Introduction to Qualitative Comparative Analysis (QCA)

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2012 November 11, Riga
Lecture 2

- Comparison and comparative perspective
- Foundations of comparative method
- Foundations of QCA
Comparison and comparative perspective

- **Comparison**: elementary procedure of thinking (thinking without comparison is unthinkable)

- Elementary definition?

- **Comparison** – *juxtaposition of values* (units of variation) of *attributes* (characteristics or variables) of *two or more objects* (cases or units of observation) and identification of their similarity (difference)
Comparison and comparative perspective

- In its broadest sense comparison is related to variation → objects (cases) have different values of attributes
- Comparison (together with classification) is a basic principle of science (if it is a science, it goes without saying that it is comparative)
Comparison and comparative perspective

• **Major methods of science**: procedures according to which alternative hypotheses about causal relationships between phenomena are tested:
  - Experimental
  - Non-experimental
    • Statistical
    • Comparative
    • Case study
Comparison and comparative perspective

• Traditional **gold standard – experimental method:**
  - Special influence on objects in order to change condition of some of their attributes in experimental and control groups
  - Conditions of other attributes are held constant
  - Look for differences in results according to manipulation
  - Not really possible in social sciences
Comparison and comparative perspective

- Dominant non-experimental method – statistical:
  - In the essence: search for similarities and differences between the objects (cases), when distributions of values of attributes (variables) of those objects are being compared.
Comparison and comparative perspective

- Conditions of application:
  - **Large N** (number of observations greatly exceeding that of variables) → Golden proportion = (n of cases - n of variables) - 1
  - Variation of values
  - Statistical idea of causality:
    - Ci causes E, if P(E/Ci) > P(E/~Ci), all other C’s controlled
    - Statistical causes cannot explain single events
    - The knowledge of statistical causes provides no sound basis for receipts how to produce or prevent singular event
Comparison and comparative perspective

- Not possible to exercise special influence on objects → searching for covariation of values

- Control of influence of “undesirable” variables (attributes) is performed “holding their values constant” -> searching for covariation of values holding values of “unnecessary” variables constant
Comparison and comparative perspective

- **Case study** – qualitative method for deep and thorough analysis of many attributes of single cases

- **Comparative method** – first systematically elaborated in middle of XIX century by J. S. Mill, when he laid down canons of the logic of establishing causal relationships
Comparison and comparative perspective

- **All in all** comparative method in science:
  - Method of analysis of relationships (causal) between phenomena, which is based on empirical analysis of alternative hypotheses stating relationships between causes and outcomes
  - **Also method of inductive inference**, regularities of relationships between variables are established
  - Not different from experimental or statistical methods?

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Comparison and comparative perspective

• Difference of comparative method:
  - Analysis of macrosocial phenomena
  - Analysis in Small N situations
  - Intensive analysis (many variables, few cases)
  - The less cases the better we know them!
  - Analysis of deterministic necessary and sufficient conditions of phenomena
  - Explanation of phenomena with multiple conjunctural conditions
Comparison and comparative perspective

- **Deterministic vs. probabilistic hypotheses:**
  - Relationship is unequivocal (if C, then O) vs. probability of O is higher if C

- **Deterministic necessary conditions:**
  - Only if C is present O occurs (but C might not be enough)

- **Deterministic sufficient conditions:**
  - If C is present O occurs (but C might not be the only cause)
Comparison and comparative perspective

- Deterministic necessary and sufficient conditions:
  - If and only if C is present O always occurs (C is the only cause of O)

- Deterministic INUS conditions:
  - Insufficient non-redundant part of unnecessary, but sufficient condition of O
    - C is neither sufficient nor necessary cause of O, its causal status occurs only in combination with other C and these combinations may vary
Comparison and comparative perspective

- Deterministic INUS conditions (multiple conjunctural):
  - $X$ is multiple condition of $Y$, if there alternatives (different conditions, same outcome)
    \[ X \text{ OR } W \text{ OR } Z \rightarrow Y \]
  - $X$ is conjunctural condition of $Y$, if $X$ is sufficient to cause $Y$, only in combination with other conditions
    \[ X \text{ AND } W \text{ AND } Z \rightarrow Y \]
Comparison and comparative perspective

• Deterministic INUS conditions (multiple conjunctural):
  - $X$ is *multiple and conjunctural* condition of $Y$, when it works in combination with other causes, and there alternatives to combination of which it is a part

$$(X \text{ AND } W \text{ AND } Z) \text{ OR } (W \text{ AND } C \text{ AND } D) \rightarrow Y$$
Comparison and comparative perspective

- Employed in:
  - Biology
  - Social Sciences and Humanities:
    - Macro-comparative contexts
    - Ragin (2008): even micro comparative context
Comparative method

• Until 1987 comparative method was understood along the lines of Mill's eliminative induction rules which were applied in small N situations when testing causal hypotheses

• Qualitative comparative analysis was invented (Ragin, 1987) as an extension, allowing to test deterministic causal hypotheses in non-experimental situations, where multiple conjunctural causation is involved
Comparative method

• Number of cases:
  – At least 7-8 (depends on n of variables)
  – No upper limit, however, there is a limit to how many cases single researcher can deeply know
  – 7-50 most common practice

• Relatively small number of cases is compared in order to explain their diversity:
  – Why cases have different outcomes (why democracy survived in Finland but not Estonia)
Qualitative comparative analysis

- Thus in QCA attention is concentrated on analysis of attributes of cases which have the same outcome:
  
  - There must be some common attributes that differentiate cases with one outcome from cases where the outcome is different
Qualitative comparative analysis

- Aims of QCA (Ragin 2011):
  1. Analysis of diversity (Finland vs. Estonia)
  2. Interpretations of culturally and historically significant phenomena (Germany)
  3. Theory development (socio-economic factors are not enough to explain democracy)
Qualitative comparative analysis

• **Logic** of QCA (Ragin 2011):

1. **Selection of cases:**
   - Research problem and aims
   - Clearly defined
   - Comparable and relevant for analysis purposes
   - Not only macro phenomena

2. **Theoretical model:**
   - Research problem and aims
   - Refine cases

3. **Analysis of diversity**
Qualitative comparative analysis

• Some special features of QCA (Ragin 2011):
  - Case – configuration of values of conditions related to a certain outcome (holistic perspective)
  - QCA is more deductive than inductive method
  - Configurations of causal conditions are compared (rows of data matrix) not values of conditions variables with values of outcome variable (columns of data matrix)
Qualitative comparative analysis

- Some special features of QCA (Ragin 2011):

<table>
<thead>
<tr>
<th>Case</th>
<th>$S_1$</th>
<th>$S_2$</th>
<th>$S_3$</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Qualitative comparative analysis

• Some special features of QCA (Ragin 2011):
  – Specific definition of causality:
    • Not once and for all
    • Multiple conjunctural:
      – Causes 'act' in combinations
      – Several combinations of causal conditions are related to the same outcome
      – A single causal condition (depending on combinations with other causal conditions) may be a cause to different outcomes
    • Causation is not necessarily symmetric
Qualitative comparative analysis

- Some special features of QCA (Ragin 2011):
  - Generalizations only tentative:
    - Small N → only for very similar other cases
    - Might be modified after analyzing other cases
  - Eliminative in nature:
    - Unnecessary causal conditions are eliminated
    - Theories may be refuted, not confirmed
  - Process of analysis is open to scrutiny and repeatable
Qualitative comparative analysis

• When to use?
  - To generalize data (truth table → which cases are similar?)
  - To check data consistency (truth table → contradictory cases with respect to outcome are identified)
  - To test hypotheses and theories (refute with empirical data/analysis)
  - To develop theories (results lead to further theoretical and empirical analysis)
Qualitative comparative analysis

• Types of QCA:
  – Crisp set QCA (Ragin, 1987):
    • Dichotomous (0/1) variables
    • Crisp sets (each case fully belongs or does not belong to a set; law of impossible third option)
    • Software: TOSMANA, fs/QCA, Stata (fuzzy), R (QCA, QCAGUI, QCA3)
Qualitative comparative analysis

• Types of QCA:
  – Multivalue QCA (Cronqvist, 2007):
    • Multivalue categorical variables (1, 2, ...)
    • Crisp sets
    • Software: TOSMANA, R (QCA, QCAGUI, QCA3)
Qualitative comparative analysis

- Types of QCA:
  - Fuzzy set QCA (Ragin, 2000 & 2008):
    - Proportions (ranging from 0 to 1)
    - Fuzzy sets (each case may more or less belong to each set)
    - Software: fs/QCA, Stata (fuzzy), R (QCA3)
Qualitative comparative analysis

- **Main resources:**
  - **Books:**
  - **Websites:**
    - www.compasss.org
    - www.u.arizona.edu/~cragin
    - www.tosmana.net
Qualitative comparative analysis

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