Introduction to Causal Data Analysis and Modeling with Coincidence Analysis

30 May – 2 June, 2022, Grand Hotel Terminus, Bergen Norway

main instructor:

Michael Baumgartner, University of Bergen, Norway

additional presentations by:

Deborah Cragun, University of South Florida, USA

Edward Miech, Regenstrief Institute, USA

Veli-Pekka Parkkinen, University of Bergen, Norway

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Workshop Description

This workshop offers an intensive 4-day introduction to causal modeling with Coincidence Analysis (CNA), a relatively new configurational comparative method of data analysis geared towards causal complexity, which has seen a considerable uptick in applications in recent years (click here for references). **No prior knowledge of CNA is required.**

In plenary lectures, the main developer of CNA, Michael Baumgartner, and a team of experienced CNA methodologists and practitioners will guide participants through the nuts and bolts of configurational data analysis and cutting-edge methodological innovations, as well as offer advice on practical issues such as getting funded and published with CNA. In smaller practice groups, the understanding of the material will be deepened through exercises and the instructors will demonstrate how to make the most of current software for CNA.

From Boolean algebra and the philosophical roots of regularity theories of causation, over the basic ideas behind CNA's search algorithm, and measures of fit to multi-outcome structures, model ambiguities, and robustness analyses this introduction will enable participants to conduct CNA analyses themselves and review those of other researchers in a sophisticated manner.

In addition, this will be an opportunity to get to know researchers working with and on CNA from all over the world. There will be social activities around the city of Bergen, which is particularly beautiful at this time of the year.

On the two days after the workshop (i.e. June 3-4), there will be a **conference on CNA** at the same venue in Bergen. Participants of the training workshop will be invited to attend that conference as well. More information about the conference can be found here. Moreover, the instructors will remain available for consultation after the event to help participants with the methodological and practical aspects of their research projects.

Participation, Registration, Tuition

Registration is now open here:

> https://form.app.uib.no/CNA2022

There will be a course fee of NOK 5400, which is approximately €540 or $610. We can offer a certain amount of tuition scholarships to people without sufficient institutional funding (grad students, post-docs, etc.) and we have special arrangements for participants from Norwegian universities. If you are interested in a scholarship or have an affiliation with a Norwegian university, write to michael.baumgartner@uib.no for more information.

After successful completion of the course, we can provide participation certificates to those interested, stating, among other things, that the course is worth 5 ECTS points.

Space is limited. There will be a waiting list, once all enrolment slots are reserved. For questions, please, write to michael.baumgartner@uib.no.

Workshop Schedule

Day	Module and Topics Covered
Day 1; Monday, 30 May 2022	
09:00 - 09:15	**Welcome**
09:15 - 10:30	**Module 1.1:** Methodological Landscape and the Essentials of Boolean Algebra
10:30 - 10:45	Break
10:45 - 12:15	**Module 1.2:** Theories of Causation
12:15 - 13:30	Lunch Break
13:30 - 15:00	**Module 1.3:** The General Principles of Configurational Causal Discovery
15:00 - 15:15	Break
15:15 - 16:45	**Module 1.4:** Top-down vs. Bottom-up Search / the CNA algorithm
17:00 - 18:00	**Optional Session** (De Souter/Parkkinen/Swiatczak): Introduction to R for those new to R
19:00	Workshop Dinner at Hotel Terminus (included in the course fee)

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)

- 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. (introduction of the CNA algorithm)

- Mackie, John L. 1965. "Causes and conditions." *American Philosophical Quarterly* 2 (4):245-64. (central piece on the INUS theory of causation)

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. (historical background)

- 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. (technical introduction to the theory of causation behind CNA)

- 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)

- Ragin, Charles C. 1987. *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies.* Berkeley: University of California Press. (first and still very readable introduction of QCA)

Day 2; Tuesday, 31 May 2022

09:00 - 10:30	**Module 2.1** (Swiatczak): Data Types and Calibration
10:30 - 10:45	Break
10:45 - 11:30	**Module 2.2a:** Measures of Fit
11:30 - 12:15	**Module 2.2b:** (Miech): Factor Selection
12:15 - 13:30	Lunch Break
13:30 - 14:30	**Module 2.3:** Introduction to the CNA R package
14:30 - 14:45	Break
14:45 - 16:45	**Module 2.4:** Group Work: Exercises
16:45 - 17:00	Break
17:00 - 18:00	**Consultation Session:** The instructors are available for individual consultation (use sign up sheets)

Essential readings

- Baumgartner, Michael, and Mathias Ambühl. 2021. "**cna:** An R package for configurational causal inference and modeling." R package vignette: The Comprehensive R Archive Network. Package version 3.3. https://cran.r-project.org/web/packages/cna/vignettes/cna.pdf. (introduction to the CNA R package)

- Oana, Ioana-Elena, Carsten Schneider, and Eva Thomann. 2021. *Qualitative Comparative Analysis using R: A Beginner's Guide.* Cambridge: Cambridge University Press, Chapter 2 (chapter on calibration).

Supplementary readings

- 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)

- Swiatczak, Martyna. 2021. "Towards a neo-configurational theory of intrinsic motivation." *Motivation and Emotion.* doi: 10.1007/s11031-021-09906-1 (calibration in practice)

- Thiem, Alrik, and Adrian Dușa. 2013. *Qualitative Comparative Analysis with R: A User's Guide.* New York: Springer, pp. 51-62 (chapter on calibration of fuzzy sets).

- Yakovchenko, Vera, Edward Miech, et al., and Shari Rogal. 2020. "Strategy configurations directly linked to higher Hepatitis C virus treatment starts. An applied use of configurational comparative methods, *Medical Care* 58(5), pp. e31-e38, doi: 10.1097/MLR.0000000000001319. (factor selection in practice)

Day 3; Wednesday, 1 June 2022	
09:00 - 10:30	**Module 3.1:** Model Ambiguities
10:30 - 10:45	Break
10:45 - 12:15	**Module 3.2:** (Parkkinen): Benchmarking and Overfitting
12:15 - 13:15	Lunch Break
13:15 - 14:45	**Module 3.3** (Parkkinen): Robustness
14:45 - 15:00	Break
15:00 - 16:30	**Module 3.4:** Group Work: Exercises
17:00 - 19:00	**Field Trip:** Hike to Fløyen

Essential readings

- Baumgartner, Michael, and Alrik Thiem. 2017. "Model ambiguities in configurational comparative research." *Sociological Methods & Research* 46 (4):954-87. (discussion of the problem of model ambiguities)

- Parkkinen, Veli-Pekka, and Michael Baumgartner. 2021. "Robustness and model selection in configurational causal modeling." *Sociological Methods & Research.* doi: 10.1177/0049124120986 200. (introduction to robustness analysis with CNA)

Supplementary readings

- Arel-Bundock, Vincent. 2019. "The double bind of Qualitative Comparative Analysis." *Sociological Methods & Research.* doi: 10.1177/0049124119882460. (discussion of the problem of overfitting)

- Dy, Sidney, Ryan Acton, et al., and Sarah Hudson. 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. (exemplary CNA application)

- Haesebrouck, Tim. 2019. "Who follows whom? A Coincidence Analysis of military action, public opinion and threats." *Journal of Peace Research* 56(6): 753-766. (exemplary CNA application)

09:00 - 10:30	**Module 4.1:** Group Work: Exercises
10:30 - 10:45	Break
10:45 - 12:15	Parallel Session: **Module 4.2:** (Swiatczak): CNA and Related Methods: QCA / **Consultation Session:** Individual consultation (use sign up sheets)
12:15 - 13:30	Lunch Break
13:30 - 15:00	**Module 4.3:** CNA and Related Methods: Logic Regression
15:00 - 15:15	Break
15:15 - 16:45	**Module 4.4:** (Miech/Cragun): Getting Funded and Published with CNA
16:45 - 17:00	**Closing**

Essential readings

- Baumgartner, Michael and Christoph Falk. 2021. "Configurational causal modeling and Logic Regression." *Multivariate Behavioral Research.* doi: 10.1080/00273171.2021.1971510. (comparison of CNA and Logic Regression)

- Swiatczak, Martyna 2021. "Different algorithms, different models." *Quality & Quantity.* doi: 10.1007/s11135-021-01193-9. (comparison of CNA and QCA)

Supplementary readings

- Ragin, Charles C. 2008. *Redesigning Social Inquiry: Fuzzy Sets and Beyond.* Chicago: University of Chicago Press, pp. 147-175. (introduction to fuzzy-set QCA)

- 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. (introduction to crisp-set QCA)

- Ruczinski, Ingo, Charles Kooperberg, and M. LeBlanc. 2003. "Logic regression." *Journal of Computational and Graphical Statistics*, 12(3), 475–511. doi: 10.1198/1061860032238. (introduction of Logic Regression)

- Swiatczak, Martyna. 2021. "Towards a neo-configurational theory of intrinsic motivation." *Motivation and Emotion.* doi: 10.1007/s11031-021-09906-1 (example study for replication)

- Thiem, Alrik. 2016. "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. (concise introduction to QCA)