Course title

WD204 Advanced Topics in Set-Theoretic Methods and QCA

Instructor details

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Short Bio

Carsten Q. Schneider is Associate Professor of Political Science at Central European University, Budapest (http://people.ceu.hu/carsten-q_schneider). His research focuses on regime transitions and the qualities of democracies. He is also working in the field of comparative methodology, especially on Qualitative Comparative Analysis (QCA) and its fuzzy set extension. He has published articles in several peer-reviewed journals and three books, among them the Cambridge University Press book “Set-Theoretic Methods for the Social Science”, co-authored with Claudius Wagemann, in 2012.

Prerequisite knowledge

Participants are expected to have a firm command of basic formal logic, Boolean algebra, and set-theory. Participants also need to be familiar with the basic protocol of Qualitative Comparative Analysis (QCA), including the following topics: the difference between sets and variables; the notion of set calibration; the meaning of set relations (sufficiency, necessity, INUS, SUIN); the construction and logical minimization of a truth table; the calculation and interpretation of the parameters of fit (consistency and coverage); the treatment of logical remainders as done by the Standard Analysis. In short, participants should check whether they are in command of all the issues addressed in Schneider/Wagemann (2012): “Set-Theoretic Methods for the Social Sciences”, chapters 1-7. In case of doubt, students are encouraged to consult the online appendix of the book, which contains exercises and test questions for all these chapters. Participants are further expected to be familiar with the basics of the R software environment as we will use the R packages relevant for performing set-theoretic analyses (QCA and SetMethods) during the course. Students who have attended the two-week course on Set-Theoretic Methods and QCA at the ECPR Summer School in Ljubljana should be well prepared for this advanced course.

Short course outline

This course addresses advanced issues that arise if and when scholars embrace notions of sets and their relations. While it is a course about set-theoretic methods writ large, most of the time, we will discuss issues that are specific to Qualitative Comparative Analysis (QCA). Although much effort has been put into developing standards of good practice, still many important issues remain unresolved, and even sometimes unaddressed. This has given rise to a recent wave of literature sceptical of set-methods, in general, and QCA, in particular. In this course we not only discuss the issues raised by theses critiques, but go beyond them and explore the hitherto under-used potentials of set-theoretic
methods. The topics addressed are set-theoretic multi-method principles and practices; set-theoretic theory evaluation; robustness and uncertainty; time and set-theoretic methods; two-step QCA; and contemporary QCA critiques.

**Long course outline**

Participants who are in good command of all the issues addressed above under “prerequisite knowledge” can expect from this course a deepened understanding of potentials and pitfalls of set-theoretic methods. This should enable them to be both more critical and assertive if and when they choose or reject set-theoretic methods as the most appropriate research method for their research project. Successfully completing the course will also enable participants to produce QCA studies of a quality and level of sophistication beyond the current mainstream and thus yield substantive results that are more compelling both for themselves and their (critical) audience. Since much of the course explores the boundaries of the still relatively young family of set-theoretic methods, it will be unavoidable that some of our debates will have to remain inconclusive. Participants should therefore be prepared to not always be provided ready-made and fool-prove answers and procedures for all the issues that they will face when trying to implement a high-quality QCA. Rather, this course invites students to think critically about set-theoretic methods, in particular, but, by extension, also about other data analysis techniques that they will have to choose when doing empirical comparative research.

This course is the result of two developments. First, the toolbox of set-theoretic methods is quickly expanding. Second, there are renewed and forceful critiques that question the fundamental logic of set-theoretic methods and QCA and the way it is put into practice in applied research. This course deals with these two, partially overlapping, recent developments. We proceed as follows.

In order to set the stage, we discuss several recent writings that are heavily critical of set-theoretic methods and QCA. From this debate, we distil the most important issues of contention. These are, among others, the question of how robust QCA results are and how (not) concerned QCA scholars are about this issue; the unrecognized assumptions incorporated in a QCA and the preconditions that are thus required in order to meaningfully apply QCA; the status of fuzzy sets, especially their alleged distinctiveness vis-à-vis variables; and the connection between QCA and proper within-case analyses. Days 2 and 3 are dedicated to discussing these critiques. On day 2, we discuss the notion of robustness in set-theoretic methods and try to systematize the debate by specifying the analytic decisions to be made against which QCA results should be expected to be robust. On day 3, we introduce set-theoretic multi-method research as an attempt at specifying just how QCA should be combined with within-case process tracing. We define the meaning of typical and deviant cases after a QCA, spell out the different rationales for studying each of them, and provide formulas for selecting the best available cases for (comparative) within-case analysis after a QCA.

During days 3 to 5 we address issues that are important for the further improvement of set-theoretic methods but which have not (yet) been addressed by QCA critics. On day 4 we discuss strategies for handling logical remainders. Since logical remainders are omnipresent in comparative social science research and since assumptions on these remainders heavily influence the inference drawn from an analysis, it is of utmost importance that researchers make conscious and explicit decisions as to which counterfactual claims to make and why. In this regard, QCA is arguably making significant contributions to the general methodological literature. On day 4, we also discuss the analytic pitfalls that arise when researchers handle sets with skewed membership scores. On day 5, we present strategies for including notions of time into set-theoretic analyses. Along these lines, we discuss calibration strategies, sequence elaboration, and temporal QCA. In addition, we look at a revised version of the so-called two-step QCA protocol. Furthermore, on day 5, we also introduce the notion of theory evaluation. By contrasting it to theory testing, we provide arguments as to why QCA is inherently inductive rather than deductive. We also learn how to use Boolean algebra for performing theory evaluation based on QCA solution formulas.

Participants of the course should not expect to be provided a general introduction to the basics of set-theoretic methods and QCA. We will also not introduce into the very basics of the R software environment. Furthermore, several topics that are arguably advanced issues will only be addressed
at the margins, such as: different functional forms for the direct calibration; the status of multi-value QCA; or principles and practices of large N QCA.

** the information contained in this course description form may be subject to subsequent adaptations (e.g. taking into account new developments in the field, specific participant demands, group size etc.). This course deals with a quickly developing field and new contributions to the literature that are relevant for this course are likely to be published over the upcoming months. Registered participants will be informed in due time in case of adaptations. **

**Day-to-day schedule (Monday 16 February to Friday 20 February)**

(The readings might change slightly in order to take into account new developments in the field. Participants will receive a final list well in advance of the course.)

<table>
<thead>
<tr>
<th>Day</th>
<th>Topic(s)</th>
<th>Details [NB : incl. timing of lecture v/s lab or fieldwork etc. hours]</th>
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| Day 1 | Set-Theoretic Methods and QCA in a Nutshell; Critiques of QCA I          | 180’ seminar:  
- the standard QCA protocol  
- criticisms (robustness, hidden assumptions, the status of (fuzzy) sets, the detachment from cases, the superiority of non-set methods) |
|       | Critiques of QCA II and tentative replies: Robustness and uncertainty    | 90’ lecture:  
- What can and cannot be the meaning of robust results in set-theoretic methods?  
- Robustness against what?  
- the inherently inductive nature of QCA  
90’ lab:  
- applying set-theoretic robustness tests to published QCA studies |
| Day 2 | Topics not addressed by critiques I:  
Set-theoretic multi-method research                                     | 90’ lecture:  
- how to select cases after a QCA  
- how to make use of the insights gained from these (comparative) within-case analyses  
90’ lab:  
- applying the post-QCA case selection principles to examples of published QCA studies |
| Day 3 | Topics not addressed by critiques II:  
- the proper treatment of logical remainders  
- the analytic consequences of skewed set membership scores              | 90’ lecture:  
- the avoidance of untenable assumptions on remainders and the inclusion of good counterfactuals  
- detecting skewed set membership scores and remedies for avoiding the analytic pitfalls they can cause  
90’ lab:  
- applying the Enhanced Standard Analysis to examples of published QCA studies  
- identifying SUIN conditions  
- calculating alternative parameters of fit for |
### Day 5

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<th>Topics not addressed by critiques III:</th>
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<td>- the inclusion of time into set-theoretic analyses</td>
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<td>- set-theoretic theory evaluation</td>
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**90’ lecture:**
- the intrinsic challenges of including notions of time as causally relevant
- sequence elaboration
- an updated version of two-step QCA
- theory testing vs. theory evaluation

**90’ lab:**
- implementing tQCA
- using the software for performing theory evaluation

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### Readings (please list at least the compulsory reading for the scheduled day)

#### Day 1

**Standard QCA protocol; critiques of QCA I**


**Optional**


Mahoney, James. 2014. „Set Diagrams and Qualitative Research.“ *Comparative Political Studies*. DOI 10.1177/0010414013519410


#### Day 2

**critiques of QCA II and tentative replies**


**Optional**


#### Day 3

**set-theoretic multi-**

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<td><strong>logical remainder; skewed sets</strong></td>
<td><strong>Cooper, Barry, and Judith Glaesser. 2011. “Paradoxes and Pitfalls in Using Fuzzy Set QCA: Illustrations from a Critical Review of a Study of Educational Inequality.” Sociological Research Online 16(3).</strong></td>
</tr>
<tr>
<td><strong>Optional</strong></td>
<td><strong>Caren, Neal, and Aaron Panofsky. 2005. “TQCA. a Technique for Adding Temporality to Qualitative Comparative Analysis.” Sociological Methods &amp; Research 34(2): 147–72.</strong></td>
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**Software and hardware requirements**

**Software programme**
- R, packages QCA, SetMethods, and all their dependencies
**Hardware requirements**
none

**Literature**

**Lecture room requirement**
classical lecture style and computer lab

**Preferred time slots**
afternoon

**Other recommended courses (before or after this course)**
The following other ECPR Methods School courses could be useful in combination with this one in a ‘training track’. NB this is an indicative list.

**Before this course:**

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<tr>
<th>Course title</th>
<th>Summer School</th>
<th>Winter School</th>
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<tr>
<td>1 Set-Theoretic Methods: Qualitative Comparative Analysis and Related Approaches</td>
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<td>2 Introduction to R</td>
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<tr>
<td>1 Case Study Research – Method and Practice</td>
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