

IAS Academy Workshop Overview

Challenges and perspectives for studying emergence in complex systems

Host: [Dr. W. \(Wout\) Merbis](#)

Co-Host: [Dr. F.A. \(Fernando\) Nobrega Santos](#)

Many natural and social systems are characterized by emergent phenomena: novel collective behaviors which arise spontaneously from the seemingly disparate properties of their components. The great variety of complex systems showing emergent properties necessitates a broad and versatile approach towards their simulation and analysis. Finding mathematical similarities between seemingly different processes and applications, as well as developing mathematical and numerical methods which can be applied in a wide range of scientific disciplines, is therefore of great importance. In this workshop we wish to highlight new opportunities, perspectives and challenges in the analysis and simulation of emergent phenomena across different domains. We pay special attention to methods with an origin in (quantum) statistical mechanics, information theory, algebraic topology, stochastic processes, and dynamical systems. Examples include (but are not restricted to) renormalization group methods, topological data analysis, and tensor networks.

Climate change and displacement

Host: [Prof. dr. H.O. \(Huub\) Dijkstra](#)

Co-Host: [Dr. D.V. \(Darshan\) Vigneswaran](#)

The relationship between climate change and migration is complicated and, in some respects, controversial. While international organizations, the media, and climate researchers increasingly emphasize the causal link between global warming and human mobility, migration researchers are generally reluctant to attribute the phenomenon to climate change. They show how migration is not driven by climate change alone, but influenced by a mix of climatic, socio-economic, cultural, and political factors. In this workshop, we will look at empirical, conceptual, and normative approaches to bring together the study of climate change and the study of migration. We will explore various theories, methodologies, and attempts to integrate different forms of research. In the afternoon, we will carry out a mapping exercise to identify different forms of climate change, mobility, and immobility, to explore what new classifications emerge, and to examine the legal and policy implications. The aim is to bring together a community of scholars and define projects for future collective research.

Crime and democratic decline

Host: [Dr. J.E.B. \(Jill\) Coster van Voorhout](#)

Co-Host: [Prof. dr. Z.J.M.H. \(Zeno\) Geradts](#)

Worldwide, liberal democracies have been in decline for seventeen consecutive years, oftentimes “slowly, in barely visible steps” (Levitsky and Ziblatt, 2018). Suggested causes range from economic inequality, (AI-generated) misinformation and disinformation, culturally conservative reactions to societal changes, distrust of the population in domestic politics, populist, or personalist politics to external influence from great power politics. Whenever this decline becomes highly visible through an outright attack like January 6th in the United States, liberal democracies respond through criminal cases like sedition trials. However, interdisciplinary scholarship on crime as a cause and a consequence of global democratic decline remains largely lacking. For example, to what degree do crimes like human trafficking, money laundering and corruption contribute to rising economic inequality within a liberal democracy? And from without a liberal democracy, to what extent do great powers use trafficked laborers or illegally obtained money to weaken foreign politics and the judiciary? Considering that a liberal democracy is a complex adaptive system, this undermining of the governance system from within and without poses challenges that require a more forensically investigated and data-driven agenda for resilience of democracy and the rule of law.

Critical methods for AI

Host: [Prof. T. \(Tobias\) Blanke](#)

Co-Hosts: [MA D.M.R. \(Dieuwertje\) Luitse](#) & [MSc. A.S. \(Anna Schjøtt\) Hansen](#)

There is a need for critical approaches to Artificial Intelligence (AI) that aim to understand, critique, and provide alternatives to the current mainstream approaches to AI development and implementations – from dataset production to model development, evaluation, and deployment as well as social, political, and institutional contexts that shape them. In this workshop, we will explore what criticality means in this context and what it could look like methodologically across sciences and humanities. The workshop will be part of the activities in the newly launched Cultural Data & AI Lab (CUDAL), which is a hub for interdisciplinary collaborations that explores cultural data and AI.

Disentangling digital citizenship

Hosts: [Mr. E.H. \(Elke\) Olthuis](#) , [Dr. J. \(Jaron\) Harambam](#) , [Dr. T.M. \(Tamar\) de Waal](#) , [Prof. dr. P.J. \(Peter\) van Baalen](#) & [Prof. dr. G. \(Guda\) van Noort](#)

Digital technologies affect our societies and how we interact with each other and institutions. In other words: they change the concept of us as a citizen, how we navigate society. This altering concept of citizenship is changing as our identities in the digital society become the sum of countless (digital) personae, loyalties, assets and contexts, requiring a redefinition of citizenship

in the digital society. Citizenship in a digital society thus requires new skills, competencies, attitudes and behavior, especially as the digital society offers opportunities, such as for participating in democracy, but also struggles with undesirable effects such as declining trust in governments, escalating polarization, digital exclusion and bias, and the spread of disinformation. Digital platforms reinforce such undesired effects and control consumption in new ways, for example by chatbots, social media influencers, fake advertisers or virtual assistants. Moreover, digital technologies and the algorithms that are part of it can confirm and reinforce inequalities among citizens, as not everyone can benefit from the benefits to the same extent.

These developments require research into:

1. How to understand digital citizenship and how to develop digital citizenship?
2. How do platforms undermine digital citizenship and how to combat this undesired impact?
3. How do digital technologies reinforce inequalities, among which citizens and how can we combat the digital divide?

As digital citizenship and impacts of digital technology is a complex societal issue, an integrative and interdisciplinary research approach is required. Therefore, we answer these questions with an interdisciplinary approach to understand how education, communication, law & regulation, (organizational) infrastructures and technological design can contribute. At the same time, we investigate digital citizenship at the micro (individual), meso (organizational, institutional) and macro (societal) level.

The aim of this workshop is to bring together the young bright minds of today and the Digital Citizen- scholars on how to approach, investigate and possibly answer these pivotal, yet difficult research questions. This is your opportunity to work together with leading interdisciplinary scholars on one of the three main research topics and possibly develop new research projects and continue to work with scholars from the Digital Citizenship-sectorplan.

Empirical Ethics

Host: [Dr. P.M. \(Paula\) Helm](#)

Co-Host: [Dr. S. \(Selin\) Gerlek](#)

Empirical Ethics is a new research line that continues the so-called empirical turn in epistemology, the humanities and beyond by connecting insights gained through qualitative and quantitative methods with value considerations. The analytical focus thereby shifts from principles to understanding what different actors and stakeholders consider as desirable and undesirable practices, whether at the individual, societal, or institutional level. Empirical Ethics thus enacts a turn toward the horizontal perspective, coined in terms of ethics in practice, situated ethics, ethics from within, as well as ethical interventions. In this workshop we will discuss different perspectives on and applications of empirical ethics.

Health complexity

Host: [Prof. dr. F. \(Federica\) Russo](#)

Co-Host: [Dr. S.F. \(Suzanne\) Fustolo-Gunnink](#)

Health and disease are complex phenomena. But what does it mean to apply methodology from complexity science to them? How does this, in practice, change our research? Or treatment and public health interventions? In this workshop, we wish to showcase empirical, conceptual, and methodological research that tries to drive change in the practices of the health sciences and public health. We welcome participants from medicine, the health sciences, as well as from public health. We also welcome philosophical and historical perspectives that can help shed light on a potential paradigm change.

Polarization

Host: [Dr. M. \(Marte\) Otten](#)

Co-Host: [MSc. I. \(Iris\) Smal](#)

Polarization has been studied in the social sciences, psychology, but also in physics and computer science, using models developed in statistical physics and agent-based modeling. Bridging these fields is a major challenge. In the morning, short overviews will be given of empirical work in the social sciences and psychology on the one hand, and formal modeling work on polarization on the other. In the afternoon, we will discuss links between these fields, opportunities for collaboration, and new avenues for research.

Safe and Sustainable Design for molecules and materials

Host: [Prof. dr. A.P. \(Annemarie\) van Wezel](#)

Co-Host: [MSc. B.P. \(Bianca\) Stadelmann](#) & [MSc. I. \(Ismalia\) Bouba](#)

Recently, the EU introduced the concept of Safe and Sustainable by Design (SSbD) for chemical substances, products and production processes. SSbD is a crucial element in accomplishing sustainable development goals and integrates earlier work on Safe-by-Design, sustainable development assessment and circular economy. This is a highly challenging task, since it requires both increasing and integrating safety, sustainability and circularity of chemicals, materials and products and their production processes. In this workshop we will discuss different aspects of and approaches to Safe and Sustainable by Design.

Suggest a theme

Host: TBD

Co-Host: TBD

Select this ‘theme’ as one of your three choices in the registration form if you would like to suggest a theme around which you would like us to organize a workshop for the IAS Academy. Under ‘motivation’ you can elaborate why you would like to work on this theme and from which perspective.

Surprise me

Host: TBD

Co-Host: TBD

Depending on interests, registrations, and suggestions workshops will still be added to the IAS Academy. If you would like to be surprised, then select this ‘theme’ as one of your three choices in the registration form.

The role of emotions in societal challenges

Host: [Prof. dr. A.H. \(Agneta\) Fischer](#)

Co-Host: [Dr. D.A. \(Disa\) Sauter](#)

Emotions are generally seen as obstacles to rational decision making and are frequently ignored when considering big societal challenges. However, insights from emotion science can help us to tap into individual or collective emotions and resist the gut feelings that decrease the chances for successful transitions. There are different roles that emotions can play, for example as emotional appeals from political leaders, or non-governmental organizations, as social glue for connecting groups of people in protest movements, or as a determinant of pro-social and pre-environmental behaviors. In this workshop, we will discuss the different levels at which emotions operate, focusing on two societal challenges: the energy transition and democratic backsliding (e.g. the rise of populism).

Towards learning infrastructures to promote livable futures

Host: [Prof. dr. J.A. \(Anne\) Beaulieu](#)

Co-Host: [Prof. dr. S. \(Stefania\) Milan](#)

Digital infrastructures have been predominantly shaped as data infrastructures, communication infrastructures, research infrastructures and knowledge infrastructures. In the face of the increasingly unpredictable futures spurred on by the concurrent crises (permacrises?) in social, environmental and governance spheres, we propose to fuel our infrastructural imagination with the possibility of ‘learning infrastructures’ —not in the sense of

infrastructures for teaching and education but in the sense of infrastructures that embrace and support learning—rather than monitoring, accounting, or efficient transmission. Which examples can inspire us? What are promising changes in approaches to infrastructures that might help realize such infrastructures?

Towards responsible decriminalization: A multidisciplinary approach to regulating drug markets

Host: [Prof. dr. H.L.J. \(Han\) van der Maas](#)

Host: [MSc. J.B. \(Johnny\) van Doorn](#)

In January 2024, the mayor of Amsterdam, Femke Halsema, chaired an international conference entitled ‘Dealing with Drugs.’ This unique meeting led to the proposal of a research initiative focused on the decriminalization of drug markets. The research aims to explore optimal regulatory frameworks for currently illegal drug markets, including seller qualifications and conditions. It also seeks to understand how to avert a potential increase in drug use following legalization, navigate international treaties, and persuade the public and political figures to support such policies. The goal of the workshop is to develop a comprehensive, interdisciplinary research agenda to support new initiatives to end the War on Drugs, for which we hope to receive substantial funding.

Transitions in addiction

Host: [Prof. dr. R.W.H.J. \(Reinout\) Wiers](#)

Co-Host: [MSc. J. \(Jesse\) Boot](#)

Addictions are characterized by (often rather sudden) transitions, into and, in most cases, out of problematic use. Some have argued that developing addiction is best characterized by irreversible changes in brain functioning, but that is hard to reconcile with the fact that most people who meet the criteria for an addiction at some point in their life overcome their addiction with minimal or no help. During this workshop we will discuss models and data on the transitioning into and out of addictions.

Understanding rare events and transitions in high-dimensional complex systems

Host: [Prof. dr. P.G. \(Peter\) Bolhuis](#)

Co-Host: [Prof. dr. D.T. \(Daan\) Crommelin](#)

Rare but important events play a crucial role in many complex dynamical systems. Two main types of rare events are transitions between preferred states (“regimes”), and short-lived extreme events of the system. Examples include tipping points in ecosystems, extreme events in climate, societal changes, and material phase transitions. Many of such dynamical systems

can be modelled mathematically using the appropriate degrees of freedom. However, often these models become large (high-dimensional) due to the many degrees of freedom that contribute to the overall system behavior. Furthermore, they are difficult to predict and understand due to their stochastic and nonlinear (or even chaotic) nature. This often means that the only way to analyze them is by computer simulation, i.e. by numerical integration of the time dependent equation of motions (an initial value problem). However, when done in a straightforward manner, this approach becomes computationally extremely expensive or even intractable for rare events, because of the involved long timescales combined with the high dimensionality of the models. In the past many solutions have been proposed to accelerate simulations and to enhance the sampling of rare events, in order to obtain insight into the underlying causes and mechanisms. These solutions often require an accurate description or a collective variable that is capable of describing the event in a succinct way, through dimensionality reduction. But this is the problem that we began with in the first place: the challenge of finding an accurate yet compact quantitative description, involving only a few variables that can explain the macroscopic characteristics of the event. Solving this chicken and egg problem is at the heart of various rare event methodologies and studies in many different fields. For these methodologies, mathematical concepts like large deviations, rate functions, committor functions, and dimensionality reduction are found to be very useful. In this workshop we would like to discuss different concepts and approaches in a wide variety of fields and applications, and how we can learn from each other.

What you see is what you get: Hacking the mind with Deepfake and its impact on mental health

Host: [Prof. dr. C.L. \(Claudi\) Bockting](#)

Co-Host: [MSc. E.A. \(Evi-Anne\) van Dis](#)

A Deepfake is a highly realistic digital copy of a person that can be manipulated to say and/or do anything, with the help of Artificial Intelligence. Deepfake videos can be generated easily and spread even faster globally. Substantial concerns about possible misuse have been raised of Deepfake given the presumed impact on a psychological, financial, and societal level resulting in proposals for legislation. Adverse effects of Deepfake videos on mental health have been reported. Mental imagery (such as a mental image of fantasy) and actual visual stimuli as well as other sensory information (a video) can hack the mind. That is, imagery and sensory stimuli can have a strong negative, but also a positive impact on mental health. Even more so, mental imagery and the use of visual and other sensory stimuli (such as Virtual Reality) are used as interventions to successfully treat individuals with mental health conditions. Here we will discuss the impact of Deepfakes on mental health, resulting in a hackathon that will focus on the potential of using Deepfakes, but also on policy making, to target mental health problems.