University of Technology Chemnitz
Faculty for Behavioural and Social Research
Institute of Sociology

Programme

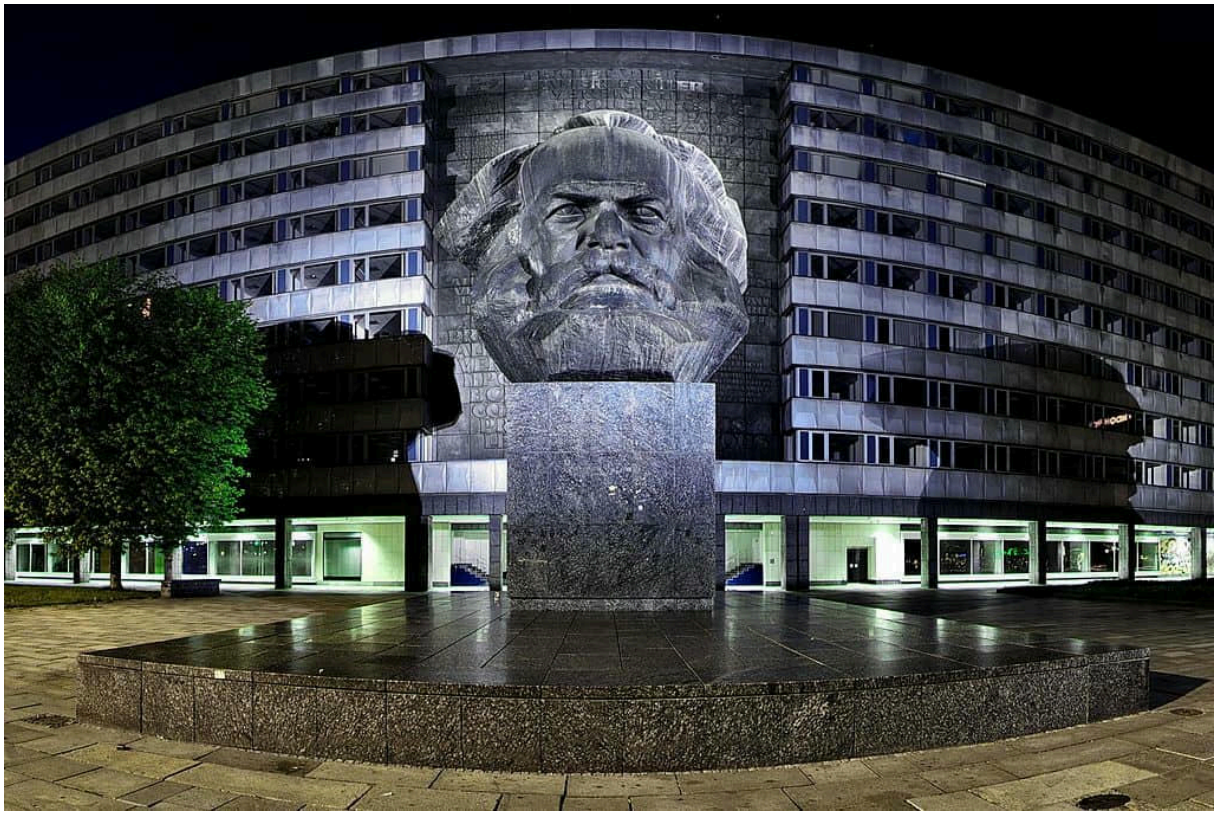
2025 Meeting of the Structural Equation Modeling Working Group

Location:	University of Technology Chemnitz
Date:	20–21 March 2025
Pre-Conference Workshop:	19 March 2025
Organizers:	Prof. Dr. Jochen Mayerl & Dr. Henrik Andersen Institute of Sociology Professorship for Empirical Social Research

2025/01/14

1 | Conference Format and Venue

The meeting will take place in person from 19–21 March, 2025 at the University of Technology Chemnitz. Chemnitz is the third largest city in the state of Saxony and the University of Technology Chemnitz is third largest university in the state, as well. The university consists of eight faculties and has around 8,600 students.



The city of Chemnitz is the 2025 European Capital of Culture. There are more than 1,000 events planned for the year to highlight Chemnitz and the surrounding areas' unique traditions and cultures. Have a look at the Chemnitz 2025 programme and consider staying an extra day or two to enjoy the festivities!

The Meeting of the SEM Working Group will take place at the Reichenhainer Straße Campus in the **"Orangerie"** building, just across the street from the cafeteria.

University of Technology Chemnitz
Reichenhainer-Str.
Zentrales Hörsaal- und Seminargebäude,
C10 (Orangerie)
09126 Chemnitz

2 | Local Organizers

The 2025 Meeting of the SEM Working Group is being organized by Prof. Jochen Mayerl and Dr. Henrik Andersen, both from the Professorship for Empirical Social Research, Institute of Sociology, Faculty of Behavioural and Social Research.

3 | Sponsor

We thank the **Akademie für Soziologie** for helping to fund this event.

4 | Pre-Conference Workshop and Keynote Speakers

A Pre-Conference Workshop to be held on 19 March by **Prof. Yves Rosseel** (Ghent University) on the Structural After Measurements (SAM) approach to Structural Equation Modeling using `lavaan`. Further details about the pre-conference workshop will follow.

Keynote addresses will be given by **Prof. Bart Meuleman** (KU Leuven) and **Prof. Jost Reinecke** (Bielefeld University) together with **Prof. Peter Schmidt** (University of Giessen).

5 | Accomodation

We have reserved a contingent of rooms for the meeting at the 4-star **SEASIDE RESIDENZ HOTEL**. When booking a room, please **use the code `SEM`**.

Seaside Residenz Hotel Chemnitz
Bernsdorfer Str. 2
09126 Chemnitz

The hotel is located about 1.5 km from the campus. It is walkable in about 15 minutes and a tram stop is located directly in front of the hotel. A tram arrives every 10 minutes and stops directly at the campus in front of the Orangerie (3 stops, approx. 5 minutes).

6 | Conference Dinner

The conference dinner will take place on March 20 at **Ratsstube zu Chemnitz** at 7:00 pm. The restaurant is in the city center, located approximately 2.5 km from the campus and about 1 km away from the Seaside Residenz Hotel.

Ratsstube Chemnitz
Johannisplatz 1
09111 Chemnitz

The conference dinner will be à la carte. Attendees are kindly asked to pay individually.

7 | Fees

There is *no conference fee*. Participation in the meeting is *free* to both active and passive participants.

8 | Contact

For questions or concerns, please feel free to contact local organizer Henrik Andersen at henrik.andersen@soziologie.tu-chemnitz.de.

9 | Schedule

Wednesday, March 19

The pre-conference workshop will be held in the Orangerie building, room C10 NK004.

Time	Author(s) and Title
14:00–17:00	*Prof. Yves Rosseel* **Pre-conference workshop**: The Structural After Measurement (SAM) Approach to Structural Equation Modeling

Thursday, March 20

Normal sessions are held in the Orangerie building, room C10 NK004.

Time		Author(s) and Title
09:30–10:15		Registration
10:15–10:30		Welcome address
10:30–11:15	01	*Jost Reinecke & Peter Schmidt* **Keynote**
11:15–12:00	02	*Bart Meuleman* **Keynote**
12:00–13:15		Lunch at the Mensa
Session 1 13:15–15:00	03	*Pascal Kolkwitz-Anstötz, Marcus Eisentraut, Christian Czymara, Eldad Davidov, & Peter Schmidt* Classical and Israel-Related Antisemitism: Prevalence and Correlates among Muslim and Non-Muslim Groups in Germany
	04	*Henrik Andersen, Deliah Wagner, Jochen Mayerl, & Frank Asbrock* Testing the Causal Effect of Victimization on Fear of Crime: A Latent Differences-in-Differences Approach
	05	*Claas Pollmanns* Utilizing Structural Equation Modeling for Analyzing Experimental Designs: A Study on the Relationship between Political Ideology and AI Technology Acceptance
	06	*Volker Lang, Martin Groß, & Stephanie Jütersonke* Differences in identification with (right wing-)populist parties between Eastern and Western German federal states: An explanation based on social identity threats
	07	*Moritz Ketzer* Bridging the Gap: Translating Common Multi-Level Path Diagrams into Directed Acyclic Graphs for Advanced Causal Inference
15:00–15:30		Coffee break
Session 2 15:30–17:00	08	*Emily Fuchs, Florian Schuberth, & Jörg Henseler* Specifying and testing differences between variables in structural equation modeling using the H-O specification
	09	*Tomasz Żółtak & Grzegorz Humenny* Vulnerability of various estimators to model misspecification regarding correlations of predictors in path models involving interaction term
	10	Julien Irmer Power Up Your Nonlinear SEM Analysis: Model-Implied Simulation-

		Based Power Estimation with powerNLSEM using Asymptotic Normality
	11	*Yves Rosseel* The Structural-after-Measurement (SAM) approach: updates and extensions
17:00–17:30		Meeting of the SEM Working Group
19:00		**Conference dinner** at Ratsstube Chemnitz

Friday, March 21

Normal sessions are held in the Orangerie building, room C10 NK004.

Time		**Author(s) and Title**
Session 3 09:00–10:30	12	*Daniel Gloris* Climate change threat and social conflict: an inevitable relationship? Evidence from a preregistered survey experiment
	13	*Klara Steinmetz, Claas Pollmanns, & Sarah Buhl* The Influence of Deepfakes in the US election campaign: A panel study
	14	*Wolfgang Aschauer, Christopher Etter, Florian Nemetz, Knut Petzold, & Patrick Kutschar* Attitudes towards virtual healthcare assistants in the D-A-CH region: Exploring social determinants by using higher order factor structural equation modelling
	15	*Britta Maskow & Jochen Mayerl* Cross-validation of the Subjectivisation of Labour Scale using Confirmatory Factor Analysis and Differential Item Functioning Analysis
10:30–11:00		Coffee break
Session 4 11:00–12:30	16	*Oliver Arránz Becker* Measurement Invariance of an instrument for social cohesion
	17	*Pit Rieger* A Novel Method for Detecting Non-invariant Items in Confirmatory Factor Analysis
	18	*Tamara Schamberger, Florian Schuberth, & Jörg Henseler* The Measured Latent Method Construct Approach to Control for Common Method Variance
	19	*Edita Chvojka, Elizabeth M. Grandfield, & Rens van de Schoot* New insights into the behaviour of fit indices in Longitudinal Structural Equation Modeling
12:30–13:30		Lunch at the Mensa

Session 5 13:30–15:00	20	*Jason John Berger, Martin Kukuk, Jörg Henseler, & Florian Schuberth* Using the delta-method for calculating the standard errors in partial least squares path modelling
	21	*Christian Bloszies* Assessing Heterogeneity of Correlation Matrices in Misspecified Meta-Analytic Structural Equation Models
	22	*Jörg Henseler, Florian Schuberth, Xi Yu, Tamara Schamberger, & Gregory R. Hancock* Novel approaches to incorporate composites in structural equation modeling
	23	*Dominik Becker* Emergence and related concepts of ontological dependence in measurement theory
15:00–15:30		Coffee break
Session 6 15:30–17:00	24	*Marc Vidal & Yves Rosseel* Towards a structural after measurement model for functional data
	25	*Madelin Jauregui, Haiyan Liu, & Sarah Depaoli* A Data-drive Approach to Estimate the Optimal Structure of Mixture Models in the Structural Equation Modeling Framework: The Reversible Jump Markov Chain Monte Carlo
	26	*Laura Trinchera, Gloria Pietropolli, Mauro Castelli, & Florian Schuberth* Automated Specification Search for Composite-Based SEM
	27	*Artur Pokropek* Confirmatory Factor Analysis with Word Embeddings: Measurement Models for Textual Big Data
17:00		Closing and farewell

10 | Abstracts

Classical and Israel-Related Antisemitism: Prevalence and Correlates among Muslim and Non-Muslim Groups in Germany

Pascal Kolkwitz-Anstötz[1], Marcus Eisentraut[2], Christian Czymara[3], Eldad Davidov[2], Peter Schmidt[4,5]

[1] GESIS - Leibniz-Institut für Sozialwissenschaften
[2] University of Cologne
[3] Goethe University Frankfurt
[4] University of Giessen
[5] University of Mainz

Antisemitism manifests itself in various forms, with two being particularly significant: classical and Israel-related antisemitism. Classical antisemitism is rooted in history, driven by religious or racial prejudices and portrays Jews through negative stereotypes. In contrast, Israel-related antisemitism is a more modern phenomenon, focusing on the state of Israel, often demonizing and delegitimizing it, and applying double standards when comparing Israel to other nations. The distinction between legitimate criticism of Israel and Israel-related antisemitism is often blurred, making it a topic of debate in both research and public discourse. Additionally, the empirical differentiation between classical and Israel-related antisemitism remains unclear. The recent rise in antisemitic incidents linked to Muslim communities in Germany following the October 7th massacre underscores the need for a more nuanced understanding of these dimensions.

This paper explores whether classical and Israel-related antisemitism are similarly prevalent among Muslim and non-Muslim groups in Germany and examines the potential influence of migration backgrounds on these views. Using data from the “Selected Groups of Migrants in Germany” survey (RAM 2015) conducted by the Federal Office for Migration and Refugees (BAMF), this study analyzes the prevalence and association between different forms of antisemitism across various religious denominations and migration backgrounds. The data focuses on major immigrant groups whose countries of origin have different socio-cultural contexts regarding antisemitism.

Using confirmatory factor analysis, our findings reveal that classical and Israel-related antisemitism, especially among Muslims in Germany, are empirically difficult to separate, suggesting that Israel-related antisemitism may be a modern variant of classical antisemitism. However, criticism of Israel can still be distinguished from the two empirically, though it remains highly correlated with antisemitism. Additionally, people of Turkish origin, those of Muslim faith, and particularly those with strong religious beliefs, display the highest levels of both classical and Israel-related antisemitism.

Testing the Causal Effect of Victimization on Fear of Crime: A Latent Differences-in-Differences Approach

Henrik Andersen[1], Deliah Wagner[2], Jochen Mayerl[1], Frank Asbrock[1,2]

[1] University of Technology Chemnitz
[2] Center for Criminological Research Saxony

The relationship between victimization and fear of crime is well-documented, but establishing a causal link has remained a challenge due to the complexity of psychological processes and the presence of unobserved confounders. This study addresses these challenges by employing a latent differences-in-differences (DiD) approach within the structural equation modeling (SEM) framework, offering a rigorous test of the so-called victimization hypothesis. Using longitudinal panel data from a representative sample of the German population (Wagner et al., 2024), we examine how personal experiences of street crime (burglary, robbery, and assault) influence fear of crime over time. By modeling fear of crime as a latent construct, this approach controls for both measurement error and unobserved time-invariant confounders, enhancing the precision of the causal estimates.

Our findings indicate that individuals who became victims of crime exhibit a significant increase in fear of crime, with a latent mean difference exceeding one scale point on a seven-point scale. Measurement invariance tests confirm that the construct is stable across time points, ensuring that observed changes reflect real psychological shifts rather than measurement artifacts.

This study not only advances the application of SEM in causal analysis but also contributes to criminological theory by empirically validating the victimization hypothesis at the individual level. The latent DiD approach offers a powerful tool for disentangling complex social phenomena, providing a model for future research on longitudinal data with latent constructs.

Utilizing Structural Equation Modeling for Analyzing Experimental Designs: A Study on the Relationship between Political Ideology and AI Technology Acceptance

Claas Pollmanns[1]

[1] University of Technology Chemnitz

While Structural Equation Modeling (SEM) has become a popular analytical framework in non-experimental research, its application to experimental designs remains relatively underexplored despite early contributions (Bagozzi et al., 1991; Bagozzi & Yi, 1989; but see: Köchling et al., 2024). Traditional approaches like ANOVA are more commonly used, despite SEM offering greater flexibility and precision—particularly for modeling complex relationships, such as mediations, which can be critical to explain effects in studies that use multiple experimental groups. Breitsohl (2019) has made one of the few recent contributions to applying SEM in experimental designs, proposing several methodological frameworks that enable researchers to capitalize on SEM's advantages for this purpose.

In this presentation, I apply and expand this SEM approach to a vignette experiment examining the acceptance of different AI technologies, expanding it by mediation analysis. I will explore the relationships between political ideologies—Right-Wing Authoritarianism (RWA) and Social Dominance Orientation (SDO)—and attitudes towards different AI Domains, using personal values serving as the mediating variables. The different experimental groups will be treated by applying multigroup comparison. I will demonstrate both the benefits and challenges of applying SEM to these experimental data.

The findings will underscore the utility of SEM for experimental researchers, offering guidance on selecting the appropriate model and overcoming common pitfalls. My results

offer practical implications for the broader application of SEM in experimental research, making a strong case for its increased adoption.

Differences in identification with (right wing-)populist parties between Eastern and Western German federal states: An explanation based on social identity threats

Volker Lang[1], Martin Groß[1], Stephanie Jütersonke[1]

[1] University of Tübingen

Why does a much higher share of citizen support (right wing-)populist parties in Eastern compared to Western federal states of Germany? Current explanations focus on more profound socio-eco-nomic and cultural changes during the aftermath of German reunification in the East compared to the West which weaken perceived political efficacy and foster a stronger feeling of anomia (so called transformation fatigue) in the East (Mau et al., 2023). In turn, lower efficacy and more trans-formation fatigue lead to populist and xenophobic attitudes as well as support for populist parties.

In this study we extend and tie back this explanatory framework with the threatened identities-thesis (Babst et al., 2024). In short, based on social identity theory we presume that actors strive for a positive evaluation of the social categories they belong to, and such a positive evaluation mainly depends on the social recognition these categories receive from others in interactions. (Macro-)social changes call into question consolidated social identities on the micro-level which can lead to strongly emotional resistance, stir up social conflicts and foster support for alternative – populist – political offers (Fukuyama, 2019).

In line with this expectation, our research so far shows that measures of perceived social recognition are highly predictive of populist attitudes as well as of the other factors involved in the ex-planation of populist party support described above (subjective status, efficacy, anomia, and xenophobia). This pattern is especially clear with respect to (social) class recognition. However, it also holds for the influence of perceived recognition for an East German identity.

Regarding analyses, we use multinomial SEMs to assess in how far the threatened identities-the-sis is able to a) explain differences in identification with (right wing-)populist parties between Eastern and Western German federal states and b) supplement current attempts to explain these differences. Our analyses are based on an online survey of an offline recruited sample (n ≈ 3,000) which is representative of the adult population of Germany and contains multi-item measures of all the indicators involved in the explanation as well as a large set of socio-demographic controls. The survey was conducted with a planned missing data design. Full information maximum likelihood (FIML) estimation is used with the SEMs to handle the (planned) missing data.

Climate change threat and social conflict: an inevitable relationship? Evidence from a preregistered survey experiment

Daniel Gloris[1]

[1] Technische Universität Dortmund

Climate change is not only a highly intractable technical problem, but also an urgent sociopolitical challenge. As political intolerance and authoritarian aggression are both potent

threats to democratic polities, it is important to study the relationships with environmental attitudes and behaviors. Previous research has shown that (experimental) climate change threat leads to higher levels of intergroup threat, outgroup derogation, modern racism, ethnocentrism and authoritarian attitudes. However, the existing research does not address the question of whether climate change threat can also contribute to the emergence of political intolerance. Conversely, research has demonstrated that experimentally induced climate change threat has an effect on climate change mitigation behavior. In addition, threat can be expected to increase environmental protest intentions, leading to less political intolerance. It is therefore important to study these two different defense strategies in response to threatening climate change information. This is particularly crucial in the context of the growing urgency of the climate crisis. The objective of this paper is to empirically examine the effects of climate change threat on authoritarian aggression and political tolerance. A preregistered survey experiment (n=351, student sample) will be employed, with the application of SEM. It is hypothesized that experimental climate change threat will have positive effects on authoritarian aggression and political intolerance, which will be partially mediated by intergroup threat. SEM is particularly well-suited to testing these hypotheses. An alternative hypothesis is that the relationships are not driven by the experimental treatment, but by subjective climate change threat (which was used as a manipulation check). In this study, I draw on the General Process Model of Threat and Defense (Jonas et al., 2014) and replicate the experimental evidence from other studies (Fritsche et al., 2012; Barth et al., 2018). Interestingly, my results are mixed, which suggests a need for further research.

Bridging the Gap: Translating Common Multi-Level Path Diagrams into Directed Acyclic Graphs for Advanced Causal Inference

Moritz Ketzer[1]

[1] Humboldt-Universität zu Berlin

Graph-based approaches, such as directed acyclic graphs (DAGs) play an important role in causal inference. Although DAGs are closely related to structural equation modeling (SEM), much of the research on DAGs has been conducted within a nonparametric framework. Studying causal effects non-parametrically offers the advantage of avoiding strict assumptions about functional forms and parametric structures. Most research on causal graphs, however, is restricted to single-level models and thus makes the assumption of homogeneity of units of analysis. To address unit heterogeneity statistically, multilevel models have a long tradition in psychological research. However, conventional methods for constructing multilevel path diagrams do not produce graphs that formally qualify as DAGs, thus cannot be used for graph-based causal inference. To address this gap, we integrate parametric multilevel SEM with graph-based causal inference. We describe a straightforward set of rules for constructing a DAG from a given set of multilevel equations and illustrate the approach with multilevel linear regression, including both baseline and causal effect heterogeneity. We then demonstrate the parametric identification of causal effects with Wald's generalized rank rule, which complements the graph-based nonparametric do-calculus. We extend this to more complex examples, such as cross-lagged panel models with varying intercepts.

Specifying and testing differences between variables in structural equation modeling using the H-O specification

Emily Fuchs[1], Florian Schuberth[1], Jörg Henseler[1,2]

[1] University of Twente
[2] Universidade Nova de Lisboa

In social sciences, differences can be found across a range of disciplines such as economics, sociology, and psychology. Yet, approaches employed in structural equation modeling (SEM) to studying differences are limited. For instance, they do not model the difference or can only include the difference as a predictor, rather than as an outcome variable. As a consequence, researchers are prevented from exploiting SEM's full potential when it comes to studying differences. In my presentation, I address this limitation and present a modification of the recently introduced refined Henseler-Ogasawara (H-O) specification to model differences in SEM. This specification allows for flexibly modeling differences in SEM and can mimic the results of extant approaches. In addition, it allows to assess whether a difference fully transmits the effects of its components. To demonstrate the application of the proposed specification, an illustrative example is provided.

Vulnerability of various estimators to model misspecification regarding correlations of predictors in path models involving interaction term

Tomasz Żółtak[1], Grzegorz Humenny[1]

[1] Educational Research Institute

In our presentation, we want to describe a phenomenon that occurs only under specific conditions. Nevertheless, we consider it important because it can lead researchers to draw conclusions from their analysis that are completely opposite to the correct ones. Moreover, because the problem arises from a combination of circumstances, it is difficult for practitioners of path modeling to diagnose, understand and address it.

We will show that in path models 1) with a categorical (final) dependent variable, 2) including interaction variable to predict this final outcome, 3) in which one of the variables included in the interaction is not exogenous, and 4) has skewed distribution 5) omitting explicit specification of the covariance parameter between this variable and the interaction variable while defining the model 6) while using unweighted least squares (ULS) or diagonally weighted least squares (DWLS, also including estimators labeled as "WLSM" and "WLSMV" in Mplus) estimators may lead to a reversal of the sign of the interaction coefficient. While these conditions may seem rather specific, we argue that the first four are not uncommon in social sciences with many theories assuming interactions, variables typically having non-normal distributions and Likert-scale questions being widely used while collecting the data. On the other hand, the last two of the conditions above are typically fulfilled by using estimation software default options.

We will also discuss the reasons for ULS and DWLS estimators' behavior and in what other, similar conditions they may also be highly vulnerable to some types of model misspecification.

Power Up Your Nonlinear SEM Analysis: Model-Implied Simulation-Based Power Estimation with powerNLSEM using Asymptotic Normality

Julien P. Irmer[1]

[1] Humboldt-Universität zu Berlin

As research questions grow increasingly complicated, there is a rising demand for complex nonlinear structural equation models (SEM), such as those incorporating moderated mediation. Available methods vary in their approaches: some rigorously model measurement error but rely on strong distributional assumptions and numerous parameters (e.g., product indicator approaches or latent moderated structural equations, LMS; Klein & Moosbrugger, 2000), while others simplify by using limited data information and partially or fully ignoring measurement structures, as seen in scale regression. Power analysis is crucial for planning these studies, but traditional simulation-based approaches have primarily served regression models, leaving methods that explicitly model measurement error underexplored. Additionally, conventional methods require predefining sample and effect sizes, with precision influenced by the number of replications per sample size.

To address these gaps, we propose a model-implied simulation-based power estimation (MSPE) approach that predicts power using a probit regression model. Applicable to any method with asymptotically normal estimates, MSPE offers versatility across a broad spectrum of models including complex SEMs. We apply this new approach to complex interaction models, evaluating power for various methods, including scale regression, factor score regression, product indicator approaches and LMS. Our findings illustrate the tradeoffs in complexity and performance, with the MSPE implementation available in the powerNLSEM R-package for researchers seeking accessible tools for (nonlinear) SEM power analysis.

The Structural-after-Measurement (SAM) approach: Updates and extensions

Yves Rosseel[1]

[1] Ghent University

In the Structural-after-Measurement (SAM) framework for Structural Equation Modeling (SEM), parameters of the measurement model are estimated first, followed by the estimation of the structural model parameters. This presentation focuses on the 'local' SAM approach, where summary statistics (mean, covariance matrix) of latent variables are derived in the first step. I will present recent developments in this method, including: 1) incorporating binary or ordinal indicators in the measurement model, 2) integrating multiple interaction and quadratic terms into the structural model, and 3) applying the infinitesimal jackknife technique to obtain local two-step standard errors.

The Influence of Deepfakes in the US election campaign — A panel study

Klara Steinmetz[1], Claas Pollmanns[1], Sarah Buhl[1]

[1] University of Technology Chemnitz

Deepfakes are increasingly common on social media, and they are becoming a powerful force in shaping political information. Alarmingly, deepfakes are already eroding trust in democratic institutions, distorting political discourse, and undermining the legitimacy of

political decisions (Chesney & Citron, 2019; Pawelec, 2022). In this presentation, we share key findings from our preregistered longitudinal study (4 waves, NT1 = 900) conducted during the 2024 US election campaign, aiming to shed light onto the growing threat posed by deepfakes for democratic processes.

Based on two qualitative studies (N1= 55; N2 = 100) and building on intergroup threat theory (Stephan et al., 2009), we postulate two different ways in which deepfakes can convey threat and thus potentially influence democratic decision-making processes. On the one hand, people, particularly those who strongly identify with their political party, may be concerned that deepfakes could be used by political opponents to their advantage in political discourse (partisan threat hypothesis). On the other hand, people, especially those who are motivated to engage in political discussions, may be concerned that deepfakes contribute to the loss of a common ground essential for democratic debates (democratic threat hypothesis). We present the results of two dynamic panel models that test our assumptions and discuss their implications for political polarization within liberal democratic systems.

Attitudes towards virtual healthcare assistants in the D-A-CH region – Exploring social determinants by using higher order factor structural equation modelling

Wolfgang Aschauer[1], Christopher Etter[1], Florian Nemetz[2], Knut Petzold[1,3], Patrick Kutschar[4]

[1] Paris Lodron Universität Salzburg
[2] Wirtschaftsuniversität Wien
[3] Hochschule Zittau/Görlitz
[4] Paracelsus Medizinischen Universität

Taking demographic changes into account, the need for health care among the elderly is expected to increase significantly (cf. Dall et al., 2013; Harper, 2014). One possible way of dealing with these forthcoming challenges is to rely on the use of modern technologies, such as telecare solutions and virtual healthcare assistants (VHA) (Turner & McGee-Lennon, 2013; Schulz et al., 2015; Miller & Polson, 2019). However, according to the WHO, health systems must simultaneously improve the health of populations while ensuring the smallest possible degree of health inequalities (Murray & Frenk, 2000). In the area of eHealth, this is made particularly difficult by “digital divides” (Lythreatis et al., 2022), which lead to unequal technological capabilities, unequal access to technology and therefore potentially unequal patterns of use of digital tools (Cornejo Müller et al., 2021).

In our study, we analyse opinions towards a VHA called “Addison” as an example of a tablet-based tool that supports older people in private households. We designed an extensive survey for the D-A-CH region, which was conducted in spring 2023 and is based on a quota sample drawn by an established online-access provider. In total, more than 1500 respondents took part in every country. We integrated important background variables to control for differences in technological readiness between social groups and countries. Furthermore, we measure subjective factors potentially influencing attitudes towards VHAs (such as wellbeing and affinity towards technology).

Using sophisticated scales, we perform structural equation modelling with second order factors to show the various paths through which social inequalities exert an influence on our dependent variable. The results underscore the importance of social inequality with regard to technological readiness and point towards the high potentials but also certain limits of

structural equation modelling when it comes to complex associations between sociodemographic characteristics and attitudes.

Cross-validation of the Subjectivisation of Labour Scale using Confirmatory Factor Analysis and Differential Item Functioning Analysis

Britta Maskow[1], Jochen Mayerl[1]

[1] University of Technology Chemnitz

Subjectivisation of labour is the social process in which the “whole person” is or should be included in the rationalisation strategies of companies in order to gain extended access to individual competences. (working definition cf. Minssen 2012, 118). Most measurement instruments of this construct have been developed qualitatively. Fritz et al. developed the first quantitative Workforce Entrepreneur Scale (16-items) based on Pongratz & Voß (2003), Nievergelt (2004), and Schmitz & Schwarzer (1999).

Our research design involves a mixed mode sample (online and postal survey, N=788). We randomly selected 3,000 people from the residents’ registration office of the city of Chemnitz, Saxony, Germany, to participate in the survey. We mailed questionnaires to parents with children aged 13-18 in Chemnitz. The response rate was 27.8 percent.

The presentation discusses the results of the confirmatory factor analysis with random split data, which cross-validates the subjectivisation of labour scale. To test the scale in different sub-populations, we conducted several multi-group analyses by gender, age, socio-economic status and survey mode. We used differential item functioning (DIF) as part of the multi-group analysis by survey mode.

Our findings help us to understand the strengths and weaknesses of the latent construct of the subjectivisation of labour.

Measurement Invariance of an instrument for social cohesion

Oliver Arránz Becker[1]

[1] Martin-Luther-University Halle-Wittenberg

The present study aims to test a questionnaire instrument on social cohesion comprising seven (mostly) Likert-type items for invariance across twelve German urban regions ($n > 12.000$) located in four federal states, stratified by town size, comprising one small town, one medium and one large city. The items pertain to three subdimensions: spatial identity (3 items), social trust (2), and collective efficacy (2). Descriptive item analyses reveal substantial regional variance clustering for most items; moreover, one item has only four response categories combined with a fairly high proportion of missing values ($> 17\%$, all others $< 6\%$). According to the non-random region sampling, a fixed multigroup CFA approach for continuous and ordinal indicators was adopted using Mplus 8.4. Traditional frequentist multigroup CFA models (robust ML and WLSMV) show that, as expected, ML methods tend to yield invalid (e.g. out-of-bounds) estimates, whereas WLSMV and empirical Bayes models result in proper estimates but fail to establish scalar invariance across all twelve regions, pointing to partial invariance. Additional tentative alignment models for identifying subsets of groups with invariant measurement illustrate current limitations of

Mplus in semi-automated CFA invariance testing in the presence of ordinal indicators and “messy” (e.g., non-normal) data across a medium-sized number of survey regions.

A Novel Method for Detecting Non-invariant Items in Confirmatory Factor Analysis

Pit Rieger[1]

[1] ETH Zurich

Violations of measurement invariance (MI) of a given confirmatory factor analysis (CFA) model can arise as a result of non-invariant items and pose a significant threat to the validity of latent variable comparisons across subgroups of a study population. While methods for detecting such items under partial MI exist, they are complicated and their performance has not been evaluated systematically — hampering their wide-spread use by applied researchers. This paper makes three contributions. First, I propose a novel detection approach that has an intuitive interpretation. Instead of relying on likelihood inference, it builds on residuals and only requires a basic understanding of linear regression, thus being much more accessible to a broad audience of applied researchers. Second, the performance of two versions of this approach and four existing methods is benchmarked in a simulation study. This enables a comparison of detection methods and offers guidance for choosing a method in applied research. The results of this simulation study provide evidence that the novel detection method strongly outperforms existing approaches, only one of which can be recommended conditionally. Finally, the detection methods are applied to different CFA models for measuring populist attitudes using survey data, demonstrating their usability and showing how they can be generalized to more complex measurement models. The results corroborate findings of significant issues with respect to cross-cultural validity at the model level, but also provide a starting point for model improvement to be taken up by further research.

The Measured Latent Method Construct Approach to Control for Common Method Variance

Tamara Schamberger[1,2], Florian Schuberth[2], Jörg Henseler[2,3]

[1] Bielefeld University
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Common method variance (CMV) is a form of systematic measurement error that can bias empirical studies in many research fields. Empirical researchers seeking to control for CMV are faced with conflicting advice the most recent of which recommends the confirmatory factor analysis marker variable (CFAMV) approach in combination with an ideal marker variable such as attitude towards the color blue. Besides the CFAMV approach, the unmeasured latent method construct (ULMC) approach is frequently used to control for CMV in empirical research. Using a scenario analysis, we show that (i) the CFAMV approach is not Fisher-consistent, (ii) the CFAMV approach hardly controls for CMV, and (iii) the ULMC approach is not identified. To overcome these problems of existing approaches to deal with CMV, we propose a new approach to control for CMV: the measured latent method construct (MLMC) approach. The MLMC approach quantifies the amount of CMV by a common factor underlying a set of theoretically unrelated variables measured by the same method as the original indicators in the study. Furthermore, to avoid unnecessary controls for a problem that

is not present, we perform a pre-test to check whether CMV is actually a problem in the current dataset. The MLMC approach is only used if CMV is actually present. A Monte Carlo simulation study shows that (i) the MLMC approach is Fisher consistent and (ii) the MLMC approach is superior to the CFAMV approach in detecting CMV in all considered conditions.

New insights into the behaviour of fit indices in Longitudinal Structural Equation Modeling

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Fit measures like RMSEA, CFI, and SRMR are essential tools for evaluating the fit of structural equation models (SEM). Yet, they are often misinterpreted as test statistics rather than measures conceptually akin to effect sizes. As with effect sizes, fit measures are shaped by the model's structure and the data characteristics. While considerable research has examined these influences in CFA models, relatively few studies address the unique challenges of longitudinal SEM (LSEM). LSEM involves specifics, such as an increasing number of items with each measurement occasion and the likely presence of missing data. LSEM is also frequently applied to developmental phenomena like the incidence of bullying or other adverse behaviours that typically result in skewed data. Our simulation study dives into how model and data characteristics typical for LSEM influence RMSEA, CFI, SRMR and one less used fit measure – the gamma hat. We will specifically investigate whether the model fit may seem more optimistic with the growing number of items and greater skewness and missingness in the data.

Using the delta-method for calculating the standard errors in partial least squares path modelling

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Partial least squares path modelling (PLS-PM) is a composite-based estimator for structural equation modelling (SEM). Currently, inference in PLS-PM is done by bootstrapping. In various situations, the bootstrap distribution of PLS-PM estimates is bimodal. This is in contrast to the distribution assumed by the z-test, which is often used for statistical inference on PLSPM estimates. In my presentation, I propose to use the delta method to calculate the standard errors (SE) of PLS-PM estimates. To evaluate my proposal, I conduct a Monte Carlo simulation to compare the performance of the bootstrap and delta methods for different population models and varying sample sizes.

Assessing Heterogeneity of Correlation Matrices in Misspecified Meta-Analytic Structural Equation Models

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Meta-analytic structural equation modeling (MASEM) techniques are increasingly common tools to synthesize data across multiple studies. One popular approach is two-step MASEM, where study correlation matrices are pooled in a first stage using either a fixed- or random-

effects model, to then fit one or multiple structural equation models onto the pooled correlation matrix in a second stage. In a simulation study, we examined the performance of different fit criteria and resulting parameter estimates under both random- and fixed-effects pooling when fitting a three-factor CFA model to study populations that were partly misspecified. We discuss benefits and issues when using a random-effects model in this scenario and discuss future research directions regarding correlation matrix heterogeneity when using MASEM methods.

Novel approaches to incorporate composites in structural equation modeling

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Composites which refer to linear combinations of variables, are frequently encountered in various fields, e.g., in the form of indices, inventories, formative constructs, parcels, and emergent variables. However, ways to incorporating composites into larger models are rather limited. The existing approaches are either limited to exogenous composites, or they do not use weights as model parameters, or they do not model composites. We propose two novel specifications of composites to overcome these drawbacks: 1) the phantom variable specification, which relies on the refined Henseler–Ogasawara (H–O) of composites in combination with phantom variables and uses the inverse of the weights as free parameters, and 2) the blended H–O specification, which blends the pseudo-indicator approach with the H–O specification. We demonstrate the performance of the new specifications with a scenario analysis.

Emergence and related concepts of ontological dependence in measurement theory

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In measurement theory, reflective models refer to latent variables that cause their observed indicators (e.g., intelligence; Bollen, 1989). Contrarily, formative models assume that latent variables are caused by their observed indicators (e.g., socio-economic status; Bollen & Diamantopoulos, 2017). As a special case of formative models, composite models assume the outcomes of the observed variables to be measured without error (Grace & Bollen, 2008).

Following recent advances in composite analysis (Henseler, 2021; Henseler & Schuberth, 2020), composite variables are regarded as emergent variables where “the components do not act as a mere heap of parts, but as a whole” (Henseler, 2021, p. 36) or are even “more than the sum of its parts” (Henseler, 2015).

The concept of emergence has a long tradition in the domains of ontology (Aristotle, n.d [2002]; Chalmers, 2006; O’Connor, 2020; O’Connor, 1994) and social theory (Greve & Schnabel, 2014). In the latter, emergence is often discussed regarding the relation (typically: reducibility) of macro-level entities – in terms of group-level phenomena – to their micro-level constituent parts – typically individuals. Hence, while recent studies of composite models

adopt a horizontal perspective on emergence by asking whether composites (e.g., socio-economic status) are emergent from their same-level constituent parts (e.g., education, occupational prestige, income), social theory typically adopts a vertical perspective by asking how a higher/group-level phenomenon (e.g., socio-economic composition) emerges from lower/individual-level constituent parts (e.g., socio-economic status).

In this contribution, I will first discuss formative and composite measurement models in structural equation modeling (SEM). I will then introduce the notion of emergence and related concepts of ontological dependence, supervenience and, specifically, grounding which received considerable attention in recent contributions to (social) ontology (Epstein, 2015, 2016; Schaffer, 2009, 2019). Particularly, I will discuss how different concepts of ontological dependence relate to horizontal (composite) and vertical (multilevel) perspectives on measurement theory in SEM.

Towards a structural after measurement model for functional data

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Data in the form of curves, images, or shapes frequently arise in modern social and psychological sciences. These data are observed with error, typically in an ordered sequence over time, across spatial locations, or both. The objective is to harness their inherent smoothness by transforming raw data points into continuous functions that allow for uncovering underlying patterns and structures. Recently, structural equation modeling (SEM) has gained traction in the analysis of such data, often referred to as functional data, due to its ability to infer structural relationships across groups of curves. Building on the structural after measurement (SAM) approach proposed in [1, 2], we extend the concept of factor analysis to functional settings and explore a set of “vintage” non-iterative techniques to estimate the core substrate of functional SEM.

[1] Dhaene, S., & Rosseel, Y. (2024) An evaluation of non-iterative estimators in the structural after measurement (SAM) approach to structural equation modeling (SEM). Structural Equation modeling 30(6), 926–940.

[2] Rosseel, Y., & Loh, W. W. (2024) A structural after measurement approach to structural equation modeling. Psychological Methods 29(03), 561-588.

A Data-drive Approach to Estimate the Optimal Structure of Mixture Models in the Structural Equation Modeling Framework: The Reversible Jump Markov Chain Monte Carlo

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Latent Growth Mixture Modeling (LGMM) is a powerful technique for studying individual differences in change trajectories. A main advantage of LGMM is its capacity to model change within heterogeneous populations. As such, LGMM can help identify latent subgroups characterized by substantively different patterns of change and estimate group-level growth trajectories. Bayesian estimation has recently been used to help improve the

accuracy of LGMM results, especially when classes are poorly separated. One issue to contend with is class enumeration.

Traditionally, fit indices have guided model selection via model comparison. However, alternative data-driven approaches that directly estimate the optimal number of latent classes have not been explored in the mixture SEM framework yet. The Reversible Jump Markov Chain Monte Carlo (RJMCMC) method is data-driven (Ho and Hu, 2008). This paper evaluates the ability of RJMCMC to discover the correct number of mixture components in the context of LGMM via a simulation study. We considered a variety of design scenarios by manipulating the following set of factors: class structure (2 and 3 classes), class proportion (equal and unequal), sample size (n = 150, 600), and class separation (small, medium, large).

Results demonstrate that the performance of the RJMCMC varies depending on the manipulated factors. The best-performing conditions–those that retrieve the correct class solution with near-perfect accuracy–were those with two latent classes and a large sample size. Here, class separation and class proportion had little to no effect on performance. Moreover, conditions with three classes demonstrated great difficulty in identifying the correct class structure. Additional results on growth parameter bias and precision across MCMC iterations in which the correct class structure was identified suggest good parameter recovery. This research contributes to the existing literature by laying the groundwork for establishing robust model selection guidelines that go beyond traditional methods by exploring Bayesian non-parametric approaches.

Automated Specification Search for Composite-Based SEM

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Structural Equation Models (SEMs) are primarily employed as a confirmatory approach to validate research theories. SEMs operate on the premise that a theoretical model, defined by structural relationships among unobserved constructs, can be tested against empirical data by comparing the observed covariance matrix with the implied covariance matrix derived from the model parameters. Traditionally, SEMs assume that each unobserved construct is modeled as a common factor within a measurement theory framework. Recently, Henseler (2021) proposed the synthesis theory, which allows for the inclusion of composites as proxies for unobserved constructs in SEMs. While automatic search algorithms have been proposed for factor-based SEMs to systematically identify the model that best fit the data based on statistical criteria, such algorithms have not been developed for composite-based SEMs. This presentation introduces an extension of these approaches to composite-based SEMs using a genetic algorithm (GA) to identify the theoretical model that best fits the data. Bayesian Information Criterion (BIC) is employed to compare model fits and determine the optimal model. We present a Monte Carlo simulation study that investigates the ability of our approach to accurately identify the data-generating model under various conditions, including different sample sizes, path-coefficients effect sizes, and levels of model complexity. Our methodology can be considered a grounded theory approach, offering novel insights for

conceptualizing structural relations among unobserved constructs and potentially advancing new theories.

Confirmatory Factor Analysis with Word Embeddings: Measurement Models for Textual Big Data

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The digital revolution has exponentially increased the availability of unstructured text data, including social media content, online forums, blogs, e-commerce reviews, news articles, and digitized publications. This wealth of textual data offers social scientists a unique opportunity to study human beliefs, values, attitudes, and interactions. However, this emerging field lacks standardized methods for managing its methodological and statistical challenges. Proper indicator selection (usually keywords) that define a measurement remains a constant and often overlooked challenge. Consequently, studies based on user-generated text rarely report the reliability of their indicators, the measurement model, or its fit to the data. This is a significant oversight and can lead to questionable validity and reliability of their findings, which is a central focus of this article. This work introduces a statistical approach that provides tools to implement an informed measurement process on unstructured textual data. The proposed approach is grounded in the longstanding tradition of Confirmatory Factor Analysis, now enhanced by the integration of word embeddings. This machine-learning technique represents words in a continuous vector space based on their semantic relationships. By merging classical CFA with machine learning models, the approach opens up new possibilities for applying tools developed by the CFA community for researchers interested in big textual datasets.