential process in fsQCA.

By means of a simple estimation technique it transforms variable raw scores into set measures, rescaling the original measure into scores ranging from 0.0 to 1.0

This enables to specify the score that would qualify a case for full membership in the sets of interests and also the score that would completely exclude it from each of the sets.

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FUZZY SET QCA

Calibration and irrelevant variation

E.g. Set of individuals with strong work experience

Full membership, full non-membership and cross-over point

- A person with 20 years of WE is deemed to be a full member in the set of individuals with strong work experience
- A person with 3 years of WE is deemed to be a full non-member in the set of individuals with strong work experience
- It is unknown whether a person with 5 years of WE is within or without (point of maximum ambiguity)
- A person with 35y WE is also a full member, and +15 is irrelevant variation
- A person with 1y WE is also a full non-member, and -2 is irrelevant variation

FUZZY SET QCA

Calibration and irrelevant variation

Set of individuals with strong work experience
Full membership 20 years
Full non-membership 3 years
Cross-over point 5 years

case	work_experience	we_calibrated
Case 1	7	0.6
Case 2	4	0.18
Case 3	2	0.01
Case 4	6	0.55
Case 5	7	0.6
Case 6	8	0.65
Case 7	10	0.73
Case 8	35	1
Case 9	20	0.95
Case 10	40	1
Case 11	5	0.5
Case 12	18	0.93
Case 13	18	0.93
Case 14	22	0.97
Case 15	25	0.98
Case 16	37	1
Case 17	42	1
Case 18	12	0.8
Case 19	10	0.73
Case 20	7	0.6
Case 21	9	0.69
Case 22	11	0.77
Case 23	2	0.01
Case 24	5	0.5
Case 25	4	0.18
Case 26	3	0.05
Case 27	1	0
Case 28	15	0.88
Case 29	17	0.92
Case 30	22	0.97
Case 31	26	0.99

TRUTH TABLE AND CONFIGURATIONAL ANALYSIS

work experience + entrepreneurial orientation + education -> intention

case	work_experience	orientation	education	intention (out)	work_experienc	orientation	education	intention
Case 1	0.6	0.99	0.99	0	7	10	5	1
Case 2	0.18	0.73	0.95	0.73	4	6	4	6
Case 3	0.01	0.5	0.05	0.73	2	5	1	6
Case 4	0.55	0.95	0.82	0.88	6	8	3	7
Case 5	0.6	0.98	0.95	0.18	7	9	4	4
Case 6	0.65	0	0.99	0.18	8	1	5	4
Case 7	0.73	0.88	0.99	0.88	10	7	5	7
Case 8	1	0.88	0.99	0.88	35	7	5	7
Case 9	0.95	0.73	0.82	0.88	20	6	3	7
Case 10	1	0.18	0.5	0.95	40	4	2	8
Case 11	0.5	0.05	0.05	0.95	5	3	1	8
Case 12	0.93	0.88	0.95	0.95	18	7	4	8
Case 13	0.93	0.88	0.99	0.05	18	7	5	3
Case 14	0.97	0.95	0.99	0.05	22	8	5	3
Case 15	0.98	0.98	0.82	0.18	25	9	3	4
Case 16	1	0.99	0.95	0.73	37	10	4	6
Case 17	1	0.73	0.99	0.73	42	6	5	6
Case 18	0.8	0.5	0.82	0.88	12	5	3	7
Case 19	0.73	0.73	0.5	0.88	10	6	2	7
Case 20	0.6	0.18	0.95	0.88	7	4	4	7
Case 21	0.69	0.88	0.05	0.99	9	7	1	10
Case 22	0.77	0.95	0.99	0.99	11	8	5	10
Case 23	0.01	0.18	0.95	0.5	2	4	4	5
Case 24	0.5	0.05	0.99	0.5	5	3	5	5
Case 25	0.18	0.5	0.82	0.73	4	5	3	6
Case 26	0.05	0.73	0.5	0.73	3	6	2	6
Case 27	0	0.99	0.95	0.98	1	10	4	9
Case 28	0.88	0.88	0.82	0.98	15	7	3	9
Case 29	0.92	0.73	0.99	0.5	17	6	5	5
Case 30	0.97	0.73	0.05	0.73	22	6	1	6
Case 31	0.99	0.88	0.05	0.99	26	7	1	10

TRUTH TABLE AND CONFIGURATIONAL ANALYSIS

Once the data are collected and the measures calibrated, the software constructs a *truth table* listing the different logically possible combinations of causal conditions along with the cases conforming to each combination.

work experience + entrepreneurial orientation + education -> intention

work_experience	orientation	education	cases	intention	raw consist.
1	1	0	3		0.997788
1	0	1	2		0.895636
0	1	1	2		0.892256
0	0	1	1		0.883669
1	1	1	15		0.718887
0	0	0	0		
0	1	0	0		
1	0	0	0		

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TRUTH TABLE AND CONFIGURATIONAL ANALYSIS

In order to reduce the truth table to simplified combinations, two thresholds need to be defined:

Frequency threshold specifies the minimum amount of cases to be considered in the analysis.

Consistency threshold defines the minimum acceptable level to which a combination of causal conditions is reliably associated with the each of the outcomes.

work experience + entrepreneurial orientation + education -> intention

work_experience	orientation	education	cases	intention	raw consist.
1	1	0	3	1	1.00
1	0	1	2	1	0.90
0	1	1	2	1	0.89
0	0	1	1	1	0.88
1	1	1	15	0	0.72

TRUTH TABLE AND CONFIGURATIONAL ANALYSIS

Based on these frequency and consistency thresholds, fsQCA applies a Boolean algorithm based on a counterfactual analysis of causal conditions to logically reduce the truth table rows to a solution table comprising simplified combinations of conditions, which can be understood as different solution paths or recipes for the outcome.

	raw coverage	unique coverage	consistency
education*~work experience	0.316187	0.122227	0.823096
education*~orientation	0.288344	0.083058	0.786358
~education*orientation*work experience	0.212836	0.124587	0.997788

solution coverage: 0.542709
solution consistency: 0.816761

work_experience	orientation	education	cases	intention	raw consist.
1	1	0	3	1	1.00
1	0	1	2	1	0.90
0	1	1	2	1	0.89
0	0	1	1	1	0.88
1	1	1	15	0	0.72

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TRUTH TABLE AND CONFIGURATIONAL ANALYSIS

Based on these frequency and consistency thresholds, fsQCA applies a Boolean algorithm based on a counterfactual analysis of causal conditions to logically reduce the truth table rows to a solution table comprising simplified combinations of conditions, which can be understood as different solution paths or recipes for the outcome.

Labor market regulation
Employment protection (EMP)
Collective bargaining (BARGAIN)

Training system
University training (UNI)

Occupational training (OCCUP)

Financial system
Stock market size (STOCK)

Institutional arbitrage
Mergers and acquisitions (M&A)

Table 5 Sufficient combinations of conditions for strong export performance in high-tech

Intermediate solution	*Raw coverage*	*Unique coverage*	*Consistency*
UNI*STOCK+	0.78	0.27	0.76
OCCUP*STOCK*M&A+	0.44	0.06	0.85
emp*occup*STOCK*m&a+	0.30	0.01	0.90
UNI*OCCUP*M&A+	0.38	0.00	0.86
emp*UNI*m&a	0.29	0.00	0.88
Solution coverage: 0.88			
Solution consistency: 0.74			

Schneider, M.R., Schulze-Bentrop, C. & Paunescu, M., 2010. Mapping the institutional capital of high-tech firms: A fuzzy-set analysis of capitalist variety and export performance. Journal of International Business Studies, 41(2), 246–266.

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SOLUTION TABLE: CORE AND PERIPHERAL CONDITIONS

Solution tables distinguish core and peripheral conditions.

The distinction between core and peripheral conditions is based on how causal components are causally connected to a specific outcome.

In any solution term there are:

- Decisive causal ingredients that distinguish configurations
- Complementary ingredients that only make sense as contributing factors that reinforce the central features of the core conditions

Core conditions are present in both parsimonious and intermediate solutions and exhibit a strong causal relationship with the outcome

Peripheral conditions are present only in the intermediate solution and exhibit a weak causal relationship with the outcome

SOLUTION TABLE: CORE AND PERIPHERAL CONDITIONS

--- PARSIMONIOUS SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.841487

	raw coverage	unique coverage	consistency
per_cap*ent_int	0.699335	0.047894	0.907887
~no_fof*ent_int	0.347672	0.000887	0.846652
ent_int*ent_career	0.749446	0.025277	0.878378

solution coverage: 0.798670
solution consistency: 0.871311

Parsimonious solution incorporates easy and difficult counterfactuals to produce the simpler solution without any evaluation of its plausibility

--- INTERMEDIATE SOLUTION ---
frequency cutoff: 1.000000
consistency cutoff: 0.841487
Assumptions:

	raw coverage	unique coverage	consistency
ent_career*ent_int*~no_fof	0.346341	0.080709	0.863938
~ent_career*ent_int*no_fof*per_cap	0.236807	0.024390	0.846276
ent_career*ent_int*per_cap*per_opp	0.594235	0.011530	0.943662
ent_int*no_fof*per_cap*per_opp	0.570732	0.002661	0.963323

solution coverage: 0.746341
solution consistency: 0.893312

Intermediate solution incorporates only easy counterfactuals

Easy counterfactuals refer to situations where a redundant causal condition is added to a set of causal conditions that by themselves already lead to the outcome in question.

Difficult counterfactuals refer to situations where a condition is removed from a set of causal conditions leading to the outcome on the assumption that this condition is redundant

SOLUTION TABLE: CORE AND PERIPHERAL CONDITIONS

Table B. Solution Table for IDEA

	Configurations for IDEA						
	I1	**I2**	**I3**	**I4**	**I5**	**I6**	**I7**
KNOWLEDGE	●	●	⊗	●	●	⊗	-
INTENTION	-	●	-	⊗	●	⊗	⊗
VALUE CREATION	●	●	●	●	⊗	⊗	●
ORIENTATION	●	●	-	●	●	●	●
BUSINESS SUPPORT	-	⊗	●	●	●	⊗	-
SOCIAL SUPPORT	●	-	●	-	-	⊗	●
Consistency	0.91	0.97	0.94	1	0.99	1	0.99
Raw coverage	0.60	0.29	0.23	0.19	0.17	0.068	0.18
Unique coverage	0.027	0.026	0.018	0.01	0.09	0.009	0.004
Overall solution consistency				0.89			
Overall solution coverage				0.73			

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SOLUTION TABLE

Analysis of solutions: sufficiency consistency and coverage

Solution paths are evaluated in terms of consistency and coverage.

Set-theoretic consistency assesses the degree to which the cases sharing a given condition or combination of conditions agree in displaying the outcome in question.

It is estimated by dividing the number of cases that are present in a given configuration of conditions and exhibit the outcome by the number of cases that are present in the same configuration but do not exhibit the outcome.

Set-theoretic coverage assesses the degree to which a causal combination accounts for instances of an outcome.

If multiple configurations are sufficient for the outcome, raw and unique coverage provide assessments of their empirical relevance.

These set-theoretic measures of fit are descriptive, not inferential and were developed as methods of exploring cross-case evidence in a configurational way

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SOLUTION TABLE

Analysis of solutions: sufficiency consistency and coverage

Sufficiency consistency means that the membership score on the outcome is consistently higher than the membership score of the causal combination, weighted by the relevance of each case.

Sufficiency Consistency $(X_i \leq Y_i) = \Sigma[\min(X_i, Y_i)] / \Sigma(X_i)$

The measure of fuzzy set coverage indicating sufficiency is simply the overlap expressed as a proportion of the sum of the membership scores in the outcome (Y).

Sufficiency Coverage $(X_i \leq Y_i) = \Sigma[\min(X_i, Y_i)] / \Sigma(Y_i)$

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SOLUTION TABLE

Analysis of fuzzy necessity and sufficiency

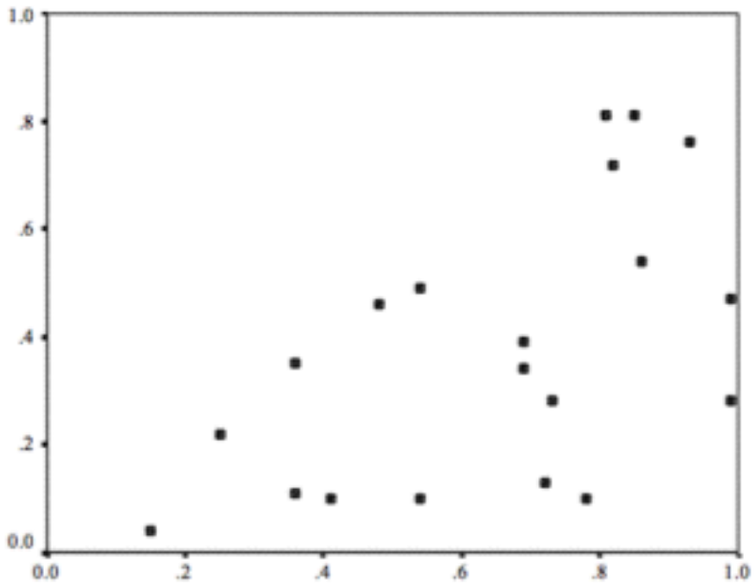
Fuzzy subset relations are evaluated in terms of necessity and sufficiency. An argument of causal necessity is supported when it can be demonstrated that instances of an outcome constitute a subset of instances of a causal condition

A combination of conditions is assessed as being sufficient for the outcome when all instances of the combination are followed by the occurrence of the outcome.

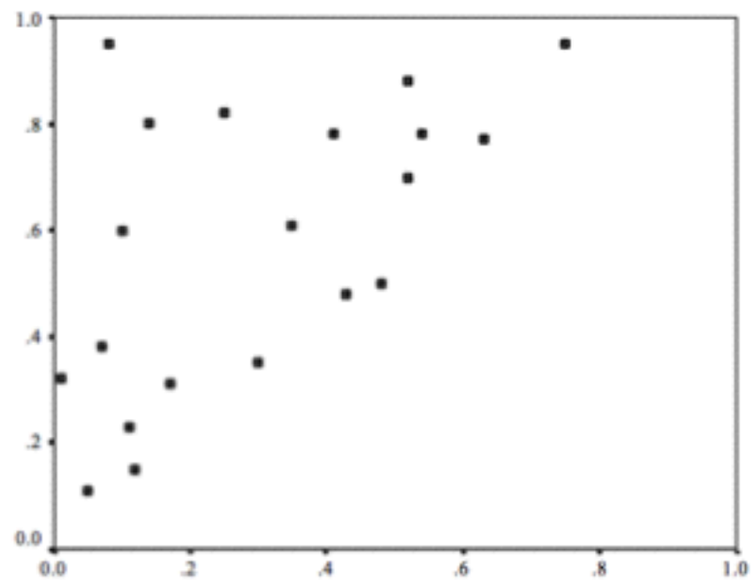
Formal tests of sufficiency and necessity

Plots XY

Plot A. Pattern of necessity



Plot B. Pattern of sufficiency



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EXAMPLE

Total Early-stage Entrepreneurial Activity

Variables
(TEA) Early-Stage Entrepreneurial Activity
(OPP) = Perceived opportunities
(CAP) = Perceived capabilities
(NFF) = No Fear of Failure
(INT) = Entrepreneurial intentions
(CAR) = Entrepreneurship as a good career choice
(STA) = High status to successful entrepreneurs
(MED) = Media attention for entrepreneurship

Calibration
TEA= calibrate(tea,19,9,4)
OPP= calibrate(per_opp,58,41,8)
CAP= calibrate(per_cap,65,46,16)
NFF= calibrate(no_fof,67,65,34)
INT= calibrate(ent_int,45,18,3)
CAR= calibrate(ent_career,72,65,31)
STA= calibrate(status,80,70,56)
MED= calibrate(media_att,69,58,39)

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EXAMPLE

Total Early-stage Entrepreneurial Activity

Calibration table

CASE	TEA	OPP	CAP	NFF	INT	CAR	STA	MED
Algeria	0.52	0.91	0.9	0.31	0.93	1	0.97	0.26
Argentina	0.97	0.93	0.94	1	0.79	0.99	0.47	0.89
Australia	0.61	0.77	0.56	0.31	0.24	0.27	0.38	0.96
Bangladesh	0.76	0.98	0.1	0.03	0.68	0.97	1	0.2
Barbados	0.75	0.63	0.96	1	0.21	0.39	0.22	0.23
Belgium	0.12	0.59	0.45	0.37	0.19	0.47	0.04	0.15
Bosnia	0.37	0.13	0.61	1	0.46	1	0.57	0.08
Brazil	0.85	0.59	0.75	1	0.76	1	0.99	1
Chile	0.99	0.94	0.93	1	0.96	0.97	0.45	0.86
China	0.99	0.8	0.45	0.49	0.94	0.97	0.73	0.99
Colombia	0.98	1	0.92	1	0.99	1	0.93	0.93
Croatia	0.27	0.11	0.62	0.74	0.5	0.53	0.01	0.06
Finland	0.17	0.97	0.3	0.99	0.1	0.15	0.98	0.93
France	0.12	0.36	0.32	0.45	0.49	0.58	0.39	0.15
Germany	0.12	0.37	0.29	0.34	0.08	0.29	0.92	0.21
Greece	0.35	0.06	0.64	0.43	0.18	0.41	0.45	0.02
Guatemala	0.96	0.92	0.98	1	0.72	1	0.38	0.75
Hungary	0.17	0.08	0.35	0.54	0.54	0.27	0.92	0.02
Iran	0.84	0.31	0.52	0.97	0.79	0.41	0.69	0.53
Ireland	0.25	0.2	0.49	0.94	0.08	0.16	0.98	0.44
Jamaica	0.8	0.81	0.99	1	0.54	1	0.98	0.99
Japan	0.09	0.04	0.04	0.33	0.06	0.03	0.04	0.46
Korea	0.33	0.06	0.13	0.27	0.39	0.41	0.35	0.76
Malasyia	0.08	0.4	0.18	1	0.13	0.23	0.02	0.99
Mexico	0.54	0.61	0.91	1	0.67	0.32	0.07	0.16
Netherlands	0.38	0.77	0.4	0.5	0.13	1	0.35	0.76
Norway	0.22	0.99	0.22	0.37	0.13	0.26	0.96	0.65
Pakistan	0.51	0.47	0.42	0.49	0.63	0.98	0.69	0.16
Peru	0.98	0.99	0.99	0.36	0.9	1	0.97	1
Poland	0.5	0.33	0.72	0.32	0.63	0.97	0.23	0.5
Romania	0.57	0.39	0.39	0.47	0.68	0.78	0.47	0.45
Russia	0.07	0.22	0.22	0.31	0.05	0.49	0.27	0.4
Singapore	0.19	0.14	0.1	0.4	0.22	0.27	0.18	0.99
Slovakia	0.83	0.16	0.75	0.99	0.49	0.29	0.23	0.39
Slovenia	0.04	0.11	0.68	1	0.15	0.27	0.48	0.12
South_Africa	0.51	0.49	0.42	1	0.32	0.96	0.65	0.99
Spain	0.13	0.08	0.68	0.41	0.12	0.52	0.32	0.11
Sweden	0.13	1	0.36	0.65	0.16	0.24	0.56	0.76
Taiwan	0.34	0.45	0.15	0.39	0.76	0.85	0.17	1
Thailand	0.96	0.48	0.42	0.13	0.72	0.99	0.94	1
Trinidad_Tobago	0.98	0.98	1	1	0.87	1	0.97	0.72
UK	0.27	0.33	0.41	0.47	0.14	0.24	0.96	0.16
United_Arab_Emirates	0.16	0.62	0.93	0.18	0.04	0.93	0.72	0.79
Uruguay	0.91	0.9	0.92	0.71	0.9	0.35	0.08	0.02
Venezuela	0.87	0.79	0.96	1	0.56	1	0.9	0.81

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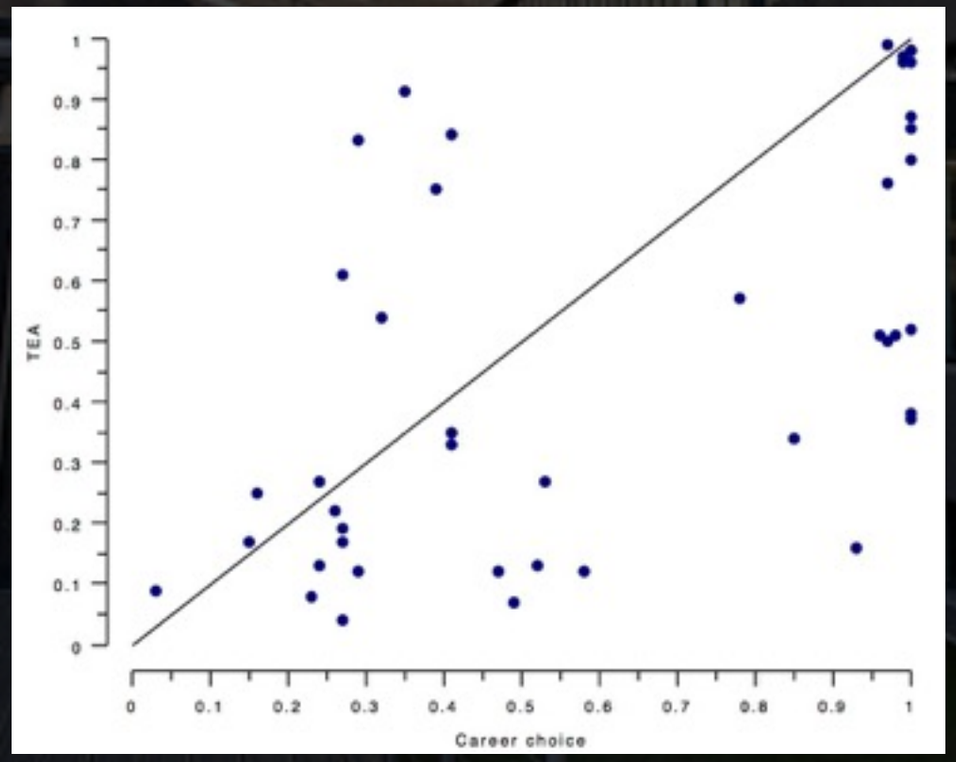
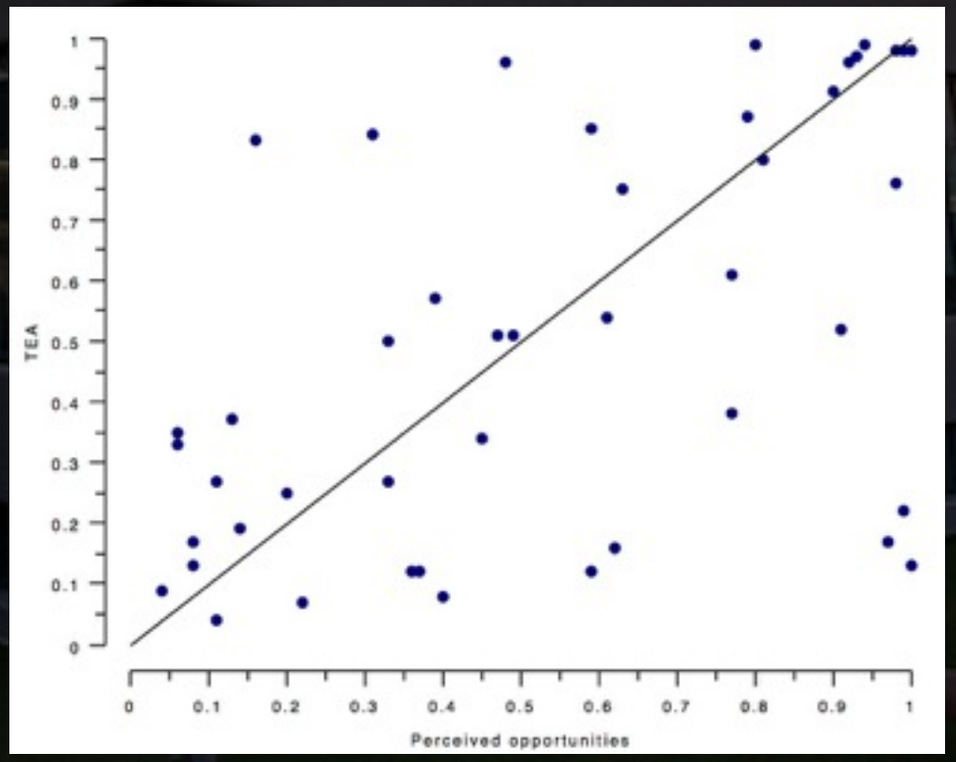
EXAMPLE

Total Early-stage Entrepreneurial Activity

Necessity analysis

	Consistency	Coverage
Perceived opportunities	0.816851	0.759275
Perceived capabilities	0.852328	0.754613
No Fear of Failure	0.833703	0.655966
Entrepreneurial intentions	0.810643	0.869648
Entrepreneurship as a good career choice	0.880710	0.704006
High status to successful entrepreneurs	0.742350	0.668797
Media attention for entrepreneurship	0.745898	0.678226





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EXAMPLE

Total Early-stage Entrepreneurial Activity

Truth Table

OPP	CAP	NFF	INT	CAR	CASES	TEA	CONS.
1	1	1	1	1	8	1	0.966929
1	1	0	1	1	2	1	0.921536
1	0	0	1	1	2	1	0.920213
1	1	1	1	0	2	1	0.898129
0	1	0	1	1	1	1	0.896266
0	0	0	1	1	4	1	0.853403
0	1	1	1	0	1	1	0.841487
0	1	1	0	1	1	0	0.785323
0	0	1	1	0	1	0	0.784232
0	0	1	0	1	1	0	0.772672
1	1	1	0	0	1	0	0.765112
1	1	0	0	1	1	0	0.750865
0	1	0	0	1	1	0	0.732656
0	0	0	0	1	1	0	0.722756
1	1	0	0	0	1	0	0.720297
0	1	1	0	0	2	0	0.640219
0	1	0	0	0	1	0	0.628821
1	0	0	0	0	2	0	0.617582
1	0	1	0	0	2	0	0.592834
0	0	1	0	0	2	0	0.553163
0	0	0	0	0	6	0	0.474777

EXAMPLE

Total Early-stage Entrepreneurial Activity

Solution table

	Solutions			
Configurations	**S1**	**S2**	**S3**	**S4**
OPP	-	-	●	●
CAP	-	●	●	●
NFF	⊗	●	-	●
INT	●	●	●	●
CAR	●	⊗	●	-
Consistency	0.86	0.85	0.94	0.96
Raw coverage	**0.35**	**0.24**	**0.59**	**0.57**
Unique coverage	0.08	0.02	0.01	0.003
Overall solution consistency			0.89	
Overall solution coverage			0.75	

Cases with greater than 0.5 membership in S1:
Thailand (0.72,0.96), Algeria (0.69,0.52), Bangladesh (0.68,0.76), Peru (0.64,0.98), Poland (0.63,0.5), Taiwan (0.61,0.34), Romania (0.53,0.57), China (0.51,0.99), Pakistan (0.51,0.51)

Cases with greater than 0.5 membership in S2:
Mexico (0.67,0.54), Uruguay (0.65,0.91), Iran (0.52,0.84)

Cases with greater than 0.5 membership in S3:
Chile (0.93,0.99), Colombia (0.92,0.98), Algeria (0.9,0.52), Peru (0.9,0.98), Trinidad_Tobago (0.87,0.98), Argentina (0.79,0.97), Guatemala (0.72,0.96), Brazil (0.59,0.85), Venezuela (0.56,0.87), Jamaica (0.54,0.8)

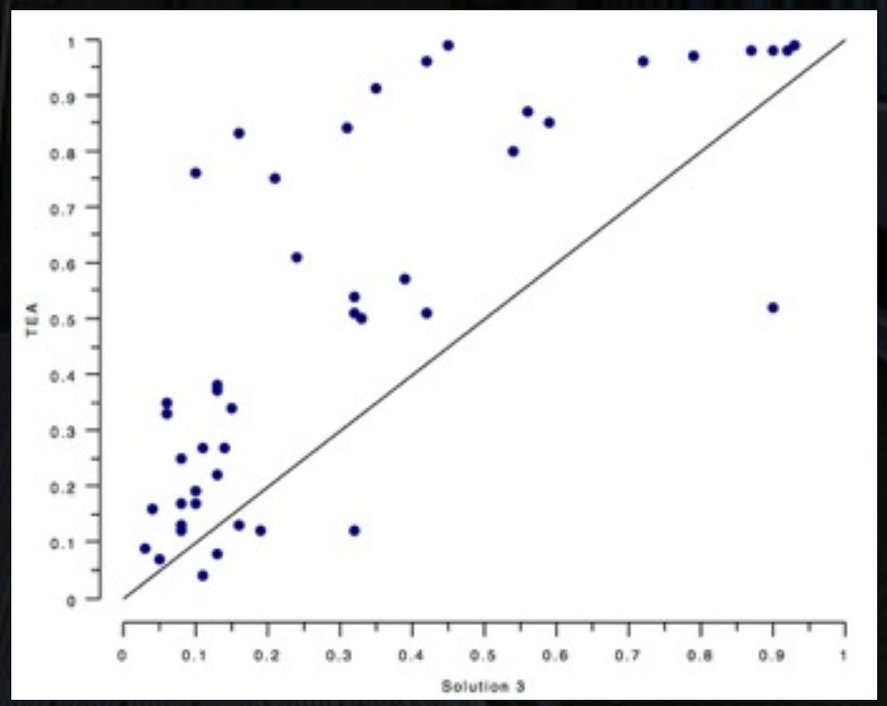
Cases with greater than 0.5 membership in S4:
Chile (0.93,0.99), Colombia (0.92,0.98), Trinidad_Tobago (0.87,0.98), Argentina (0.79,0.97), Guatemala (0.72,0.96), Uruguay (0.71,0.91), Mexico (0.61,0.54), Brazil (0.59,0.85), Venezuela (0.56,0.87), Jamaica (0.54,0.8)

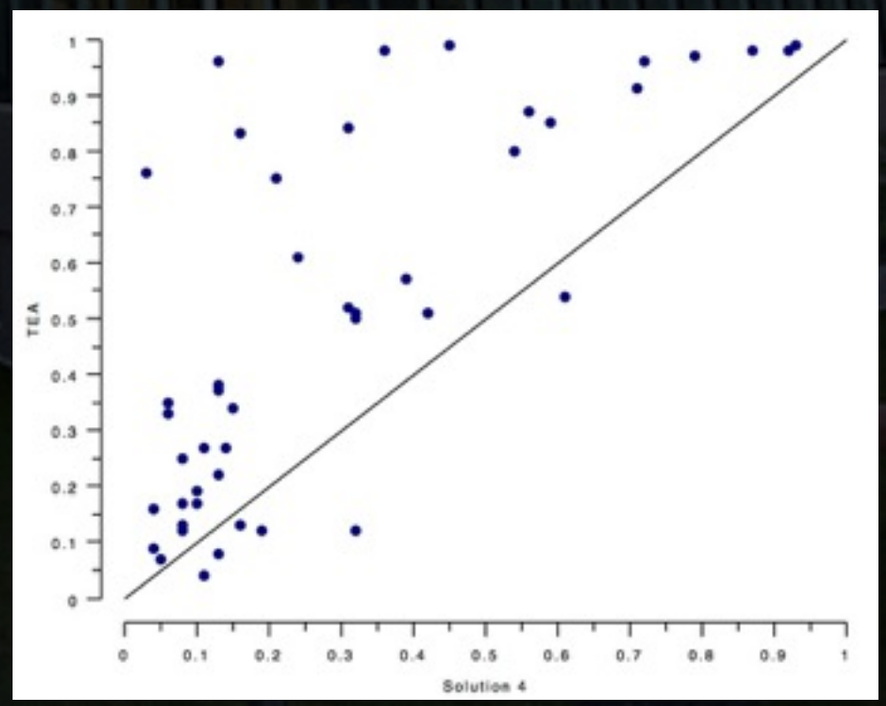
EXAMPLE

Total Early-stage Entrepreneurial Activity

Solution table

	Solutions			
Configurations	**S1**	**S2**	**S3**	**S4**
OPP	-	-	●	●
CAP	-	●	●	●
NFF	⊗	●	-	●
INT	●	●	●	●
CAR	●	⊗	●	-
Consistency	0.86	0.85	0.94	0.96
Raw coverage	**0.35**	**0.24**	**0.59**	**0.57**
Unique coverage	0.08	0.02	0.01	0.003
Overall solution consistency			0.89	
Overall solution coverage			0.75	





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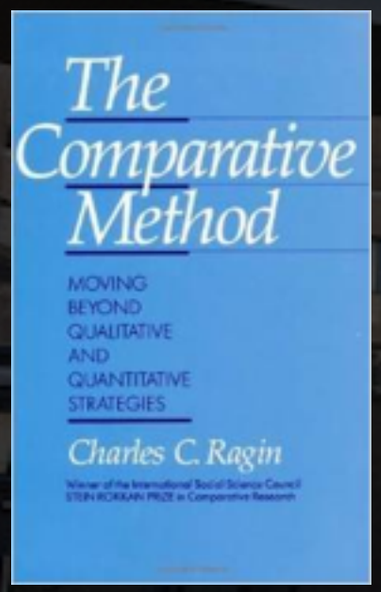
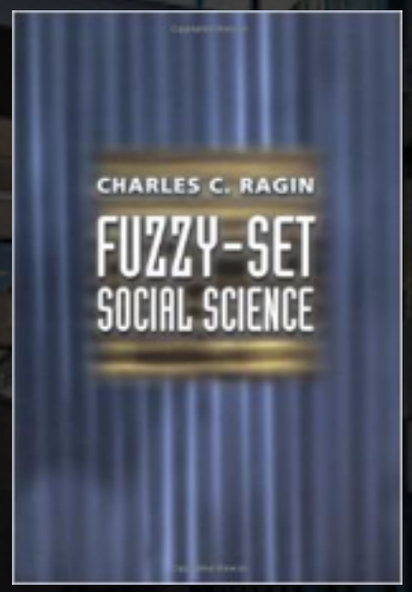
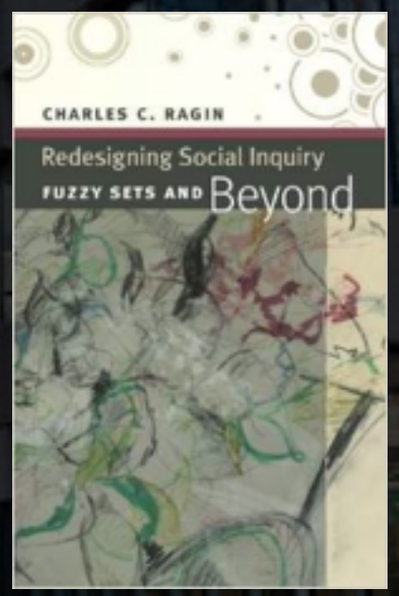
Resources

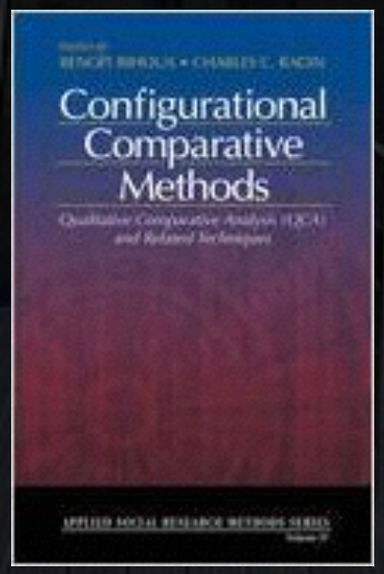
COMPArative Methods for Systematic cross-caSe analySis
http://www.compasss.org

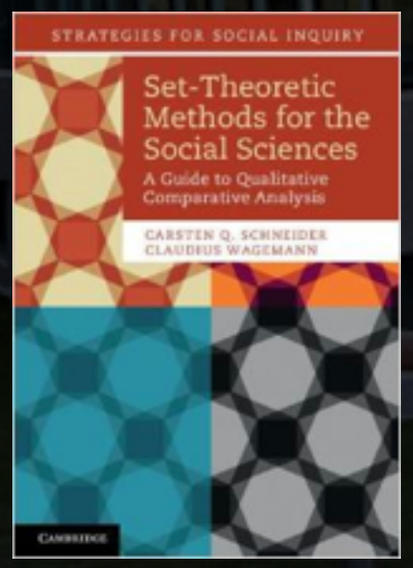
Charles Ragin's website
http://www.u.arizona.edu/~cragin/fsQCA/

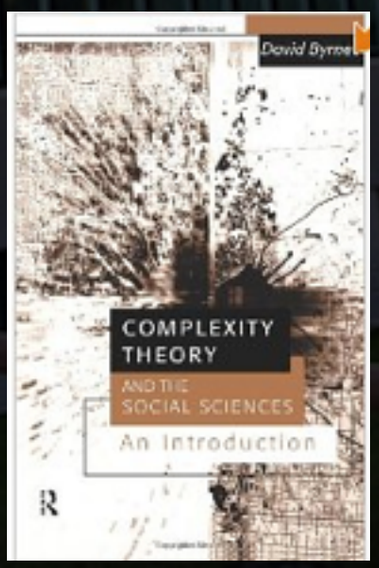












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