



Fellows

2020



Hanse-Wissenschaftskolleg
Institute for Advanced Study



Fellows

2020



Hanse-Wissenschaftskolleg
Institute for Advanced Study

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Brain 2020

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January 2020–October 2020

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Being a Selfish Soloist or a Cooperative Chorister? Rhythmic Tuning and Turn-Taking in Seal Pups' Choruses

Imagine you are shopping in a crowded market with your daughter. People chat away as they cross your path and your daughter gets lost in the crowd. Although she is trying to call you, her voice is drowned out in the noise. Now imagine being a female seal looking for her pup within a colony of seals. The pup's call is lost in the cacophony of hundreds of other conspecifics all trying to attract their own mothers. In both situations, individuals have to deal with a common problem: analyzing different acoustic inputs and adjusting their signals to increase their detectability.

In this project, I investigate whether and how individuals vary their vocal rhythms in response to the calls of conspecifics. I suggest that harbor seals are the ideal species to test my hypotheses thanks to

promising findings on vocal production and temporal tuning abilities. Because harbor seals live in large colonies, the timing plasticity of a pup's call could be a crucial socio-ecological trait to increase the pup's survival chances.

Therefore, I will test whether harbor seal pups 1) interact vocally when their neighbors are silent; 2) maintain their timing strategy independently of the group's size and composition; and 3) display an inter-individual variation in call timing.

I aim to provide insight into the functional meaning of rhythmic behaviors and their connections to vocal production and social cognition in a noisy environment.

● **Dr. Sara Coelho**

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When Time Meets Empathy: A Sentimentalist Defence of Morality in High-Functioning Autism and Asperger Syndrome

Do you need to put yourself in someone else's shoes to be a moral person?

This is a question that has haunted scientists for decades. Opinions are divided. Some agree that good thoughts make good deeds while others believe you need to be able to feel another's pain to act morally. The study of the lived experience of high-functioning autism (HFA) and Asperger syndrome (AS) patients may prove enlightening. There is consensus on patients' capacity for moral behavior, yet it is not clear whether they feel or lack empathy. Some researchers believe that these patients' moral conduct is bolstered by their ability to suffer with others and not by intellectual reasoning. What, however, inspires compassionate behavior?

Is it the experience of perceiving someone else's pain? Or is it reliance on past emotional experiences?

This last possibility is new in the research literature on the topic. It is critical because it may influence the type of moral behaviour HFA and AS patients exhibit. A detailed analysis of the autobiographies of HFA and AS patients may provide an answer to this question. Thus, it may help us clarify the importance of empathy in HFA and AS moral behavior.

● **Prof. Dr. Kenneth R. Coventry**

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Object-Location Memory and Object Knowledge: Underlying Mechanisms and Neural Correlates

Remembering where objects are located is essential in everyday life. Without this ability, we would be continually engaged in looking for our keys, phone, or glasses. It may also hold one of the keys to understanding healthy vs. pathological ageing. However, the mechanisms of object-location memory are not well understood.

Our work focuses on the underlying mechanisms of memory for object location, with a focus on how information about what objects are affects memory for where they are. Previous research has shown that memory for where an object is located is affected by knowledge about that object, including information about its ownership, familiarity, or how it has been previously described. For example, owned objects are remembered as closer to the viewer than not-owned objects.

Most models of object-location memory assume that object properties are bound to object location and can therefore affect location memory only at retrieval but not at encoding. In contrast, consistent with models of predictive coding, the expectation model suggests that memory for object location is a concatenation of where an object was and where it was expected to be, as a function of object knowledge.

Our project examines how and when object knowledge affects the representation of object location, using fMRI to tease apart these different models, help understand neural system underlying object-location memory, and test whether effects occur at encoding or retrieval.

Note: Prof. Dr. Kenneth Coventry is engaged in a collaborative project with Dr. Harmen Gudde.

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Mechanisms of Behavioral Evolution

By observing animals—including ourselves—we may observe that very different animals exhibit very similar behaviors (e.g., mating, aggression, parental care). The observation of similar behaviors across different species leads to the question about whether evolution repeatedly results in the same or distinct mechanisms in the brain to develop similar behaviors. In other words: are there many possible “nervous system solutions,” such that underlying neural mechanisms are different across individuals, sexes, and species? Or are biological systems constrained, such that solutions are limited and mechanisms are shared?

Addressing these questions requires unifying the strengths and insights of evolutionary biology, neuroscience, and

computational biology. The goal of my HWK junior fellowship is to develop a comprehensive research framework and research proposals that address fundamental questions about how brains can be simultaneously remarkably flexible and robust and how this influences animals’ ability to change their behavior to meet environmental challenges immediately, throughout their lifetimes, and across generations.

Expanding our understanding of these phenomena will contribute to a more holistic understanding of brain functions with important consequences for diverse fields—from evolutionary biology to human health.

● Dr. Harmen Gudde

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Universität Bremen



Object-Location Memory and Object Knowledge: Underlying Mechanisms and Neural Correlates

Remembering where objects are located is essential in everyday life. Without this ability, we would be continually engaged in looking for our keys, phone, or glasses. It may also hold one of the keys to understanding healthy vs. pathological ageing. However, the mechanisms of object-location memory are not well understood.

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My project examines how and when object knowledge affects the representation of object location, using fMRI to tease apart these different models, help understand neural system underlying object-location memory, and test whether effects occur at encoding or retrieval.

Note: Dr. Harmen Gudde is engaged in a collaborative project with Prof. Dr. Kenneth Coventry.

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The Reproducibility/Replication “Crisis” in Biomedical Sciences— A Scoping Literature Review

Over the last decade, large-scale replication projects have led to mounting evidence that there is a “replication crisis” in the biomedical sciences. We appear to produce results that cannot be replicated, i.e., confirmed using independent datasets. Unreliable research is not only a waste of time and money, it also slows down translation from preclinical research into clinical benefit for patients and might even put patients at risk if clinical trials are initiated based on unreliable preclinical evidence.

While many underlying causes and potential solutions to this “crisis” have been proposed, it is unclear what the evidence is that the “crisis” even exists and that suggested solutions would make a difference. Therefore, I propose to conduct a scoping literature review

with three main aims: 1) To provide an overview of the current state of the literature in biomedical meta-research on the “replication crisis,” its underlying causes and solutions; 2) To identify gaps in knowledge where more meta-research is required; 3) To investigate differences between preclinical and clinical research regarding the evidence for a “replication crisis.”

As grassroots networks of researchers are starting to advocate for systemic cultural change to improve reliability of research results, a solid and critical review of the evidence is required if we want to convince researchers, institutions, funders, and government agencies that this culture change is needed and a good investment of both time and money.

● Dr. Xiaojing Li

Joint Research Fellow
funded by the Medical Faculty Oldenburg

Fellowship

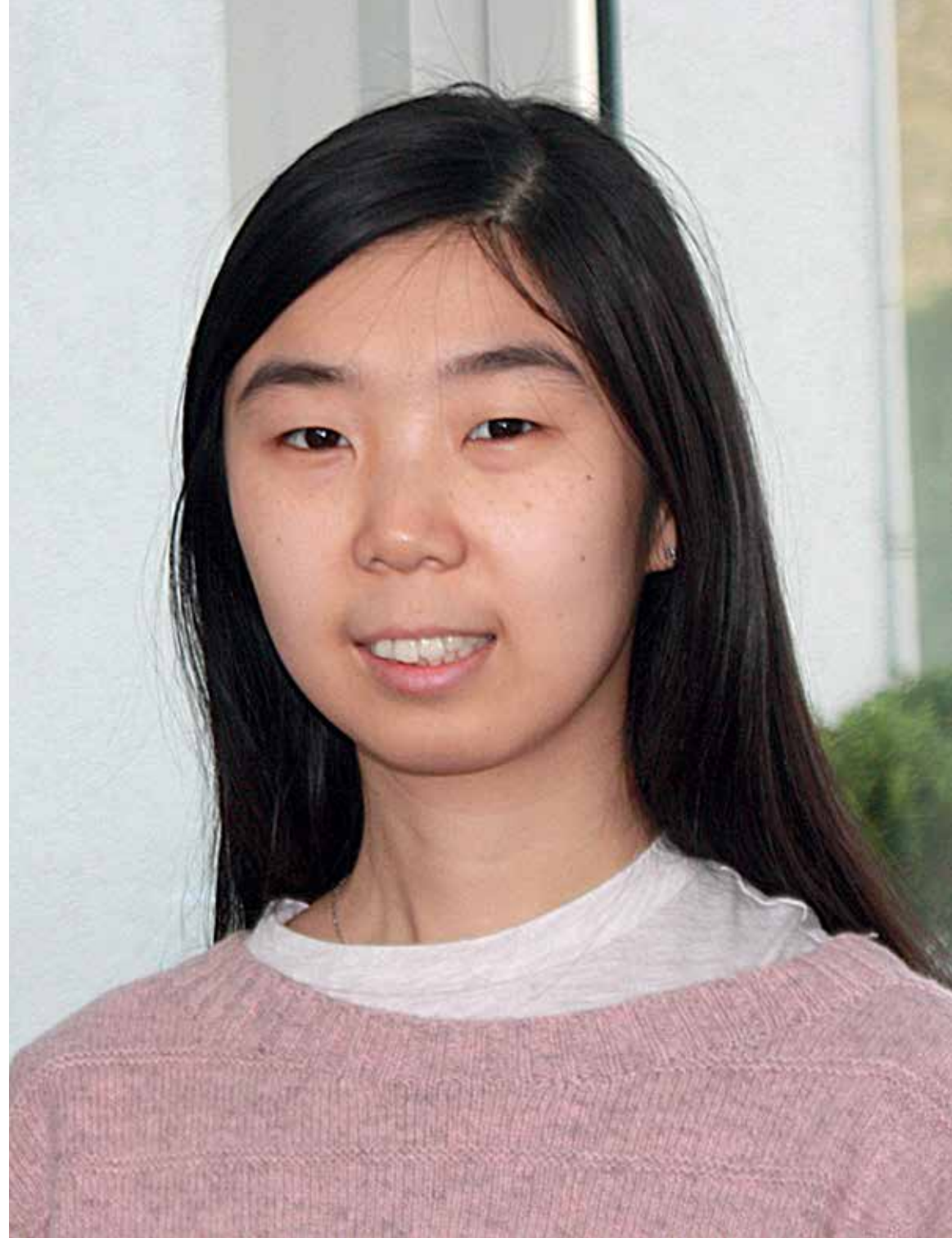
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Toward a Signal Complexity-Based EEG Biomarker for the Early Detection of Alzheimer's Disease

Alzheimer's Disease (AD) is now the prevalent form of dementia among the elderly. However, the diagnosis of AD is still largely based on memory-loss syndrome after the onset of the disease itself and no definitive early-stage investigation. Therefore, we urgently need to illuminate early physiological alterations indicating the risk for developing the disease.

In recent years, a plethora of studies has been published investigating potential biomarkers for early diagnosis of AD. An emerging field aims to explain alterations in the underlying complex neural dynamics of brain activity resulting from cognitive impairment, because the brain's signal complexity is a property that has been shown to be functional in both cognitive ability and mental disorder.

In the proposed study, we intend to investigate a measure of entropy, which is a recently established index for quantifying biological signal complexity. Building upon a previous study on younger adults at risk for AD, we aim to examine whether this measure can differentiate between young adults at risk for AD, healthy elderly individuals, and older adults with mild and severe cognitive impairment. The study will contribute to the establishment of early, low-cost neural biomarkers of AD—an endeavor that is considered highly relevant to AD diagnostics.

● **Assoc. Prof. Dr. Nikolaos Makris**

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January 2020–March 2020

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MRI-Based Parcellation of the Human Brainstem

Our brain constantly monitors our bodily functions and the outside world through its dual connection with our internal world on the one hand, and the external environment on the other. It is through this dual connection that our brain mediates efficiently between the vital vegetative requirements of the body and the continuously changing world around us. How the brain is anatomically and physiologically equipped to carry out this very complex activity is a critically important field of investigation in current neuroscience and medicine in general. Importantly, neurochemical, functional, and metabolic studies have shown that one part of the brain, namely the brainstem, plays an important role in numerous brain functions other than vegetative such as awareness, fear, pleasure, attention, and memory.

Brainstem organization and integration within the brain is related to its anatomic connections. Recently, these conceptual neurobiological and behavioral developments have been put to experimental testing using cutting-edge neuroimaging technology that facilitates more detailed study of brain anatomy, physiology, and metabolism. Arguably, the brainstem has been the least-studied so far among the intracranial brain structures despite its undisputed relevance in autonomic, affective, and cognitive functions, and, most importantly, states of consciousness.

The goal of my work is to elucidate the detailed structural anatomy and especially the connections of the human brainstem.

● Prof. Dr. András Imre Mihály

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Survey of Anatomy, Histology, and Embryology Education in the Medical Curriculum of Three Different European Union Universities: Comparison of Anatomy Teaching in the Medical Faculties of Groningen, Oldenburg, and Szeged

The European Commission aims to create the European Education Area by 2025, in which learning, studying, and research will transcend borders. We plan to study and compare the education systems of three different EU universities. We have chosen to focus on medical faculties because, on the one hand, the quality of the training provided by these faculties greatly impacts public health. On the other hand, the migration of medical doctors increased significantly over the last ten-to-fifteen years, meaning that EU countries now host medical practitioners coming from other EU countries. The mobility of these medical practitioners makes it clear that quality standards in training are essential.

Anatomy is not only a cornerstone of basic and clinical sciences, but also one of the biggest learning challenges for the medical student. New and advanced educational methods have made greater knowledge possible. We intend to study these methods and the number of anatomy topics and their place in the curricula of Rijksuniversiteit Groningen, Universität Oldenburg, and University of Szeged. We will also observe, discuss, and conduct literature research and statistical evaluations to ascertain the possible practical significance of gross anatomy, neuroanatomy, histology, and medical embryology for medical students.

● **Asst. Prof. Dr.
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Foundations of Higher Cognition with Applications to the Trolley Problem in Autonomous Vehicles

Due to several accidents caused by semi-autonomous vehicles in the US, artificial intelligence may once again become subject to public debate, and we want to ensure that these powerful systems, as we increasingly trust them with our lives, will act ethically. Asimov's robot laws, for example, may seem to form a good basis for robots to make ethical decisions, but there is a problem. Our most powerful systems currently have only a rudimentary understanding of the world and are still far from understanding moral precepts. To go from their rudimentary acquisition of abstract knowledge to transferring it to other agents is one of human beings' distinct abilities.

Building upon a previous cognition system that is able to understand and picture spatial, temporal, and similar relationships in a quasi-natural language format, my project goes one step further. I propose to implement a simple ethical coordinate system at the boundary between human and animal intelligence and to test it on a widely debated problem known as the "trolley dilemma": imagine a trolley is running down a railway track onto which a group of people has been tied; you are standing at a switch and could redirect the trolley to a side track, where only a single person is tied to the tracks; would you pull the lever? The answer people give varies depending on ethical, spatial, temporal, and social factors. A trustworthy AI would be one with a "gut feeling" similar to ours.

● **Dr. Monika Turk**

Joint Research Fellow
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Cognitive Deficits in Patients with Parkinson's Disease

Parkinson's Disease is a frequent and severe disorder. Patients with Parkinson's disease not only have difficulties with certain movements, but often also with cognitive functions. When Parkinson's disease is diagnosed, 35% of patients already exhibit cognitive impairments. Later on, 20–30% of patients develop severe cognitive deficits (dementia). In patients with Parkinson's disease, it is mainly the functions of the frontal part of the brain that are impaired. Researchers believe that changes in the brain's neurotransmitter systems cause these cognitive deficits.

1. Which cognitive functions are mainly affected in patients with Parkinson's disease?
2. When do cognitive deficits appear in the course of the disease?
3. What is the effect of therapy on cognitive deficits?

I will use a data set already available at the Universität Kiel and consisting of seventy patients with Parkinson's disease and thirty age-matched healthy controls. All participants have been tested with different cognitive tests: the ultimatum game, reversal learning test, Iowa gambling task, and Wisconsin card sorting test. These tests assess the ability to make decisions and to perform higher cognitive functions that involve planning and problem solving.



Earth 2020

● **Asst. Prof. Dr. Marshall Bowles**

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A Highly Resolved Spatial Analysis of the Biogeochemistry of a Common Salt Marsh Grass Rhizosphere

Coastal areas are very important globally for storing carbon, but are also very susceptible to environmental change (e.g., sea-level rise). We are still learning a great deal about natural coastal areas that are often dominated by the presence of marsh grasses. In the sediment where marsh grass grows, a diverse group of microbes has been identified; we have observed them respiring carbon dioxide and methane, both important greenhouse gases. However, important features of how marsh grasses or their roots and microbes interact are not yet understood. A complication to progress in understanding how roots and microbes interact is driven by their size, with plant roots in the millimeter scale and microbes in the micrometer scale. Any technique used to describe the interaction between roots and microbes must be able to work over very small spatial scales.

A newly developed technique called Mass Spectrometry Imaging allows microbes to be identified in two-dimensional space so we can see how groups of microbes interact with roots. My project applies this technique using natural samples and, through experiments, simulates the effects of global climate change, i.e., increasing salt concentrations related to sea-level rise. The goal is to determine how greenhouse gas emissions and plant-microbe interactions are influenced by high-resolution, two-dimensional analysis.

The HWK fellowship and unique expertise at MARUM enable this work; it is one of the few places where imaging of this type may be done.

● Dr. Alessa J. Geiger

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Fellowship

December 2020–June 2021

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Combining Terrestrial and Marine Records to Track Patagonian Ice-Sheet Dynamics in Southwestern Chile

Numerical models are used to predict future changes in the loss of glacier ice mass and subsequent global sea-level rise associated with increasing global atmospheric temperatures. These models are based on physical principles governing our natural environment. To fine-tune these models, they need to be tested against empirical data of glacier change during periods of non-anthropogenic climate change in order to understand the natural variability of glacier and climate systems.

I aim to build a chronology of glacier change along the former marine terminating margin of the Patagonian Ice Sheet in southwestern Chile. For the project, I will use geological dating techniques to establish when, for how long, and what shape the Patagonian Ice Sheet took in the Chilean Fjords

between 52–56° South. In parallel to land-based work, marine cores collected west of the Chilean Fjords will be analyzed for traces of sediment transported by icebergs to further elucidate changes in Patagonian ice-sheet dynamics during the last glacial period and deglacial phase (115-12 thousand years). Ice-sheet changes in morphology over time will be compared to the marine core sediment flux and to empirical constraints at the eastern margin in order to build a comprehensive understanding of Patagonian ice-sheet dynamics during the latest major natural climate reorganization.

The empirical data from this study will be used to test and refine coupled climate-ice-sheet models to enhance their predictive capacity.

● Dr. Cajetan Neubauer

Fellow

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Studying the Biosynthesis of Unusual Archaeal Lipids with New Tools for Isotope Quantification

How do microbes live in their natural habitat? This question becomes important every time we want to kill a pathogen or need to predict how a changing environment will affect microbial processes, for example production of the potent greenhouse gas methane. Today, we can closely examine living things by weighing the masses of molecules with a mass spectrometer. Particularly useful for answering our question are isotopes, variants of the chemical elements that differ only in the number of their neutrons. Biological processes lead to ordering of the isotopes in biomolecules. These small variations can then tell us much about what microbes are doing in an environment.

During my fellowship, I access new types of information about microbial metabolism by measuring isotopes. I add rare isotopes to microbes and determine how much of it gets incorporated into certain lipid metabolites. By doing so, I want to better understand a type of methane-producing microbe that has only recently been discovered in marine sediments. In a similar way, I also wish to measure natural isotope differences in lipids extracted from deep-sea sediments, which harbor a vast biosphere of poorly understood microorganisms. This can tell us how microorganisms live when they have severely limited access to nutrients and energy.

● Dr. Beth N. Orcutt

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Microbe-Mineral Interactions in Subsurface Oceanic Crust

Underneath the ocean, roughly 70% of the Earth's surface is covered by marine sediments and oceanic crust. Microscopic life—microbes like bacteria and archaea—exist in this dark, deep-sea environment, cycling elements and eating carbon. Below the seafloor, there is a vast reservoir of life on Earth, yet we do not fully understand how all of the microbes get their energy to grow, the full impact of their activity on chemical cycling, and even how many microbes there are. In particular, knowledge of the extent, diversity, and function of life in the sub-seafloor rocky oceanic crust is poorly understood. For the past several years, I have been conducting novel sampling and incubation experiments within the sub-seafloor to examine how microbes interact with rocks.

For this project, I collaborate with scientists at the Universität Bremen to examine the change in mineral chemistry associated with microbial growth, to figure out which rock types microbes prefer to colonize, and how they may alter the rocks that they grow on. I also work with these scientists to determine the amount and types of microbial life colonizing these rocks to figure how much life can be supported by these fluid-rock interactions.

Ultimately, these analyses will help us to figure out which microbes are “rusting the crust” of Earth and inform us of the possibility for life on other planets with liquid water and crustal rocks.

● Dr. Stephanie Plön

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Fellowship

December 2020–September 2021

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Whales and Dolphins as Indicators of Ocean Health— A New Transdisciplinary Approach to the Anthropocene

We are living in an era that is recognized as having been shaped by man to a greater extent than ever before—scientists are calling it the *Anthropocene*. This means we are increasingly seeing a number of impacts on marine mammals caused by human developments. These include pollution, noise, disease, poor nutrition due to overfishing and habitat degradation, and the effects of climate change—all together reflecting a deterioration of the health of our oceans. Yet increasing evidence suggests that marine mammals play an important part in regulating climate.

Living in the Anthropocene means that we need to find new solutions to ensure our survival on this planet. Using marine mammals as indicators of ocean health, I intend to develop a science and communication strategy that

launches *ocean health science* as a new way of finding solutions across different disciplines. Studies on marine mammals will be used as illustrations and will help motivate partners especially from the industry to join the discussion to restore and promote ocean health. Central to this will be a bilateral workshop between South Africa and Germany, the development of a transdisciplinary training course, a communication strategy involving natural history museums in London and Berlin, as well as a website and television documentary.

Ultimately, I hope to engage the community of marine mammal scientists to establish a global network of ocean health researchers that act locally to promote ocean health and ocean health science.

● Prof. Dr. Andreas Teske

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Microbial Processing of Fossil Organic Carbon in Hydrothermal Sediments of the Guaymas Basin

Fossil carbon, for example petroleum and gas, is not only used by human civilization but also by microorganisms and entire ecosystems that rely on these unusual carbon sources. We are learning more about the unusual microorganisms that are using hydrocarbons as a nutrition and energy source thanks to their novel biochemical capabilities and pathways and how these organisms are influencing the fate of petroleum and gas in nature.

By the same token, such knowledge should be useful to deal with the consequences of releasing hydrocarbons into the biosphere. Studying these microorganisms and processes requires an ecosystem where hydrocarbon-processing organisms are consistently abundant and the processes active;

the oil-rich hydrothermal vent site of Guaymas Basin in the Gulf of California is an excellent candidate. No other marine oil seep has already yielded such promising discoveries on all aspects of microbial hydrocarbon utilization, from identifying and cultivating the organisms themselves and tracing the hydrothermal and microbial changes in organic material within the sediments to tracking the fate of hydrocarbons under microbial attack.

Having joined my research cruises to Guaymas Basin, my research partners at the Max-Planck-Institut für Marine Mikrobiologie, the Universität Bremen, and the Universität Oldenburg have set the stage for a multi-disciplinary investigation of the Guaymas Basin oil-processing ecosystem.



Energy 2020

● Dr. Kamal Hajian

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Gravitational Waves, Memory Effect, and Black Hole Microstates

After the initial observation of gravitational waves in 2015, investigation of different aspects of this interesting phenomenon has been an active line of research in physics. One important aspect of these waves is the memory effect: when such a wave passes through an empty region of space, it affects the empty space and leaves a memory imprint behind. This effect is different from other such imprints (e.g., on hard disks in our computers), as the memory imprint is saved in an empty region of space where no matter is present. The data in the gravitational memory effect are encoded in some conserved charges called *soft hairs*. This amazing feature of nature opens a gate to our understanding of spacetime. Specifically, the memory effect is related to black hole physics.

About forty years ago, physicists discovered that black holes exhibit interesting features: they have some (yet unknown) microstates which can carry and store information.

In fact, black holes are known to have the highest capacity-to-volume ratio for storing information. Nonetheless, it is still a mystery how to identify the physical entities responsible for carrying such information. Recently, there has been progress in this interesting line of research by identifying the soft hairs of black holes. Soft hairs exist close to its horizon, and are called *horizon fluffs*. Studying soft hairs sheds light on some long-standing problems in black hole physics.

● Assoc. Prof. Dr. Martin Obligado

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Fellowship

June 2020–August 2020

Home institution

Laboratoire des Ecoulements Geophysics et Industriels (LEGI)
1209-1211 Rue de la Piscine
Saint-Martin-d'Hères
France

Cooperation partner

Prof. Dr. Joachim Peinke
Institut für Physik
Universität Oldenburg
ForWind – Zentrum für Windenergieforschung
der Universitäten Oldenburg, Hannover
und Bremen



A Benchmark Study on the Role of Turbulent Dissipation in Wind Energy Applications

In the last few years, wind energy research has experienced exponential growth worldwide. In particular, the study of the flow downstream of one or several turbines has captured the attention of the turbulence research community. It is a fascinating problem that involves turbulent wakes, interactions between them, and their coupling with the background turbulent flow.

Despite this growing interest, many recent advances in the modelling of turbulent flows have not yet been adapted to such studies. They concern the understanding of the inner structure of turbulence: the energy cascade. The models show how energy is transferred from large to small scales and how the energy of the flow is dissipated. This complicated phenomenon has been found to ultimately define important

properties of turbulent wakes, such as their velocity deficit and how they spread in the direction of the air stream. It has recently been discovered that the standard model, developed by Kolmogorov in the 1940s, is not the only one relevant to wind energy applications. In the last few years, a new type of cascade has been identified in these flows. Because the conception and modelling of wind turbines and of wind farms relies on the standard model, it is key to study and characterize the presence of this new cascade in scenarios related to wind energy generation.

In my project, I carry out a fundamental study on the energy cascade of the turbulent wakes, and of how they are coupled to the background turbulent flow, shedding light on the relevance of the energy cascade for wind energy.

● **Assoc. Prof. Dr.
Debesh Ranjan Roy**

Fellow

Fellowship

November 2019–September 2020

Home institution

S. V. National Institute of Technology
Department of Applied Physics
Surat 395 007
Gujarat
India

Cooperation partner

Prof. Dr. Thomas Frauenheim
Bremen Center for Computational
Materials Science (BCCMS)
Universität Bremen



Possibilities of Inorganic Compounds and Biomolecules in Moletronics

The emerging demand for miniaturizing the dimensions of electronic gadgets with more efficiency led to the introduction of the field of molecular electronics or moletronics in place of conventional silicon-based technology. The primary purpose of this technology is to create the capacity to fabricate a greater number of electronic units (switches, IC's, etc.) in smaller spaces in a cost-effective manner.

Conventional silicon technology has reached its limit in meeting such demands due to its high fabrication cost and miniaturization limit. In this direction, molecular transport-based technology promises great development potential.

For a number of years, research in this field had been restricted almost exclusively to organic molecules. Very recently, researchers started exploring inorganic compounds (analogues to their organic counterparts) as well as biomolecules like DNA base pairs for better potential, cost-effectiveness, and easy synthesis advantages. In the recent past, my research group investigated inorganic aluminium nitride (an analogue of organic biphenyl) and parallel DNA base pairs, and observed their superior features compared to the respective organic counterparts. The advantageous properties of the proposed materials are expected to lead to a breakthrough with regard to the future of moletronics.

● Dr. Oleg Tsupko

Fellow

Fellowship

November 2020–March 2021

Home institution

Space Research Institute of Russian Academy
of Sciences

Profsoyuznaya 84/32

Moscow 117997

Russia

Cooperation partners

Prof. Dr. Domenico Giulini

Dr. Volker Perlick

Zentrum für angewandte Raumfahrttechnologie
und Mikrogravitation (ZARM)

Universität Bremen

Prof. Dr. Jutta Kunz

Universität Oldenburg



Appearance of Strongly Gravitating Objects to a Distant Observer: Black Hole Shadows and Self-Lensing of Emitting Compact Stars

In space, there are objects exhibiting very high gravitational energy: black holes and neutron stars. In such objects, a large mass is concentrated in a small region of space, which gives rise to strong gravitational fields. An effect of these fields is that light rays that pass close by these objects, or that are emitted by them, move along curved paths. This affects the image of the object that a distant observer detects: we perceive them in unusual, distorted ways. An amazing example of such an object is what is known as the black hole shadow: a very specific dark silhouette of a black hole which was recently observed in the galaxy M87. By studying the properties of this image, we can draw conclusions about the properties of the distant object itself.

In my project, I intend to pay attention in particular to situations in which compact objects are surrounded by plasma. Plasma is a dispersive medium, and in this case “rainbow effects” may be observed, caused by light rays of different frequencies that are deflected by it at different angles. In other words, gravitating objects surrounded by plasma act like refractive prisms, splitting light into its spectral colors.

In my project, I investigate how properties of such objects and their environments can be deduced from their appearance to the distant observer.



Society

2020

● **Asst. Prof. Dr. Marci Cottingham**

Junior Fellow

Fellowship

September 2019–June 2020

Home institution

Universiteit van Amsterdam
Department of Sociology
Nieuwe Achtergracht 166
1018 WV Amsterdam
The Netherlands



Viral Fear: The Global Ebola Response

Social sciences research on epidemics has detailed the emotions of those directly impacted by a disease. Yet as the Ebola panic in the global North spread over the course of the 2014-16 outbreak, airline travel was restricted, recruitment of health workers hampered, and doubt about the possibility of solving the outbreak—the very source of such fear—became intractable. Fear spread beyond the reach of the virus itself.

But how? Building on work in sociology and media studies, this interdisciplinary project examines epidemic emotions from the perspective of international organizations and remote publics.

Emotion scholarship has predominantly focused on individual states, with less attention to collective, digital, and cross-cultural processes. Tracing viral fear is key to understanding how a rising death toll in West Africa connects disparate events across the globe. From an infected nurse in Spain to a schoolyard attack in the Bronx—“viral fear” connotes both a fear of the Ebola virus and its virus-like spread during an outbreak.

Using cross-national comparisons and innovative digital data sources, the project findings move the study of emotion out of the laboratory and into the global, digital fray. In a hyper-connected world, understanding viral fear is critical to creating effective global health policies.

● **Christophe Delory**

Fellow

Fellowship

March 2020–May 2020

July 2020–August 2020

Home institution

Independent

Argenton sur Creuse

France



Norddeutsche Wollkämmerei & Kammgarnspinnerei (NDW): Photographs by Christophe Delory

From 1884 to 1981, the Norddeutsche Wollkämmerei & Kammgarnspinnerei (NDW) in Delmenhorst was an important company for the treatment of wool and combed yarn. It grew in the 1920s and eventually closed in 1981. Today, some of its buildings remain preserved and constitute one of the major industrial monuments of Europe. They are an important testimony to the historic architecture of large factories. On the site of the decommissioned factory, a district with a modern residential development deeply connected to the historic site was built. The district was a mix of old buildings later converted into new constructions. This rehabilitation took many years and gave rise to different architectural styles. These differences are testimonies to the period of their creation as well as the people they were built for. The integrity of these buildings forms a particularly complex whole.

I aim to document this kind of architectural richness. I also plan to reflect on the people's social interaction with this architecture and how they, the people and the buildings, "live together." My goal will be to create links between past and present, as well as between people of different cultures and social backgrounds. Photography has the power to connect people. In collaboration with the StadtMuseum Delmenhorst, I am also planning a public exhibition of the final works. The photographs will include portraits of citizens as well as architecture. This will be an opportunity to encourage today's inhabitants of the Nordwolle grounds to visit the museum revisit their collective memory, and remind themselves that the present does indeed write the past.

● Dr. Tim Dorlach

Junior Fellow

Fellowship

April 2020–July 2020

Home institution

GIGA Institute of Latin American Studies
Neuer Jungfernstieg 21
20354 Hamburg
Germany

Cooperation partners

Prof. Dr. Herbert Obinger
Prof. Dr. Carina Schmitt
SOCIUM – Forschungszentrum
Ungleichheit und Sozialpolitik
Universität Bremen



The Causes of Regulatory Welfare State Development: Lessons from Latin American Public Health Policy

Chronic diseases, such as cancer and heart disease, have become the world's leading cause of death, responsible for no less than 71% of all 56 million global deaths in 2015. Given that unhealthy diets and the resulting surplus weight and obesity are major causes of most chronic diseases, public health experts have urged governments to introduce stricter regulations, in particular nutrition labeling on the front of packaging.

While opposition from the food industry defeated several attempts to introduce effective food labels in Europe, Chile and several other Latin American countries have become global leaders in the field of nutrition labeling policy. Building on research conducted in Chile, Ecuador, Peru, and Uruguay, my fellowship project examines why and how Latin American governments have been able to address the global obesity crisis so decisively. Specifically, I explain why front-of-package nutrition labeling first emerged in Chile and then spread throughout Latin America over the past decade.

● **Assoc. Prof. Dr. Catherine Gegout**

Fellow

Fellowship

September 2020–February 2021

Home institution

University of Nottingham
School of Politics and International Relations
University Park
Nottingham, NG7 2RD
United Kingdom



The European Union and the Developing World: Protectionism and Exploitation, or Economic and Social Development

The EU intends to fight poverty and promote development globally. However, it has come under criticism from civil society. Firstly, the EU's Common Agricultural Policy establishes trade barriers and competes with exports from developing states worldwide. Secondly, with the Common Fisheries Policy, the EU subsidizes fish caught by European vessels and sets strict rules on market access. Thirdly, the EU has very limited regulation controlling European companies working in the developing world. Fourthly, the EU has few regulations to protect social and gender rights.

Despite these charges, there has been little research on the shortcomings of EU protectionist measures, regulations which affect the developing world, and trade policies. How does the EU hinder or, on the contrary, contribute to economic and social development?

My project, which consists in the writing of a book, will result in the first study of: 1) the challenges faced by the EU to promote development (economic growth and reduced inequalities); and 2) the extent to which EU economic policies help development.

It brings together three interdisciplinary literatures: political economy and critical political economy, labour rights, and gender. The book will consist of two parts. The first part will analyze the EU policies' impact on the development of agriculture and fisheries and regulations on resource exploitation and supply chains. The second part will show the extent to which the EU promotes or hinders development in Vietnam, Mauritius, and Peru.

● **Assoc. Prof. Dr. Amy Hasinoff**

Fellow

Fellowship

August 2019–July 2020

Home institution

University of Colorado
Department of Communication
1201 Larimer Street
Denver, CO 80204
USA



Revenge Porn and Community Accountability: Design Interventions

Sexting is relatively common: around one third of older teens and well over half of young adults choose to share personal sexual images with partners. While most respect one another's privacy, some people choose to share or post another person's private sexual images without permission; this online abuse is popularly known as revenge porn. The current legal, social, and technological responses to revenge porn do not address the root causes of sexual violence or the fact that it often occurs within intimate relationships. In this project, however, I look for ways to address revenge porn by turning to community accountability models of justice. These models recognize that violence committed by an individual emerges out of a social context and a community—and that the community is both responsible for and capable of addressing it.

While the unique harms of revenge porn rely on familiar issues of sexism and sexual shaming, what is new is the way these images can rapidly travel through digital social networks.

This project asks: How could those networks also be used to address revenge porn? Using interviews with victims, perpetrators, designers, and activists, this project will develop ideas for how the design of social media platforms and mobile phones could help both communities and perpetrators address revenge porn. Ultimately, this project argues that social media and communication systems should include better ways to prevent and address online harm in their design.

● **Assoc. Prof. Dr. Carsten Levisen**

Fellow

Fellowship

July 2020–February 2021

Home institution

Roskilde Universitet
Universitetsvej 1
4000 Roskilde
Denmark

Cooperation partner

Prof. Dr. Ingo H. Warnke
Universität Bremen



The Anglo Order of Knowledge: A View from Postcolonial Semantics

English has become the default language of international collaboration, theorizing, and scientific publication. Yet the use of English in academia and its consequences and complications are only rarely studied. All too often, English is believed to be transparent—a pure language of human thought and communication. Recently, linguistic research has begun to illuminate the pitfalls of international academia’s reliance on English, and this project launches a new cross-linguistic and interdisciplinary investigation of Anglocentric concepts, using new techniques from linguistic semantics, and with a postcolonial perspective that allows a critical exploration into “the Anglo order of knowledge.”

The goal of the project is to identify and challenge some of the most problematic Anglocentric biases in current global scholarship and is intended as a preventative: with cross-linguistic evidence, we seek to establish new guidelines for improving the current “language of knowledge” in global academia.

● **Assoc. Prof. Dr. Alison M. Moore**

Fellow

Fellowship

April 2020–August 2020

Home institution

Western Sidney University

School of Humanities and Communication Arts

Locked Bag 1797

Penrith, NSW 2751

Australia



Sexual Ageing in the History of Medicine

This project is about the different historical periods in changing medical concepts of menopause, andropause, sex-specific aging, and longevity from the 1600s to the 2020s. It will reveal how ideas about aging, longevity, and the sexes have changed across history and nuance our current views of old age, relevant to an increasing number of people in aging populations. This project will expose the importance of a massive body of overlooked nineteenth-century sources that have shaped modern views of sex-differentiated aging and longevity.

It will identify how the various biomedical concepts of aging emerged and will identify the origins of common contemporary expectations that sexual desire declines with age. It will consider both historical and contemporary forms of medical evidence, exploring how changing ideas and individual experiences of sex-specific aging may be a product of both cultural attitudes and of the new bodily experiences of everyday life in Western modernity. The project will have a high impact as a result of being a global history of modern concepts that combines rigorous survey of overlooked historical sources with consultation of current scientific evidence. It will produce the first-ever monograph on *Sex, Gender and Aging in the Global History of Biomedicine*.

● **Prof. Dr. Gerry van Klinken**

Fellow

Fellowship

August 2020–February 2021

Home institution

The University of Queensland
School of Historical and Philosophical Inquiry
St. Lucia QLD 4072
Australia



Typhoon Politics in Twentieth-Century Asia: States, Markets, Patronage

Of the 1.2 million killed by storms worldwide in the twentieth century, 1.1 million died in Asia alone. Ninety percent of those died due to storm surges that caused the sea level to momentarily rise by up to 5 meters or more, flooding low-lying coastal areas. Despite the use of satellite-based forecasting technology, the rate of deaths due to storms has not declined in Asia since the 1970s. Japan—rich and democratic after WW2—launched massive state-funded seawall engineering projects beginning in 1959. India did little in this regard until after 1999 and then adopted digital warning technologies. The Philippines attempted similar projects, but failed consistently to put in place effective and fair protective mechanisms.

Why these differences? Uncovering the answer with a view to the twenty-first century is the aim of my project.

Climate change will increase the frequency and impact of severe tropical storms. More extreme weather plus incremental temperature and sea-level changes threaten to undo decades of developmental progress in the Global South.

How well can Asian societies cope with these climate-related disasters? What alternative forms of governance emerged on a national level in the twentieth century, which losses caused by typhoons may be managed communally or which risks may be transferred? How can we explain their emergence? (Loss-sharing refers to state formation; risk transfer to market-based initiatives.) Asian polities show great diversity on the levels of state capacity and democracy, now considered crucial to their adaptive capacity.



Postdoc Program 2020

The Postdoc Program

Supporting early career researchers is an integral part of the Hanse-Wissenschaftskolleg's statutes and an important interdisciplinary aspect of our work. Our postdoctoral program plays a significant role here. Every year, up to six projects spearheaded by early career researchers from regional universities and non-university research institutions are selected to receive support following review by our Scientific Advisory Board. The program members are named associate junior fellows for three years. Unlike the other HWK fellows, they do not live on campus but conduct their research at universities or academic institutions in the region.

The program is open to young researchers in all subject areas.

The program's foremost goals are to strengthen the associate junior fellows' networks and to increase their visibility. We do this primarily by organizing workshops on the associate

junior fellows' chosen project topics. A further goal is to foster fruitful disciplinary connections between the associate junior fellows and our regular HWK fellows as well as the institute's cooperation partners. To this end, all program participants introduce their projects in the weekly Fellow Lectures and take part in the HWK's other events and activities. There are also events especially for associate junior fellows. In addition to the annual opening event for new members with keynote speeches by outstanding personalities in the academic or cultural world, we offer education and skills training as well as talks on particular topics. Finally, the respective program heads are available to provide career counseling and mentoring.

In the following pages, we introduce seven associate junior fellows who were accepted to the postdoctoral program in 2020.

Das Postdoc-Programm

Die Förderung des wissenschaftlichen Nachwuchses ist in der Satzung des Hanse-Wissenschaftskollegs (HWK) verankert und ein wichtiger fächerübergreifender Aspekt der Arbeit des Instituts. Eine bedeutsame Rolle nimmt dabei das Postdoc-Programm ein. Jedes Jahr werden bis zu sechs Projekte von Early Career Researchers aus Universitäten und außeruniversitären Forschungseinrichtungen der Region nach der Begutachtung durch den Wissenschaftlichen Beirat zur Förderung ausgewählt. Die Mitglieder des Programms bekommen für einen Zeitraum von drei Jahren den Status eines oder einer Associate Junior Fellow. Sie leben im Unterschied zu den übrigen Fellows des Hanse-Wissenschaftskollegs nicht auf dem Campus, sondern gehen weiter ihrer Forschungstätigkeit an den Universitäten oder akademischen Einrichtungen in der Region nach.

Das Programm steht jungen Wissenschaftlerinnen und Wissenschaftlern aller Fachgebiete offen. Seine Ziele sind vorrangig die Stärkung der beruflichen Netzwerke der Associate Junior Fellows und die Erhöhung ihrer Sichtbarkeit. Dies wird vor allem durch Workshops erreicht, die das Hanse-Wissenschaftskolleg für die Associate Junior Fellows zu den von ihnen gewählten Projektthemen ausrichtet. Darüber hinaus sollen möglichst viele fachliche Berührungspunkte zwischen Associate Junior Fellows und regulären Fellows im Hanse-Wissenschaftskolleg sowie den Kooperationspartnerinnen und -partnern des Instituts geschaffen werden. So stellen alle Mitglieder des Programms ihr Projekt im Rahmen der wöchentlichen Fellow Lectures vor und nehmen an anderen Veranstaltungen des Hanse-Wissenschaftskollegs teil. Außerdem werden spezifische Veranstaltungen für die Associate

Junior Fellows angeboten. Neben einer jährlichen Auftaktveranstaltung für neue Mitglieder unter Beteiligung einer herausragenden Persönlichkeit des akademischen oder kulturellen Lebens stehen auch Schulungen beziehungsweise Skill Trainings und thematische Vorträge auf dem Programm. Nicht zuletzt stehen die jeweiligen Heads of Program bei Bedarf auch für Karriereberatung und Mentoring zur Verfügung.

Im Folgenden stellen wir Ihnen die sieben Associate Junior Fellows vor, die 2020 in das Postdoc-Programm aufgenommen wurden.

● **Dr. Go Ashida**

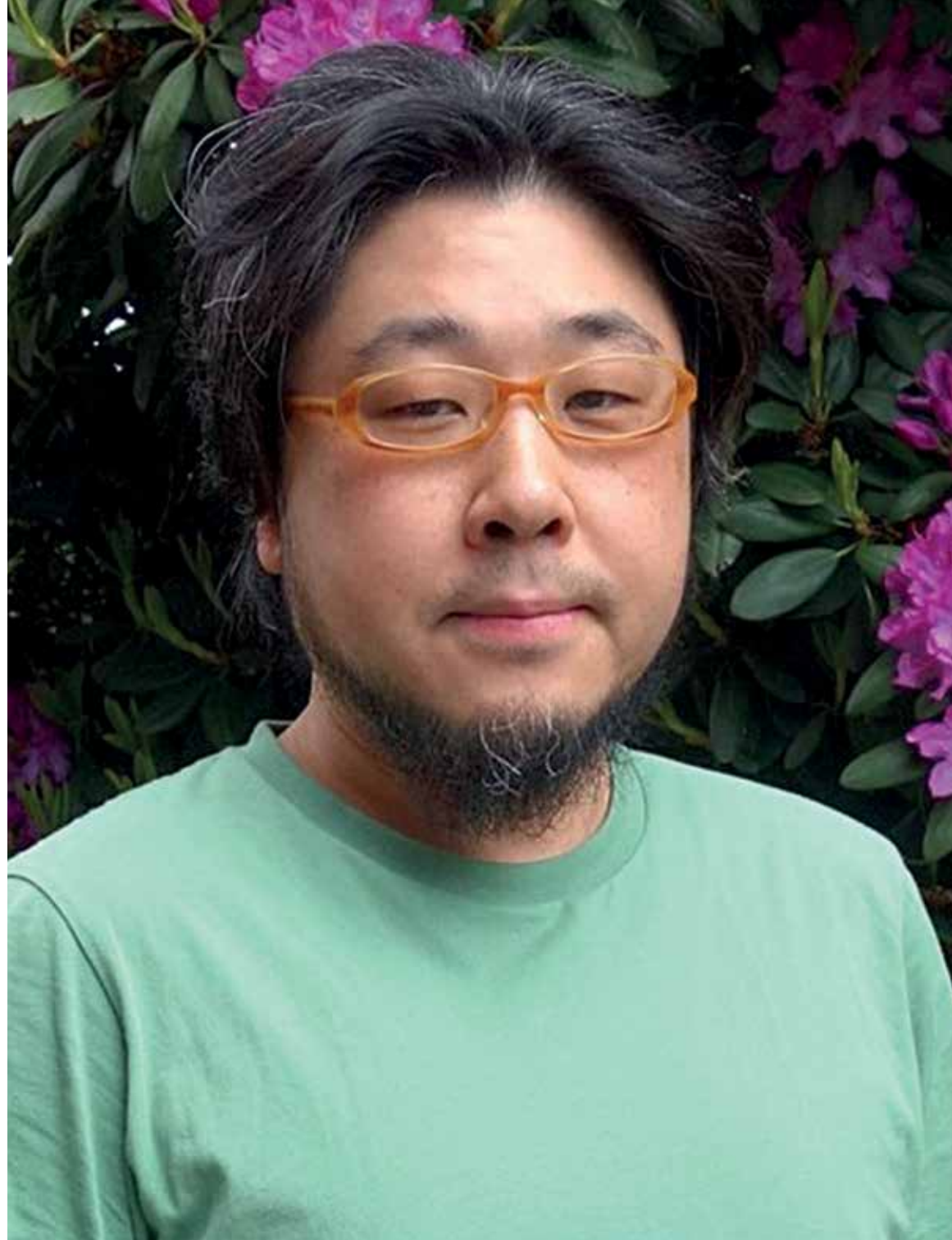
Associate Junior Fellow

Fellowship

July 2020–June 2023

Home institution

Universität Oldenburg
AG Computational Neuroscience
Fakultät VI, Exzellenzcluster “Hearing4all”
26111 Oldenburg
Germany



Computation in the Auditory Periphery: Physiological Foundations and Comparative Modeling

Computational modeling is an essential tool for hearing research. Auditory periphery models help us understand the fundamental functions of the first stages of the auditory system and enable us to simulate how and what sort of acoustic information is transferred to the brain to form a perception of sounds. Currently available auditory periphery models have been developed and tuned mostly with neurophysiological data from cats and psychoacoustic data from humans. In experimental auditory neuroscience, however, rodent species such as gerbils, chinchillas, and guinea pigs are now much more frequently used than cats. It is unclear how precisely the auditory functions of these lab animals can be simulated using existing models.

I intend to hold a two-day workshop towards the development of an auditory periphery model applicable to rodents. The first day will focus on comparative auditory nerve physiology and aims to reveal the similarities and differences among animal species that serve as the bases for computational modeling. The second day will focus on previous and ongoing modeling approaches to review existing techniques and to identify current and future challenges to auditory periphery models.

During the workshop, participants will have ample time for in-depth discussion with the goal of devising a set of physiological criteria that a good auditory periphery model should satisfy. I hope that this workshop will facilitate collaboration between auditory physiologists, model developers, and model users.

● **Jun. Prof. Dr. Katharina Block**
Dr. Thorsten Peetz

Associate Junior Fellows

Fellowship

July 2020–June 2023

Home institution

Jun. Prof. Dr. Katharina Block
Universität Oldenburg
Institut für Sozialwissenschaften
Sozialwissenschaften – Fak. I
Ammerländer Heerstraße 114-118
26129 Oldenburg
Germany

Dr. Thorsten Peetz

Universität Bremen
SOCIUM – Forschungszentrum
Ungleichheit und Sozialpolitik
Mary-Somerville-Straße 9
28359 Bremen
Germany



Jun. Prof. Dr. Katharina Block



Dr. Thorsten Peetz

Digitalization and Society: Do Social Transformations Call for New Theoretical Paradigms?

Today's societies are facing processes of digitalization that have the potential to result in fundamental social transformations. Since sociology as a scientific discipline is deeply intertwined with its subject, namely society, this situation also calls for a reflection of the analytical power of its core concepts.

During our fellowships, we will engage in a discussion on the consequences of digitalization for sociological theory. In order to do so, we will organize a symposium bringing together leading international scholars in multiple disciplines with expertise on digitalization. The symposium will address three central theoretical questions:

- 1) Do we need new basic concepts for social theory?
- 2) Are prevalent theories of society, with their focus on modernity, differentiation, and individualization still sufficient to grasp societal developments?
- 3) How do processes of digitalization interact with other important current transformations like the rise of populism, the ecological crisis, or the emergence of valuation society?

With the interdisciplinary focus of the event, we aim to inform sociological theory in dealing with multiple perspectives, as “doing theory” requires a cross-disciplinary practice.

● **Dr. Marijke de Belder**

Associate Junior Fellow

Fellowship

July 2020–June 2023

Home institution

Universität Oldenburg
Institut für Niederlandistik
Fakultät III – Sprach- und Kulturwissenschaften
Ammerländer Heerstr. 114-118
26129 Oldenburg
Germany



The Morphology-Phonology Interface

Word-formation relates to phonology, as words consist of sounds. My work raises the question about whether the sound/form aspects of word-formation belong to the independent module of morphology or whether they should be understood as properly belonging to the module of phonology in human cognition.

The conundrum is that in some empirical domains in some languages, words are systematically built in such a way as to become phonologically optimal (i.e., they become easier to pronounce). When word-formation fully obeys phonology, it seems that the form aspects of word-formation are phonology: a module will of course fully respect its own principles. However, in

other domains, the principles of word-formation make words phonologically more difficult. When morphology violates phonology, it seems to have its own requirements, suggesting that it is a module of its own.

My planned workshop will bring together scholars who currently contribute to our understanding of the interface between morphology and phonology. The goal is to define the most sophisticated current theoretical proposals and the data used to contribute to the debate. Specific attention will be given to scholars who have approached new empirical domains. Both experimental and theoretical work will be included in the workshop.

● **Dr. Jan Matti Dollbaum**

Associate Junior Fellow

Fellowship

July 2020–June 2023

Home institution

Universität Bremen
Forschungsstelle Osteuropa
Klagenfurter Straße 8
28359 Bremen
Germany



Bottom-Up Policy Change in Autocracies

How and under what conditions do citizens succeed in influencing policy decisions in authoritarian regimes? This question is at the heart of a multi-year postdoc project, of which my workshop will be an early and essential part.

Research literature holds that rulers have an incentive to respond to popular demands even in regimes that severely restrict mechanisms of participation and government accountability such as elections, courts, and the media. However, the conditions for such bottom-up influence on authoritarian policymaking remain poorly understood.

The purpose of my workshop will be to begin with a systematic discussion of the theoretical implications, measurements, and influence factors of bottom-up policy change in autocracies.

It will bring together experts on authoritarian regime functioning, social protest, non-contentious civic participation in autocracies, and policy outcomes of social movements.

The workshop is being held at an early stage in my project and will thus help me design concise hypotheses and robust research designs that allow for systematization and generalization in a methodologically and theoretically demanding research environment. It will stimulate joint publications of workshop participants and provide a solid basis for tackling research questions that are very important to both researchers and practitioners.

● **Dr. des. Karsten Levihn-Kutzler**

Associate Junior Fellow

Fellowship

July 2020–June 2023

Home institution

Universität Oldenburg

Institut für Anglistik und Amerikanistik

Fakultät III – Sprach- und Kulturwissenschaften

Ammerländer Heerstraße 114-118

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Germany



Imperial Britain and the Memorialization of Extinction

The current biodiversity crisis, shaping up to be the “sixth extinction” of geological history, must be read against the background of European colonialism. The nineteenth century saw both a significant acceleration of species extinction globally and the formation of the modern scientific understanding of extinction. The genesis of this understanding was deeply entangled with debates about cultural and linguistic extinction, processes that were also hastened by colonialist policies. Yet British imperialism was not only causing extinctions, both cultural and biological; it was also invested in memorializing them in popular narratives, visual culture, zoos, museums, botanical gardens, and ethnographic exhibitions.

My proposed workshop will explore the entanglement of the scientific discourses of extinction, British imperial expansion, and the emergence of institutions and practices for preserving and remembering extinct species and cultures in the nineteenth century. It will bring together scholars of environmental history, the history of science, cultural memory studies, postcolonial ecocriticism, and literature and science scholarship to offer complementary perspectives on the emergence of narrative, visual, and museological practices of preserving and memorializing extinct species and cultures throughout the nineteenth century.

● **Dr. Tim Ziemer**

Associate Junior Fellow

Fellowship

July 2020–June 2023

Home institution

Universität Bremen
Medical Image Computing Group
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28359 Bremen
Germany



Interactive Sonification Workshop

The Ison 2022 is the seventh international workshop on interactive sonification. It will focus on psycho-acoustic closed loops. Sonification and auditory displays are increasingly becoming an established technology for exploring data, monitoring complex processes, or assisting exploration and navigation of data spaces. Sonification addresses the auditory sense by transforming data into sound, allowing human users to extract valuable information from data by using their natural listening skills. The main differences between sound displays and visual displays are that sound may:

- alert listeners to events outside of their visual foci,
- represent changes over time,
- emphasize microstructures,
- rapidly portray large amounts of data, and
- holistically bring together many channels of information.

Sonifications typically evolve over time since sound is inherently a temporal phenomenon. Interaction thus becomes an integral part of the process because we must select, manipulate, excite, or control an auditory display. This has implications for the interface between humans and computers.

Working sonification requires the interpretability of the sonified data. Psychoacoustics offers a way to improve interpretability. The 2022 meeting will offer the chance to:

- meet experts in sonification,
- present and demonstrate individual research projects,
- attend practical workshops on selected topics,
- strengthen international networking in sonification research, and
- learn about new exciting trends.



Arts & Literature 2020

● **Dr. Vlad R. Baci**

Artist in Residence

Fellowship

October 2020–February 2021

Home institution

Independent

Iași

Romania



Candle of the Soul: An Opera Inspired by Eye Movement Desensitization and Reprocessing Psychotherapy

Eye movement desensitization and reprocessing (EMDR) psychotherapy has been proven a successful method for treating trauma. Although EMDR psychotherapy was initially developed with eye movement in mind, scientists have recently experimented with alternating sounds.

Inspired to compose an opera incorporating the EMDR procedure, I plan to do research on this therapy by working with neurologists, psychotherapists using EMDR, and acousticians who work in medical research. I intend to understand the states of the brain during the REM (Rapid Eye Movement) phase of sleep and the link between REM and EMDR.

This will include identifying brain frequencies modulated by EMDR in order to translate them into melodies, sound intervals, rhythmic pulsations, etc. After doing this research, I plan to write an opera entitled *Candle of the Soul* under the motto “The Eye is the Lamp of the Body” (Matthew 6:22). The main character experiences a childhood trauma and later develops a multitude of symptoms. He is taken through the eight phases of EMDR psychotherapy which are organized into three acts: Act 1 (Phase 1: History and Treatment Planning; Phase 2: Preparation; Phase 3: Assessment); Act 2 (Phase 4: Desensitization; Phase 5: Installation; Phase 6: Body Scan), and Act 3 (Phase 7: Closure and Phase 8: Reevaluation).

● **Sandra Boeschstein**

Artist in Residence

Fellowship

November 2020–April 2021

Home institution

Independent
Zurich
Switzerland



WHEN BOUNDARIES VISIT THE CENTER - Drawing Research on the Qualities of the Unideal and the Indirect

I draw in various ways to create collisions and layers: unspectacular but with underlying meaning with respect to the question of how meaning itself emerges. Developments and statements are often visualized in juxtaposed sequences of images. I am interested in a less visible structure: the principle of layering. Overlays, covering up, crossing out, scraping away, and erasing are being used less and less. And visible edges, ruptures, and changes in direction are increasingly being removed or deleted. In remembering, memory, and history, however, superimposing or layering remains a seminal principle.

We learn to perceive the tension between imagination and surprise by looking at layers and their non-linear qualities. One layer is called into question by the next and in the best case, we become immersed in a dense weave of losing and finding. This way of proceeding offers an opportunity for knowledge that can be gained only indirectly.

● **Thorsten Encke**

Artist in Residence

Fellowship

October 2020–February 2021

Home institution

Independent

Hanover

Germany



Algorithms and Their Applicability in Composing Music

The Greek word *technologia* can be translated as “systematic treatment of an art.” Today, the term *technology* stands for the highly specialized conversion of raw materials into technically sophisticated products. These are changing the world at ever greater speeds. New forms of communication and a society that is globally connected thanks to media are pushing established systems to the brink. Or, as the author Neil Postman writes, “...technological change is always a Faustian bargain: Technology giveth and technology taketh away.”

For the 200th anniversary, the Konzerthaus Berlin (formerly Schauspielhaus Berlin) has commissioned me to create a music composition. The motto of the

anniversary celebration is “The Pact with the Devil.” The conversion of the musical raw material into forms of mathematically structured sound puzzles is the speculative “devil’s pact” in my piece.

I would like to use my composition to research the effects of algorithms on the composition process. To what extent are computer-based, controlled procedures able to solve creative problems? How can we connect the technical handling of music materials with the intuitive nature of the creative process? In cooperation with researchers at the HWK, I would like to find out whether we can use digital methods to inspire artists’ imaginations and expand their creative horizons.

● **Asst. Prof. Chrissy Kolaya**

Writer in Residence

Fellowship

January 2020–June 2020

Home institution

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Cooperation partners

Susan Gaines
Universität Bremen

Fiction Meets Science project



The Second Voyage of Audley Worthington

During my fellowship, I plan to complete my new and second novel, *The Second Voyage of Audley Worthington*, a book about the disappearance of a nineteenth-century naturalist. The novel tells the stories of a varied group of characters across time and place, each connected by their shared fascination with the mystery of Worthington's disappearance and his search for the "yuma," the strange creature said to exist in the island's interior.

In *The Second Voyage of Audley Worthington*, I am working with new narrative techniques and subject matter.

My roots are in literary fiction, but in this book, I am experimenting with techniques from the mystery genre and from nineteenth-century adventure fiction to explore themes that include the relationship of wonder to science, the psychology of cryptozoology (the study of animals not recognized by science), what Gregory Forth, author of *Images of the Wildman in Southeast Asia* calls "the human-animal boundary," and the idea that it is only through "Western experience" that we confirm a phenomenon's "empirical reality."

● **Prof. Dr. Brook Miller**

Scholar in Residence

Fellowship

January 2020–June 2020

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Cooperation partners

Prof. Dr. Anton Kirchhofer
Universität Oldenburg

Fiction Meets Science project



Narrative and Experience

What role does narrative play in our experiences? If we are, as a popular book claims, “the storytelling animal,” how integral is narrative to how we engage the world? Is narrative solely a retrospective or imaginative imposition of form and meaning on our experiences? Do experiences have narrative features as we process them? In my current book project *Narrative and Experience*, I consider these questions in light of emerging research in narrative theory, cognitive psychology, and the neurosciences.

Narrative and Experience describes how early models of narrative’s role in basic cognitive processes were based upon misleading assumptions about

what counts as narrative. I argue that prioritizing narrative features and narrativity over formal, textual narratives helps us understand the importance of narrative as a “logic” or human capacity. The book argues that emergent models of cognition and emotion in philosophy and psychology are consonant with this view of narrative—specifically, accounts of the mind as a “prediction machine” and the recognition of emotion as integral to cognition. I argue that narrative processing occurs in basic perception as “weak narrativity,” and that this processing impacts key forms of higher order cognition, such as autobiographical memory, selfhood, and social cognition.

● Prof. Dr. Robert Mitchell

Scholar in Residence

Fellowship

June 2018–July 2018

September 2020–December 2020

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Fiction Meets Science project



Nineteenth-Century British Novels, Liberalism, and the Biopolitical Sciences of Population

My project focuses on relationships between nineteenth-century British novels and the sciences of population that first appeared alongside these literary texts. Nineteenth-century novels and the sciences of population had a surprisingly intimate relationship: Mary Shelley's *Frankenstein* (1818), for example, was written partly in response to Thomas Malthus's *An Essay on the Principle of Population* (1798), itself an attack on the political philosophy of Mary Shelley's father, William Godwin. The topic of population is central to the novel's plot—Victor Frankenstein fears that creating a second creature could spawn a population of creatures that would destroy humankind—and the strange plot of *Frankenstein* encouraged its first reviewers to reflect on different “species” (what we now call genres) into which nineteenth-century novels were differentiating themselves.

Relationships between population and novels were not limited to *Frankenstein*, for the characteristically huge populations of characters in the realist novels of authors such as Dickens and Eliot emerged in part in response to the increasing importance of population statistics. My project explores both how nineteenth-century British literature mediated the sciences of population for wider audiences, and how the sciences of population encouraged the development of literary techniques we now consider essential to this literary form (e.g., large populations of characters; free indirect discourse; segmentation of the book market by genre).

● **Nadine Ribault** (†)

Artist in Residence

Fellowship

January 2020–March 2020

Home institution

Independent

France



The Haunting Symphony of Desire

During my stay at HWK, I plan to work on the essential link between nature and desire. My thesis is that the prevailing ideology of the domination of nature leads to the vanishing of desire. In contrast, visiting and becoming acquainted with nature from which industrial activity has been eliminated (though this may now seem impossible) nourishes and sustains a strong and deep desire in human beings.

I propose to collect materials, journals, magazines, and photographs to create a series of collages. Preliminary thematic titles for this series would be: *Tombs, Cemeteries, Ruins, Birds, Coastal Heathland, Moorlands*. My aim is also to create drawings. Using inks, pastels, felt pens, charcoal, and colored pencils,

I plan to draw a series of thirty works based on a selection of citations from Novalis' work. I also plan to make short visits to the coast (Frisia, Wadden Sea, Heligoland) to prepare the writing of a new *carnet* (French for "notebook") in my already published series of *carnets*, entitled *Carnets de la Mer des Wadden*.

Furthermore, I intend to focus on the link between this very distinctive landscape and the conditions for the existence or non-existence of desire. My *carnets* always deal with questions of ecology and how human beings still need a powerful link to nature to preserve their creativity and nourish their internal movement and drift.

● **Lida Sherafatmand**

Artist in Residence

Fellowship

December 2019–January 2020

Home institution

Independent

Msida

Malta



Neuroscientific Aesthetics

After twenty years of steady painting and research, I have developed an artistic concept that I call *florescence*. This artistic concept focuses on the expression of florescence, that is, of flourishing and blooming. I explore organic forms in my paintings and integrate results from the social sciences into my works to link the paintings with the social realities that we live in.

At the HWK, I plan to take my work a step further by exploring organic forms and patterns that are not visible to the eye. These would be neurological patterns. I believe the forms and shapes created by nature are all interconnected at some level, and I would like to explore this interconnectedness further in

experiments to make these patterns visible in my painting and see whether viewers experience deeper connections with them as a result. I also want to explore how far such patterns can create a resonance in the bodies and minds of the viewers.

In the age of digitalization and artificial intelligence, it is important not to lose touch with our human connections and I would like my paintings to nurture those connections, contribute to our ability to keep our balance, and foster human warmth in society.

● **Ulrike Syha**

Writer in Residence

Fellowship

January 2020–June 2020

Home institution

Independent author

Hamburg

Germany

Cooperation partners

Staatstheater Oldenburg

Fiction Meets Science project



The Institute

Science and scholarship form a highly international cosmos, at least so it seems. Information circulates world-wide and transnational cooperation is *de rigueur*.

But how does cooperation really work across borders and systems? What are the conditions in which contemporary scientists and scholars work? Where are the boundaries and what are the loyalties? What completely private aspects enter the work? And how do science and scholarship keep political and economic concerns at bay? Do they wish to or do they even have to?

I will look at these questions during my stay at HWK. This will lead to a play about five international scientists of different ages who find themselves at different stages of the careers. One day, this fictional working group realizes that important data are missing and a few instruments no longer work properly. It quickly becomes clear that no-one except one of these five can be responsible for the problem. But who exactly and what was the motivation? How does the group deal with what has happened?

This play is a science whodunit that reflects a larger societal discourse.



Future Fellows 2021

● Prof. Dr. Stefan Heinz

Fellow

Fellowship

May–August 2021

May–August 2022

May–August 2023

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USA

Cooperation partner

Prof. Dr. Joachim Peinke

Universität Oldenburg



Cutting-Edge Turbulence Simulation Methods for Wind Energy Problems

Wind energy problems (flow around turbines in wind farms) are characterized by extremely challenging flow regimes. The accurate and efficient analysis of these flow patterns via computational fluid dynamics (CFD) poses a huge challenge. Basically, standard CFD methods are incapable of dealing with reliable and feasible predictions of such flow regimes: they are either way too expensive computationally or are known to often provide unreliable results. Combinations of existing methods have been suggested as an alternative. However, existing methods face significant problems because of the uncontrolled balance of their elements. As a consequence, existing combination methods do not yet offer an alternative to pure methods.

I have developed a mathematical exact solution to the combination of existing computational methods. First applications in real-world conditions show the huge potential of these novel methods. For the first time, we have access to reliable simulation methods that behave stably in strongly variable conditions. In particular, for the first time we can provide reliable predictions for extreme flow regimes relevant to wind energy problems (where all existing methods are hardly applicable).

The goal of my project is to explicitly demonstrate the advantages of our new methods for wind energy simulations based on an existing long-term collaboration with colleagues at the Universität Oldenburg.

● **Prof. Dr. Hilary Silver**

Fellow

Fellowship

September 2021–June 2022

Home institution

The George Washington University
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Washington, D.C. 20052
USA



Encountering Germany: Exclusion and Integration of Non-EU Migrants in West and East Berlin

The welcome culture of Germany and the rise of nationalist populism are two faces that confront migrants as they adapt to their new country. Social integration rests upon not only citizenship and labor markets, but also upon social acceptance in mundane encounters of ordinary people in their neighborhoods.

Defying predictions of “parallel societies,” this study examines the neighborhood processes of migrant integration and local challenges to social cohesion in particular social settings. It contrasts two districts in the same city that has not reunited in every respect yet, Neukölln in the West and Lichtenberg in the East, with very different patterns of relations between the established population and waves of newcomers.

Social science has demonstrated the importance of neighborhood effects on economic outcomes, but less so on immigrant integration. The proposed book shows how the Germany that intellectuals imagine and politicians debate becomes concrete only in banal, face-to-face encounters in real places. Based on a decade of comparative ethnography, it recounts conflicts and accommodations over housing, schools, public services, crime, and shared public spaces.

Taken together, the rich commercial life of small ethnic enterprises, meetings of district integration councils, efforts of neighborhood managers, ecumenical events, language and orientation classes in civic associations, and joyful festivals demonstrate the gradual knitting together of local communities.

● **Prof. Dr. Sabine Sielke**

Fellow

Fellowship

October 2021–January 2022

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Prof. Dr. phil. Peter Schneck
Universität Osnabrück



Memory, Mediation, Seriality: Re-cognizing Literary and Cultural Studies, Re-membering the Subject

Without memory, human life would be devoid of meaning. Consequently, memory became a crucial concept in the humanities as well as in the social and natural sciences. At the same time, literary and cultural studies approach memory with entirely different methods than the sciences exploring cognitive processes. This raises the question as to what cognitive science can do for literary and cultural studies and vice-versa. Can, for instance, neurophysiology inform how we remember a novel or film and in what ways text and image recall differ?

My book project explores such questions by focusing on three well-known US-American authors—Emily Dickinson (1830–86), Henry James (1843–1916), and Gertrude Stein (1874–1946)—who themselves interrogated how the brain

and the mind work. My interest is in both their literary interventions and in how other media have serially memorialized these writers, e.g., in advertisements echoing Stein’s famous lines, in cinematic adaptations of James’s fiction, and in art, cartoons, and video games featuring Dickinson’s poems.

My aim is to map common ground between cultural studies and the cognitive sciences as well the boundary between them. I look at how cognition and cultural practices update or serialize memory and how literary and cultural studies can inform cognition research, which itself cannot measure how distinct media affect memory processes and transform our sense of what it means to be human.

● Dr. ir. Veerle A.I. Huvenne

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Fellowship

October 2021–February 2022

November 2022–March 2023

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MARUM – Zentrum für Marine

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Multi-Scale Habitat Mapping of Deep-Sea Environments, Based on Marine Robotic Survey Data

The deep ocean is the last frontier on the planet, but it is increasingly impacted by human activities. To support its effective management, there is an urgent need for a better understanding of its spatial patterns in biodiversity. While it is impossible to sample every part of the ocean, habitat mapping—a series of techniques to map the spatial distribution of environmental conditions—can provide crucial information, and allows us to predict species occurrences based on environmental information.

The aim of my project is to map these habitats, quantify the spatial environmental variability, and investigate its influence on the distribution of specific species in two complex deep-sea environments: a region of cold-water coral mounds and

a hydrothermal vent field. Because of their distinct 3D morphology, complex deep-sea environments accommodate high biodiversity, making them priority areas for conservation. However, they are particularly challenging to study. Thanks to the latest marine robots, they can now be investigated in detail.

During my project, habitat mapping will be adapted to the particular scales of the two study areas, incorporating fine-scale information collected with marine robots. Predictive maps of cold-water coral species will lead to better understanding of their environmental requirements, while habitat maps of the hydrothermal vent field will show the relation between species, the rapidly changing terrain characteristics, and geochemical gradients.

● **Dr. Lasisi Adeiza Isiaka**

Junior Fellow

co-funded by the HANSA-FLEX Stiftung

Fellowship

October 2021–July 2022

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Cooperation partners

Dr. Inke Du Bois
Prof. Dr. Marcus Callies
Universität Bremen



Diasporic Spaces: Rethinking Digitality, Language, and Mobility

My work seeks to understand the combined impacts of language and the new media on transnational movements among West African migrants in Germany and, specifically, to assess the ways in which migration experiences, social memberships, integration, and prospects are determined and made visible by digital linguistic practices. I focus on the reliance of migrants on digital means for reorganizing relationships, maintaining identity, and interacting with host communities.

Drawing on concepts in language and diversity (ethnolinguistics, digital ethnography, and superdiversity), I examine the linguistic practices of prospective and resident migrants with a view to better understanding how the new mediascapes transform virtual togetherness, socialization processes, and mobility. While this has implications for theories of communication in transnational contexts, our understanding of mobility and sociality vis-à-vis the notion of globality can refine diasporic discourse and relevant socio-political engagements.

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