Simon David **Lindner** PhD

Complex Systems Researcher · Health Data Scientist

Vienna, Austria

+43 670 604 4228 | lindner.sd@gmail.com | sd-lindner.github.io | Google Scholar | ORCID

Research Interests

My research sits at the intersection of complex systems, network science, and data-driven modelling, with a focus on health and society. Over the past years I have worked on epidemic forecasting using wastewater signals, mapped multimorbidity networks from electronic health records to understand how diseases co-occur across genders and socioeconomic groups, and developed methods to stratify cancer patients by their care trajectories. What connects these projects is an interest in how structure shapes outcomes that would be invisible in aggregate statistics. I am increasingly interested in higher-order interactions: biological and social systems where groups, not just pairs, drive the dynamics, and where hypergraph models may offer a more faithful representation than classical networks.

Education

Medical University of Vienna — *Vienna, Austria*
PHD, COMPLEX SYSTEMS — *2020 – 2026*
Thesis: *Data-driven approaches to healthcare analytics, multimorbidity networks, and wastewater-based epidemiology.*
Supervisor: Prof. Peter Klimek.

University of Vienna — *Vienna, Austria*
MSC IN PHYSICS — *2017 – 2020*
Thesis: *Thermodynamics of systems with emergent structures.*
Supervisor: Prof. Stefan Thurner.

University of Vienna — *Vienna, Austria*
BSC IN PHYSICS — *2012 – 2017*
Thesis: *Methods for van der Waals Corrections in Ab Initio Molecular Dynamics.*
Supervisor: Prof. Georg Kresse.

ETH Zürich — *Zürich, Switzerland*
UNDERGRADUATE STUDIES — *2010 – 2012*

Work Experience

SUSTech-ETH Institute of Risk Analysis, Prediction & Management (Risks-X) — *Austria (Remote)*
RESEARCH ASSOCIATE — *2026 – Present*
Analyzing longitudinal legal data to construct dynamic language networks, tracking semantic shifts and structural evolution over time.

Leto Space GmbH — *Vienna, Austria*
DATA SCIENTIST — *2024*
Designed and evaluated machine-learning models for information extraction from unstructured data.

Complexity Science Hub Vienna / Medical University of Vienna — *Vienna, Austria*
RESEARCHER (COMPLEX SYSTEMS & COMPUTATIONAL HEALTH) — *2020 – 2024*
Member, Austria's COVID-19 Forecasting Committee: developed wastewater-based and short-term epidemic forecasts that informed national public health decisions.
Analyzed electronic health records to map multimorbidity networks, uncovering gender-specific associations and socioeconomic health disparities.
Built privacy-preserving analytics for international collaborations using synthetic data generation and federated learning.

Languages

German	Native
English	Full professional proficiency

Programming & Data Engineering

Python	NumPy, Pandas, scikit-learn, TensorFlow, PyTorch
Data Engineering	SQL, ETL pipelines, large-scale data processing
Tools	Git, Docker, Linux, LaTeX, R, MATLAB
Visualization	Matplotlib, Plotly, interactive dashboards

Machine Learning & Statistical Methods

Epidemic Modelling	SIR/SEIR models, agent-based simulations, wastewater surveillance
Network Science	Graph analysis, temporal networks, multimorbidity network construction
Statistical Methods	GLMMs, survival analysis, Bayesian inference, regularised regression
Pattern Discovery	Trajectory clustering, DTW, PCA, UMAP
ML & Deep Learning	Random forests, gradient boosting, CNNs, LSTMs, transformers

Academic Publications

Care Trajectories Are Linked to Mental Health and Mortality in Cancer Patients — *arXiv preprint*, Apr 2026
ARXIV: 2604.18431
First Author

Estimating unreported SARS-CoV-2 infections in Austria — *Heliyon*, Aug 2025
DOI: 10.1016/J.HELIYON.2025.E43748
First Author

Time-varying ecological interactions characterise equilibrium and stability — *arXiv preprint*, Jun 2025
ARXIV: 2506.22123

Sex, Gender, and Stroke Recovery: Functional Limitations and Inpatient Care Needs in Canadian and European Survivors — *International Journal of Stroke*, Sep 2024
DOI: 10.1177/17474930241288033

Socioeconomic Gender Variables Impact the Association between Hypertension and Chronic Health Issues: Cross-Sectional Study — *Journal of Personalized Medicine*, Aug 2024
DOI: 10.3390/JPM14080890
First Author

A comparison of synthetic data generation and federated analysis for enabling international evaluations of cardiovascular health — *Scientific Reports*, Jul 2023
DOI: 10.1038/S41598-023-38457-3
First Author

The interplay of adipokines, body composition and glucose homeostasis in pregnant women with a history of RYGB operation — *Nutrients*, Apr 2023
DOI: 10.3390/NU15112498

Homophily-based social group formation in a spin-glass self-assembly framework — *Physical Review Letters*, Jan 2023
DOI: 10.1103/PHYSREVLETT.130.057401

Meteorological factors and non-pharmaceutical interventions explain local differences in the spread of SARS-CoV-2 in Austria — *PLOS Computational Biology*, Apr 2023
DOI: 10.1371/JOURNAL.PCBI.1009973

Sex Differences in Clinical Characteristics and Outcomes of Patients with SARS-CoV-2 Infection Admitted to Intensive Care Units in Austria — *Journal of Personalized Medicine*, Mar 2022
DOI: 10.3390/JPM12040517

Agent-based simulations for protecting nursing homes with prevention and vaccination strategies — *Journal of the Royal Society Interface*, Dec 2021
DOI: 10.1098/RSIF.2021.0608

Thermodynamics of structure-forming systems — *Nature Communications*, Feb 2021
DOI: 10.1038/S41467-021-21272-7

Invited Talks & Conference Presentations

Stratifying Cancer Patients Using Visit Trajectory Analysis
INVITED SEMINAR
NetSI London Seminar Series 2025, Northeastern University
London, Oct 2025

Stratification of Cancer Patients Using Visit Trajectory Analysis
CONTRIBUTED TALK · COMPLEXITY IN HEALTH
CCS 2024 — Conference on Complex Systems
Exeter, Sep 2024

The Impact of Gender and Socio-Economic Factors on Hypertension and Comorbidities in Europe
SATELLITE TALK
NetSci 2023 — Medical NetSci Satellite
Vienna, Jul 2023

Homophily-based social group formation in a spin-glass self-assembly framework
CONTRIBUTED TALK
CCS 2022 — Conference on Complex Systems
Palma de Mallorca, Oct 2022

Thermodynamics of structure-forming systems
CONTRIBUTED TALK (ONLINE)
NERCCS 2021 — Northeast Regional Conference on Complex Systems
Apr 2021