Universität Konstanz

Workshop Seminar:
Configurational Research with QCA and CNA

26-30 September 2016, University of Konstanz, Germany

Prof. Dr. Michael Baumgartner and Dr. Alrik Thiem, University of Geneva

1 Short Seminar Description

This workshop seminar offers an intensive 1-week introduction to causal modelling with *Qualitative Comparative Analysis* (QCA) and *Coincidence Analysis* (CNA), the two most prominent configurational comparative methods (CCMs) of causal discovery. Participants will be guided through the nuts and bolts of configurational comparative research, cutting-edge methodological innovations, and they will also learn how to make the most of current software for QCA and CNA.

From the philosophical roots of regularity theories of causation, over the procedural protocol of QCA, to the empirical analysis of causal chain structures, this seminar will go way beyond the material taught in other QCA courses, enabling participants to perform QCA in a correct and sophisticated manner. It will be shown, for example, why the vast majority of past QCA studies have run the risk of failing to find the underlying causal model, and why the conservative solution in QCA is not conservative at all. The seminar also provides an introduction to CNA—a CCM geared towards uncovering causal chains and common cause structures. Last but not least, students will learn why recent high-profile critiques discouraging the use of QCA lack traction. Individual consultation sessions will be offered in addition to help participants with the methodological aspects of their own research projects.

The two instructors are among the most active researchers in the field, publishing and teaching at the forefront of configurational research. As authors of the most powerful software for QCA and CNA currently available, they also have an unrivalled familiarity with these tools, which will be made ample use of throughout the seminar.

2 Instructor Details

Michael Baumgartner is a Swiss National Science Foundation professor at the Department of Philosophy of the University of Geneva. His research focuses on questions in the philosophy of science and logic, more specifically, on aspects of causation and causal reasoning with QCA and CNA, regularity theories, interventionism,

determinism, logical formalization, argument reconstruction/evaluation and modelling in the social sciences. He has published in journals such as the *British Journal for the Philosophy of Science*, *Comparative Political Studies*, *Dialectica*, *Erkenntnis*, *Field Methods*, *Journal of Philosophical Logic*, *Sociological Methodology*, *Sociological Methods & Research*, and *Synthese*. He has developed the method of CNA and is a co-author of the corresponding cna package for the R environment. For further biographical details, see his `Homepage`.

Alrik Thiem is a post-doctoral researcher at the Department of Philosophy of the University of Geneva. The main part of his work addresses questions of methodology and application in the field of empirical social research methods, primarily configurational ones such as Coincidence Analysis, Event Structure Analysis, and Qualitative Comparative Analysis. He has taught nationally and internationally on QCA, and has published in numerous journals, including *Comparative Political Studies*, *Evaluation Review*, *Field Methods*, *International Journal of Social Research Methodology*, *Journal of Mathematical Sociology*, *Political Analysis*, *Quality & Quantity*, *Social Science Computer Review*, *Sociological Methodology* and *Sociological Methods & Research*. He is the author of the QCApro package, and a co-author of the QCA package as well as the cna package for the R environment. For further biographical details, see his `Homepage` or his `ResearchGate website`.

3 Seminar Schedule

The full seminar schedule is provided below. Each day is divided into four modules, with each module lasting 90 minutes. A consultation session is offered after the fourth module on days 2 and 3. All required and supplementary readings will be made available to registered students three weeks in advance. Main readings in either category, required and supplementary, are marked with a "•" sign. A "+" sign indicates additional readings that closely relate to the respective main reading below which it is listed.

Day	***Module and Topic(s) Covered***
Day 1; Monday, 26 September 2016: Theoretical Foundations ☞ detailed schedule	
09:00 - 10:30	**Module 1.1:** Theorizing about causation and the essentials of Boolean algebra
10:30 - 10:45	Break
10:45 - 12:15	**Module 1.2:** Regularity theories from Hume over Mill to Mackie
12:15 - 13:30	Lunch Break
13:30 - 15:00	**Module 1.3:** Discovering regularity theoretic causation
15:00 - 15:15	Break
15:15 - 16:45	**Module 1.4:** The basic work flow of QCA

Required readings

- Mackie, John L. 1965. "Causes and conditions." *American Philosophical Quarterly* 2 (4):245-64.
- Quine, Willard V. 1952. "The problem of simplifying truth functions." *American Mathematical Monthly* 59 (8):521-31. (only read until Theorem 6).
- McCluskey, Edward J. 1956. "Minimization of Boolean functions." *Bell Systems Technical Journal* 35 (6):1417-44. (only read pages 1417-28).
- Mill, John Stuart [edited by J. M. Robson]. 2006, 1973, [1843]. *A system of logic, ratiocinative and inductive.* Toronto: University of Toronto Press, pp. 388-406, 434-453.

Supplementary readings

+ Ducheyne, Steffen. 2008. "J.S. Mill's canons of induction: From true causes to provisional ones." *History and Philosophy of Logic* 29 (4):361-76.
- Barringer, Sondra N., Scott R. Eliason, and Erin Leahey. 2013. "A history of causal analysis in the social sciences." In *Handbook of Causal Analysis for Social Research*, ed. S. L. Morgan. Dordrecht: Springer, pp. 9-26.
- Baumgartner, Michael. 2008. "Regularity theories reassessed." *Philosophia* 36 (3):327-54.
- Reiss, Julian. 2009. "Causation in the social sciences: Evidence, inference, and purpose." *Philosophy of the Social Sciences* 39 (1):20-40.

Day 2; Tuesday, 27 September 2016: Crisp-Set QCA ☞ detailed schedule

09:00 - 10:30	**Module 2.1:** A short introduction to R
10:30 - 10:45	Break
10:45 - 12:15	**Module 2.2:** A short introduction to R
12:15 - 13:30	Lunch Break
13:30 - 15:00	**Module 2.3:** From raw data to the QCA solution
15:00 - 15:15	Break
15:15 - 16:45	**Module 2.4:** Measures of fit in QCA
17:00 - 18:00	Consultation session

Required readings

- Ragin, Charles C. 1987. *The comparative method: Moving beyond qualitative and quantitative strategies.* Berkeley: University of California Press, pp. 85-118.
- Ragin, Charles C. 2006. "Set relations in social research: Evaluating their consistency and coverage." *Political Analysis* 14 (3):291-310.

Supplementary readings

- Ragin, Charles C. 2008. *Redesigning social inquiry: Fuzzy sets and beyond.* Chicago: University of Chicago Press, pp. 147-175.
- Rihoux, Benoît, and Gisèle De Meur. 2009. "Crisp-set Qualitative Comparative Analysis (csQCA)." In *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and related techniques*, ed. B. Rihoux and C. C. Ragin. London: SAGE, pp. 33-68.
- Schneider, Carsten Q., and Claudius Wagemann. 2012. *Set-Theoretic Methods for the social sciences: A guide to Qualitative Comparative Analysis (QCA).* Cambridge: Cambridge University Press, pp. 151-177.

Day 3; Wednesday, 28 September 2016: Other variants of QCA ☞ detailed schedule

09:00 - 10:30	**Module 3.1:** The Three Solution Types of QCA
10:30 - 10:45	Break
10:45 - 12:15	**Module 3.2:** Multi-Value QCA

12:15 - 13:30	Lunch Break
13:30 - 15:00	**Module 3.3:** Fuzzy-Set Theory and Fuzzy Logic
15:00 - 15:15	Break
15:15 - 16:45	**Module 3.4:** Fuzzy-Set QCA
17:00 - 18:00	Consultation session

Required readings

- Baumgartner, Michael. 2015. "Parsimony and causality." *Quality & Quantity* 49 (2):839-56.
- Schneider, Carsten Q., and Claudius Wagemann. 2012. *Set-Theoretic Methods for the social sciences: A guide to Qualitative Comparative Analysis (QCA).* Cambridge: Cambridge University Press, pp. 93-104.
- Thiem, Alrik. 2013. "Clearly crisp, and not fuzzy: A reassessment of the (putative) pitfalls of multi-value QCA." *Field Methods* 25 (2):197-207.

Supplementary readings

+ Vink, Maarten P., and Olaf van Vliet. 2009. "Not quite crisp, not yet fuzzy? Assessing the potentials and pitfalls of multi-value QCA." *Field Methods* 21 (3):265-89.
+ Vink, Maarten P., and Olaf van Vliet. 2013. "Potentials and pitfalls of multi-value QCA: Response to Thiem." *Field Methods* 25 (2):208-13.
- 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):8.
- Ragin, Charles C. 2009. "Qualitative Comparative Analysis using fuzzy sets (fsQCA)." In Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and related techniques, ed. B. Rihoux and C. C. Ragin. London: Sage Publications, pp. 87-121.
- Schneider, Carsten Q., and Claudius Wagemann. 2012. *Set-Theoretic Methods for the social sciences: A guide to Qualitative Comparative Analysis (QCA).* Cambridge: Cambridge University Press, pp. 255-263.
- Thiem, Alrik. 2014. "Unifying Configurational Comparative Methods: Generalized-set Qualitative Comparative Analysis." *Sociological Methods & Research* 43 (2):313-37.
- Thiem, Alrik. 2015. "Parameters of fit and intermediate solutions in multi-value Qualitative Comparative Analysis." *Quality & Quantity* 49 (2):657-74.
- Thiem, Alrik. 2016. "Analyzing multilevel data with QCA: Yet another straightforward procedure." *Quality & Quantity* 50 (1):121-8.

Day 4; Thursday, 29 September 2016: Critiques of QCA ☞ detailed schedule

09:00 - 10:30	**Module 4.1:** A closer look at model ambiguities
10:30 - 10:45	Break
10:45 - 12:15	**Module 4.2:** Criticisms of QCA
12:15 - 13:30	Lunch Break
13:30 - 15:00	**Module 4.3:** QCA and mixed/multi-method research
15:00 - 15:15	Break
15:15 - 16:45	**Module 4.4:** Beyond QCA: causal chains and common cause structures
17:00 - 18:00	Consultation session

Required readings

- Baumgartner, Michael, and Alrik Thiem. 2015. "Model ambiguities in configurational comparative research." *Sociological Methodology*. Advance online publication. DOI: 10.1177/0049124115610351.
- Lucas, Samuel R., and Alisa Szatrowski. 2014. "Qualitative Comparative Analysis in critical perspective." *Sociological Methodology* 44 (1):1-79. (only read pages 1-27).
- Schneider, Carsten Q., and Ingo Rohlfing. 2013. "Combining QCA and process tracing in set-theoretic multi-method research." *Sociological Methods & Research* 42 (4):559-97.
- Thiem, Alrik, Michael Baumgartner, and Damien Bol. 2015. "Still lost in translation! A correction of three misunderstandings between configurational comparativists and regressional analysts." *Comparative Political Studies*. Advance online publication. DOI: 10.1177/0010414014565892.

Supplementary readings

+ Collier, David. 2014. "Comment: QCA should set aside the algorithms." *Sociological Methodology* 44 (1):122-6.
+ Ragin, Charles C. 2014. "Comment: Lucas and Szatrowski in critical perspective." *Sociological Methodology* 44 (1):80-94.
+ Thiem, Alrik, and Michael Baumgartner. forthcoming. "Modeling causal irrelevance in evaluations of Configurational Comparative Methods." *Sociological Methodology*.
+ Vaisey, Stephen. 2014. "Comment: QCA Works—When Used with Care." *Sociological Methodology* 44 (1):108-12.
- Hug, Simon. 2013. "Qualitative Comparative Analysis: How inductive use and measurement error lead to problematic inference." *Political Analysis* 21 (2):252-65.
+ Thiem, Alrik. 2014. "Mill's methods, induction and case sensitivity in Qualitative Comparative Analysis: A comment on Hug (2013)." *Qualitative & Multi-Method Research* 12 (2):19-24.
- Krogslund, Chris, Donghyun Danny Choi, and Mathias Poertner. 2015. "Fuzzy sets on shaky ground: Parameter sensitivity and confirmation bias in fsQCA." *Political Analysis* 23 (1):21-41.
- Paine, Jack. 2015. "Set-theoretic comparative methods: Less distinctive than claimed." *Comparative Political Studies* DOI:10.1177/0010414014564851.
+ Schneider, Carsten. 2016. "Real differences and overlooked similarities: Set-methods in comparative perspective." *Comparative Political Studies*. Advance online publication. DOI: 10.1177/0010414015626454.
+ Thiem, Alrik, and Michael Baumgartner. 2016. "Back to square one: A reply to Munck, Paine, and Schneider." *Comparative Political Studies*. Advance online publication. DOI: 10.1177/0010414015626455.
- Rohlfing, Ingo, and Carsten Q. Schneider. 2016. "A unifying framework for causal analysis in set-theoretic multimethod research." *Sociological Methods & Research*. Advance online publication. DOI: 10.1177/0049124115626170.
- Thiem, Alrik. 2014. "Navigating the complexities of Qualitative Comparative Analysis: Case numbers, necessity relations, and model ambiguities." *Evaluation Review* 38 (6):487-513. (pages 498-505).

Day 5; Friday, 30 September 2016: Coincidence Analysis ☞ detailed schedule

09:00 - 10:30	**Module 5.1:** The CNA algorithm
10:30 - 10:45	Break
10:45 - 12:15	**Module 5.2:** The differences and commonalities of QCA and CNA
12:15 - 13:30	Lunch Break
13:30 - 15:00	**Module 5.3:** Working with the cna package for R
15:00 - 15:15	Break
15:15 - 16:45	**Module 5.4:** The causal chain problem

Required readings

- Baumgartner, Michael. 2013. "Detecting causal chains in small-n data." *Field Methods* 25 (1):3-24.

Supplementary readings

- Baumgartner, Michael. 2008. "The causal chain problem." *Erkenntnis* 69 (2):201-26.
- Baumgartner, Michael. 2009. "Inferring causal complexity." *Sociological Methods & Research* 38 (1):71-101.
- Baumgartner, Michael, and Ruedi Epple. 2014. "A Coincidence Analysis of a causal chain: The Swiss minaret vote." *Sociological Methods & Research* 43 (2):280-312.
- \+ Thiem, Alrik. 2015. "Using Qualitative Comparative Analysis for identifying causal chains in configurational data: A methodological commentary on Baumgartner and Epple (2014)." *Sociological Methods & Research* 44 (4):723-36.
- Baumgartner, Michael, and Alrik Thiem. 2015. Identifying complex causal dependencies in configurational data with Coincidence Analysis." *The R Journal* 7 (1).

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4 Detailed Seminar Schedule

Day 1: Monday, 26 September 2016
The first module of the seminar introduces the basic objectives and designs of theories of causation, discusses various theory candidates, and presents the elements of Boolean algebra implemented by QCA and CNA. Module 1.2 then displays the details of the regularity theory of causation behind configurational methods and tracks its historical predecessors in the works of David Hume, John Stuart Mill, and John L. Mackie. In module 1.3 we turn to the problem of discovering causation as defined by modern regularity theories. We review Mill's famous method of difference, consider the problems of causal inference under epistemic uncertainty and of data confounding, and pinpoint the background assumptions required by configurational methods. Finally, module 1.4 introduces the basic procedural ideas that regulate QCA's inference from configurational data via truth tables to minimized Boolean functions (solutions formulas) and their causal interpretation. In particular, we present the details of QCA's algorithmic core: Quine-McCluskey optimization. ✍

Day 2: Tuesday, 27 September 2016
Day 2 begins with a short introduction to the R environment and its basic functionality in modules 2.1 and 2.2. In module 2.3, participants recap the material from module 1.4 by performing their first crisp-set QCA in an ideal data context from beginning to end with the QCApro package for R. Important differences between the QCApro package and popular QCA software like fs/QCA and Tosmana are also highlighted. Module 2.4 then introduces measures of fit in QCA for evaluating certain data deficiencies that are ubiquitous in applied research configurational data. In this connection, students learn about the consistency and coverage measures, and limited empirical diversity—the fact that certain cases which could theoretically exist are absent in the data. ✍

Day 3: Wednesday, 28 September 2016
Much of the methodological literature of the past years has focused on the problem

of limited empirical diversity, and how to deal with it. As a direct result, three solution types are now in use with QCA. Module 3.1 presents the logic of these three different solution types, and explains why only one of them, namely the parsimonious solution, is correct. Since about the early 2000s, QCA has also become a family of different variants that are defined by their underlying set type. Crisp-set QCA has at its root bivalent factors whose levels underlie sets in which cases can only be members or not. Both multi-value and fuzzy-set QCA extend crisp-set QCA in different directions, the former on the dimension of the number of levels a factor can have, and the latter on the dimension of the degree to which cases can be elements in the respective set formed by each level of a bivalent factor. In module 3.2, students learn about multi-value QCA, how it relates to crisp-set QCA, and why it still leads a niche existence in both methodological and applied research. Fuzzy logic and fuzzy-set QCA is the topic of modules 3.3 and 3.4. Just as on day 2, day 3 is structured around alternating theoretical and practical slots in which students directly apply the theoretical material in computer exercises. ☜

Day 4: Thursday, 29 September 2016

Critiques of QCA are the core topic of day 4. In module 4.1, a closer look is first taken at the issue of model ambiguities, a problem that has gone unnoticed in the QCA literature until very recently, with serious consequences for applied research. We show why and how this problem occurs, to which extent it affects applied research, and what can be done to alleviate it. In module 4.2, we confront prominent studies which have argued, for various reasons, that QCA is useless. We demonstrate why these studies lack methodological traction. To what extent QCA is integrated and combined in mixed/multi-method research with regression analysis and process tracing is discussed in module 4.3. The last module on day 4 prepares students for day 5. In module 4.4, we demonstrate that the restriction of QCA to single outcomes presupposes that there are no causal dependencies among the exogenous factors. ☜

Day 5: Friday, 30 September 2016

The aim of the final day is to pave a way for overcoming QCA's restriction to single-outcome structures. After all, causes of ultimate outcomes being linked in chains or causes having multiple parallel outcomes are very frequent in the world we live in. To uncover such structures, day 5 introduces Coincidence Analysis (CNA). Module 5.1 presents the algorithmic protocol of CNA, reviews its theoretical foundation, and introduces complex solutions formulas. In module 5.2, we highlight the differences and commonalities of QCA and CNA: both methods analyze the same type of data and have the same search targets, but while QCA implements Quine-McCluskey optimization, CNA draws on its own custom-built optimization routine, which does not force CNA to make recourse to counterfactual reasoning in cases of limited diversity and does not require an outcome specification as input. Module 5.3 is then devoted to acquiring familiarity with the cna package for R and to giving students the opportunity to explore possibilities of making use of CNA in their own research. The seminar ends with module 5.4 presenting the causal chain problem, in virtue of which to every causal chain there exists a common cause model that is empirically indistinguishable from the chain. That means the inference to causal chains is systematically underdetermined by empirical data. ☜

5 Prerequisite Knowledge

Formally, the course requires no prior knowledge of configurational methods, but it will be intensive for absolute beginners. Users with an intermediate to advanced knowledge of QCA as taught in standard textbooks and methods courses will learn much they did not know before. Participants at all levels of knowledge will benefit from the instructors' current research, a significant part of which will be broached during the course. Some basic knowledge of R, or at least programming more generally, will be helpful but it is not essential.

6 Date and Venue

26-30 September, 2016; University of Konstanz, Germany. Days 1 and 2 will take place in room D247, days 3 to 5 in room E403. For a map of the University of Konstanz see: `http://www.profil.uni-konstanz.de/en/contact-address/map/`

7 Fees

For students that are not enrolled at the University of Konstanz, a course fee of €300 will be charged.

8 Registration

To register for the workshop, please send an e-mail to alrik.thiem@unige.ch. Please indicate your home institution, your position, and whether you have some experience with QCA or CNA. Registrations will close on 31 August or once all places are filled.

9 Language of Instruction

The language of instruction is English.

10 ECTS Points

Participants can obtain 4 ECTS points if they submit a short research paper (2000-3000 words) within four weeks after the end of the course. It lies with participants to enquire at their home institution whether ECTS points earned at this workshop will be accepted. To participants who do not want to earn credits, a certificate of attendance will be issued at the end of the workshop. To participants who would like to earn credits, this certificate will be issued after successful completion of all course requirements.