

Beginners' Introduction to Configurational Causal Data Analysis

21-23 September 2020, Regenstrief Institute, held online via Zoom
(followed by regular online exercises over a period of five weeks)

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1 Workshop Description

This workshop offers an intensive 3-day introduction for health researchers to causal modeling with the configurational comparative methods *Qualitative Comparative Analysis* (QCA), *Coincidence Analysis* (CNA), and *Combinational Regularity Analysis* (CORA). Michael Baumgartner and Alrik Thiem will guide participants through the nuts and bolts of configurational data analysis as well as cutting-edge methodological innovations. In replicating published studies from various areas of the health sciences, they will also demonstrate how to make the most of current software for QCA, CNA, and CORA.

From the philosophical roots of regularity theories of causation, over different search strategies, optimization algorithms, and measures of fit to multi-outcome structures and model ambiguities, this introduction will go beyond the material taught in other courses, enabling participants to conduct configurational data analyses themselves and review those of other researchers in a sophisticated manner. For example, it will be shown how to interpret configurational models correctly, why the vast majority of QCA studies have run the risk of failing to find the underlying causal model, why a bottom-up search is more successful than a top-down search in correctly analyzing data with errors, how to analyze multi-outcome structures, what to do about

model ambiguities, and why two of QCA’s three solution types introduce artificial data through the backdoor.

After the workshop, the instructors will remain available for consultation to help participants with the methodological aspects of their research projects. Moreover, the workshop will be accompanied by a series of online exercise sessions over a time-span of 5 weeks, led by Deborah Cragun and Edward Miech.

2 Workshop Schedule

<i>Day</i>	<i>Module and Topic(s) Covered</i>
<i>Day 1; Monday, 21 September 2020</i>	
10:00 - 10:30	Intro: Why CCMs in Health Services Research?
10:30 - 11:30	Module 1.1: Methodological Landscape and the Essentials of Boolean Algebra
11:30 - 11:45	Break
11:45 - 12:45	Module 1.2: Causation
12:45 - 13:30	Lunch Break
13:30 - 14:30	Module 1.3: The General Principles of Configurational Causal Discovery
14:30 - 14:45	Break
14:45 - 15:45	Module 1.4: Search Strategies, Model Interpretation and Evaluation

Essential readings

- Baumgartner, Michael. 2020. “Causation.” In: *The SAGE Handbook of Political Science*, ed. by D. Berg-Schlosser, B. Badie, and L. Morlino, London: SAGE, pp. 305-321. (brief overview of theories of causation intended for political scientists)
- Mackie, John L. 1965. “Causes and conditions.” *American Philosophical Quarterly* 2 (4):245-64. (central piece on the INUS theory of causation)
- McCluskey, Edward J. 1965. *Introduction to the Theory of Switching Circuits*. Princeton: Princeton University Press, pp.97-104. (intro to Boolean algebra)
- 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. (central piece about methods of causal inference)
- Thiem, Alrik, Michael Baumgartner, and Damien Bol. 2016. “Still lost in translation! A correction of three misunderstandings between configurational comparativists and regressional analysts.” *Comparative Political Studies* 49 (6):742-74. (piece addressing the continuing debate in the social sciences about configurational methods and regression analysis)

Supplementary readings

- 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 and Christoph Falk. 2019. "Boolean difference-making: A modern regularity theory of causation." *The British Journal for the Philosophy of Science*. doi: 10.1093/bjps/axz047.
- Quine, Willard V. 1952. "The problem of simplifying truth functions." *American Mathematical Monthly* 59 (8):521-31. (only read until Theorem 6).

Day 2; Tuesday, 22 September 2020

10:00 - 11:00	Module 2.1: Data Types and Calibration
11:00 - 11:15	Break
11:15 - 12:15	Module 2.2: Measures of Fit
12:15 - 13:15	Lunch Break
13:15 - 14:15	Module 2.3: Top-down Search: QCA
14:15 - 14:30	Break
14:30 - 15:30	Module 2.4: Replication Session (including a short introduction to R)

Essential readings

- McCluskey, Edward J. 1956. "Minimization of Boolean functions." *Bell Systems Technical Journal* 35 (6):1417-44. (only read pages 1417-28). (central piece introducing core ideas of Quine-McCluskey algorithm)
- Ragin, Charles C. 1987. *The comparative method: Moving beyond qualitative and quantitative strategies*. Berkeley: University of California Press, pp. 85-118. (chapters on central technical concepts of QCA)
- Ragin, Charles C. 2006. "Set relations in social research: Evaluating their consistency and coverage." *Political Analysis* 14 (3):291-310. (introduction of consistency and coverage as measures of fit to QCA)
- Thiem, Alrik. 2017. "Conducting configurational comparative research with Qualitative Comparative Analysis: A hands-on tutorial for applied evaluation scholars and practitioners." *American Journal of Evaluation* 38 (3):420-33. (tutorial on QCA replicating study on tumor screening)
- Thiem, Alrik, and Adrian Duşa. 2013. *Qualitative Comparative Analysis with R: A User's Guide*. New York: Springer, pp.51-62 (chapter on calibration of fuzzy sets).

Supplementary readings

- Ragin, Charles C. 2008. *Redesigning social inquiry: Fuzzy sets and beyond*. Chicago: University of Chicago Press, pp. 147-175.
- 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.
- 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. 93-104; 151-177; 255-263.
- Thiem, Alrik. 2013. "Clearly crisp, and not fuzzy: A reassessment of the (putative) pitfalls of multi-value QCA." *Field Methods* 25 (2):197-207.
- Thiem, Alrik. 2014. "Unifying Configurational Comparative Methods: Generalized-set Qualitative Comparative Analysis." *Sociological Methods & Research* 43 (2):313-37.

Day 3; Wednesday, 23 September 2020

10:00 - 11:00	Module 3.1: Bottom-up Search: CNA
11:00 - 11:15	Break
11:15 - 12:15	Module 3.2: Replication Session (including a closer look at model ambiguities)
12:15 - 13:00	Lunch Break
13:00 - 14:00	Module 3.3: Combinational Regularity Analysis (CORA)
14:00 - 14:15	Break
14:15 - 15:15	Module 3.4: Replication Session
15:15 - 15:45	Extro: Revisiting 'Why CCMs in Health Services Research?'

Essential readings

- Baumgartner, Michael, and Matthias Ambühl. 2020. "**cna**: An R Package for Configurational Causal Inference and Modeling. *R package vignette*, package version 3.0. url: <https://cran.r-project.org/package=cna>. (software for CNA)
- Thiem, Alrik, Lusine Mkrtchyan and Zuzana Sebechlebská. 2020. *Uncovering complex causation with Combinational Regularity Analysis (CORA)*. Manuscript. (manuscript introducing CORA)
- Whitaker, Rebecca, Nina Sperber, Michael Baumgartner, Alrik Thiem, Deborah Cragun, Laura Damschroder, Edward J. Miech, Alecia Slade, and Sarah A. Birken. 2020. *Coincidence Analysis: A new method for causal inference in implementation science*. Manuscript. DOI: 10.21203/rs.3.rs-58815/v1. (demonstration of CNA in context of implementation science)

Supplementary readings

- Baumgartner, Michael, and Mathias Ambühl. 2020. "Causal modeling with multi-value and fuzzy-set Coincidence Analysis." *Political Science Research and Methods* 8 (3):526-42.
 - Baumgartner, Michael, and Alrik Thiem. 2017. "Model ambiguities in configurational comparative research." *Sociological Methods & Research* 46 (4):954-87.
 - Dy, Sidney, et al. 2020. "Association of Implementation and Social Network Factors With Patient Safety Culture in Medical Homes. A Coincidence Analysis." *Journal of Patient Safety*. doi: 10.1097/PTS.0000000000000752.
 - Haesebrouck, Tim. 2019. "Who follows whom? A coincidence analysis of military action, public opinion and threats." *Journal of Peace Research* 56(6): 753-766.
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