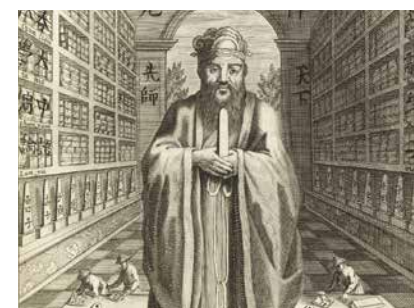


Cover: Sherry Brock Fenton

Small, speedy and nocturnal: Bats are air acrobats that are tricky to watch. The picture shows a vampire bat in flight, equipped with a high-tech backpack that weighs less than a one cent coin.

Bats: A New Approach to Wildlife Watching | Research, Policy and Society: Appreciating the Value of Knowledge Reservoirs | Pandemic Control: A Clearly Defined Goal | Development Geography: Connected by Water? | Interview with Heide Ahrens | Social Informatics: Smart Algorithms | Philosophy: The Interweaving of Text Cultures



Editorial

Katja Becker

Appreciating the Value of Knowledge Reservoirs 2

The crisis underscores what research needs to succeed

Coronavirus

Coronavirus Pandemic and Lockdown: DFG Extends Financial Support for Research Projects 4

Rembert Unterstell

Directing Energy to Achieve a Clearly Defined Goal 6

Interview with psychologist Cornelia Betsch on combating the pandemic

Humanities and Social Sciences

Detlef Müller-Mahn

Connected by Water? 10

Examining the impact of dam building in Ethiopia

An Interview with the DFG Secretary General

Working Together as a Team to Achieve the Best Results 16

After six months in office: Heide Ahrens on roles, responsibilities and plans

Life Sciences

Simon Ripperger and Alexander Kölpin

A New Approach to Wildlife Watching 20

Understanding the social behaviour of bats using a network of sensors

Engineering Sciences

Katharina A. Zweig and Melanie Löw

Smart Algorithms: The Human Factor 26

How social informatics also considers the ethical dimensions of AI

Humanities and Social Sciences

Henrik Jäger

The Interweaving of Text Cultures 30

European-Chinese exchange: François Noël, Christian Wolff and Confucius

Katja Becker

Appreciating the Value of Knowledge Reservoirs

The current crisis has made it even more apparent that excellent research holds the answers to questions that have not yet arisen. For such research to be successful, a relationship of trust is needed between and among policymakers, society, science and research funders to provide the greatest possible scope for curiosity, reflection and validation, while allowing for circuitous paths.

The sciences and humanities, research and technology can enable countless additional simplifications and improvements in our day-to-day lives. They can also be the key to our survival in this rapidly changing world. Where would we be today without the advances in biomedical research? And to take this idea a step further, where would we be now without the curiosity of those scientists who started doing research into coronaviruses and the mRNA vaccination process many years ago – a process that is currently being used for the first COVID-19 vaccines to be approved in Europe?

This process is yet another example of how the later application contexts of a research project are often not foreseeable at the time of funding. In this particular case, the origins go back to cancer research. Later company founder and vaccine developer Uğur Şahin received DFG funding in the mid-2000s to pursue his fundamental work on mRNA vaccination as part of a Collaborative Research Centre on this topic at the University of Mainz. This shows that excellent research of this kind holds the answers to questions that often do not arise until much later.

Each year the DFG funds more than 30,000 projects in knowledge-driven basic research from all areas of the sciences and humanities. Every one of these projects can potentially become highly significant for society overnight – frequently within a complex societal, biological or technological context and often on a global scale. It might be the emergence, spread and increasing

resistance of pathogens and people's susceptibility to them. Or the consequences of climate change – in the area of biology, the Earth system, politics or economics – and the often anthropogenic changes to which our living environment is subject. Or finally issues relating to migration and the scarcity of resources, religious and cultural tensions, political upheaval and armed conflict right through to the whole kaleidoscope of political and societal challenges resulting from digitalisation.

These issues continue to be highly urgent and we do not yet know which of them will keep us particularly busy this year. Nor do we know which elements of the scientific-technological or social repertoire we will be able to draw on to provide a sustainable response. But thanks to our continuous research funding, we have more than 30,000 good reasons to be optimistic as we look ahead to the future.

Accomplishments such as the development of the first coronavirus vaccines to be used in Germany depend on how policymakers and society, science and research funders work together and to what extent all the available dimensions of diversity and combinations of ideas, idea providers and procedures can be activated to create something that is genuinely new. For this purpose we need blue skies research of the greatest possible originality and at the very highest scientific level, effectively supplemented with targeted support for the ideas and findings through to their practical application.

In particular, we need to appreciate the accomplishments of all stakeholders within our globally highly



Illustration: DFG/Ausserhofer

renowned academic research system. This includes an appreciation of failure, too. If a researcher sets out on a new path and, in attempting to climb new peaks, fails or makes a mistake that sets them back a long way, this demonstrates pioneering spirit, the joy of innovation and the courage to leave well-beaten paths – even if it involves enormous effort and often loneliness as well. This is why it is particularly deserving of our respect. What a great trial! What we need is a constructive error culture. In the future, we should attach greater value to the findings of projects that did not achieve their original goal and put these findings to better use.

Research has to be able to take circuitous paths, and it is often not until years later that its accomplishments become apparent. And yet, looking back over the past months, we see what it can mean to a research field to become the pacemaker for an entire society, and for the entire world, within a very short period of time – when there is an acute demand for good summaries of previous findings, very swift results from newly launched projects and reliable interpretations of future developments. Research has responded to these expectations in real time and under great pressure, both competently and with a sense of commitment. Researchers, research funders and committees have shown responsibility in fulfilling their role in the context of an increasingly direct relationship between research, society and politics

with considerable drive – as they indeed continue to do – thereby helping to guide Germany through the crisis while at the same time providing key stimuli internationally.

However, we're now also seeing that where results are produced increasingly quickly and are more and more provisional in nature, there are limits to their usefulness.

High-quality research will continue to require time for reflection and validation. The fact that so much was able to happen so quickly last year was only due to the relevant research questions having already been investigated thoroughly and with the necessary breadth well in advance. Ideally, such knowledge repositories should be increasingly international. The challenges we face today are global, and we need to organise the sciences and humanities globally to be able to deliver effective solutions. This not only concerns common standards for the comparability of methods and results but also the general willingness to share data and analyses and the certainty that this material will be treated with care and trust.

What we are talking about is efficient links, especially digital links. We need networking, but also trust and freedom of thought, the independence of research and the unimpeded exchange of ideas between researchers. This is why our determined commitment to

a global research culture with high scientific and ethical standards, especially with partners who challenge us, is more important than ever.

The trust earned by science among society at large over the past year presents a great opportunity; it is a gift for an enlightened, knowledge-based society. And it is due in particular to the outstanding commitment demonstrated by individual scientists. This trust is not something that can be taken for granted. It has to be earned anew every day and carries with it immense responsibility.

Living up to this trust is first and foremost a question of communication – which must be transparent, prudent and consistently objective, occurring as it does increasingly now in newly established virtual spaces. Secondly, it's a matter of allowing multiple voices to be heard, of weighing up findings and arguments within

the sciences and humanities themselves. This diversity must be preserved – even when faced with the expectation of unambiguousness.

Here again, the pandemic is a prime example of the complexity of research contexts. Initial voices from the field of medicine were quickly expanded to include mathematical modelling, successive input was added from the field of economics, jurisprudential assessments were made of fundamental rights, and a wide variety of issues emerged in the areas of sociology, psychology and pedagogy that continue to occupy us to this day. Flow research was involved in the investigation of aerosol dispersion at an early stage.

Instead of demanding often very far-reaching statements from individual scientists, professional communities or interdisciplinary expert committees should be asked to provide more comprehensive assessments. This is why the DFG sought to promote the interplay be-

tween these various dimensions early on through the interdisciplinary Commission for Pandemic Research it set up last spring.

In order to ensure effective communication between politics and the sciences and humanities in the future, it will be important to gain a better understanding of the different forms of rationality, too. In the political sphere, swift action is required and democratic legitimacy has to be established and majority support sought; by contrast, the sciences and humanities seek insights and pursue truth. These poles cannot be broken down, nor do they have to be; they are an integral part of our society. However, it is important to repeatedly remind ourselves of their existence in joint discourse and to bridge them through close communication and based on far-sighted research policy that enables high-risk research in a positive sense, while being mindful of the timeframes that

such research requires. Research policy that facilitates global coordination and advocates both factual orientation and a diversity of perspectives in the public sphere.

I would like to express my respect and gratitude for this political stance, which is not always easy to defend, should not be taken for granted and very much defines our country, especially in the current crisis. It is conducive to a science in the service of people – promoted in its excellence, its independence and its thematic diversity. For me personally, it is particularly satisfying – indeed hugely pleasurable – to be able to continue to actively support this research.

Professor Dr. Katja Becker
is the President of the DFG.

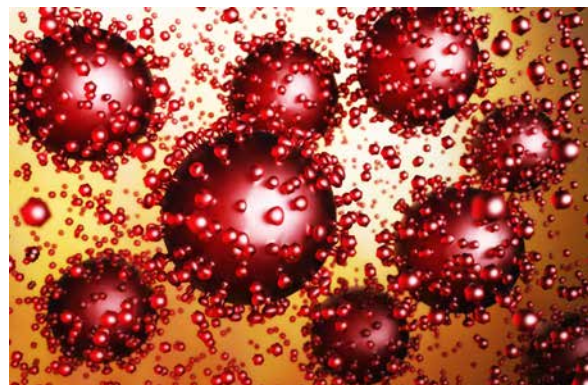
Coronavirus Pandemic and Lockdown: DFG Extends Financial Support for Research Projects

Joint Committee approves numerous measures for emergency support, additional funding, fellowships and scientific events

The DFG is extending its financial support for research projects and researchers affected by the pandemic and the continuing restrictions in place to help stop the spread of the coronavirus. On Friday, 26 March 2021, the Joint Committee of Germany's largest research funding organisation and central self-governing body for research approved a package of measures recommended by the DFG Executive Committee. This extends the support measures for numerous DFG funding programmes that have been in place since May of

last year, while at the same time extending or adding new funding for certain other programmes.

“The DFG organised financial



Graphic: dpa/Knut Niehus

assistance very early on to lessen the impact of the pandemic and lockdown on the work being done

in numerous projects so as to give the researchers we fund and their staff security for the continuation of their work. These support measures have shown themselves to be needs-based and efficient, not least due to the simplified and swift application procedure, so they've been very well received,” said DFG President Professor Dr. Katja Becker at the meeting of the Joint Committee, which was again held in virtual form. “Nonetheless, the situation facing many projects remains very serious and problematic in view of the current development of the

pandemic, as we know from the feedback we are receiving. This is why we are extending the support required to enable funded projects to be continued and successfully completed in these difficult times.”

Among other things, the regulations passed by the Joint Committee stipulate that research projects funded up until 31 December 2021 can now apply for an additional three months of emergency support amounting to 80 percent of the average funding otherwise approved for the same period. This was previously only possible for projects whose funding runs until 30 June. If further resources are needed, proposals can also be submitted for supplementary or extended funding in addition to the emergency support. These regulations apply to all research grants and numerous other programmes that fall into the category of so-called project funding, i.e. the

majority of the more than 30,000 projects funded by the DFG.

In the case of the large-scale research networks, Collaborative Research Centres whose last funding period ends at the end of 2021

We will keep you posted about the impact the coronavirus pandemic has on the DFG's work and about all measures taken to date and in the future on our website www.dfg.de and via Twitter: [@dfg_public](https://twitter.com/dfg_public).

or in mid-2022 can now receive additional funding of 80 percent for another six months; previously, additional support for Collaborative Research Centres was available for three months. Additional completion funding is now also available for Research Groups and Priority Programmes as well the DFG's Emmy Noether and Heisenberg Programmes; this applies to all projects whose last funding period ends by mid-2022.

Research Training Groups can now likewise apply for additional personnel funding for doctoral researchers for up to six months rather than the previous three. In the area of fellowship funding that does not fall under the Collaborative Research Centres and Research Training Groups Programmes, fellowships will also be extended by another six months, and it will be possible to complete foreign fellowships in Germany even more flexibly or convert them into a domestic fellowship or a position in Germany.

Finally, there is now a longer extension period for those scientific events that have already been approved but were postponed due to the pandemic. Instead of having to be held by the end of September 2021, the deadline for such events is now mid-2022.

www.dfg.de/en/service/press/press_releases/2021/press_release_no_06

Rembert Unterstell



Illustration: Marco Borggreve

Directing Energy to Achieve a Clearly Defined Goal

In view of rampant pandemic fatigue and a dramatic loss of confidence in policymakers and their measures, psychologist Cornelia Betsch calls for a change of strategy. A conversation with the member of the DFG Commission for Pandemic Research about vaccine acceptance and the opportunities and limitations of evidence-based health communication

german research: *Professor Betsch, we're having this conversation in mid-March. With lockdown measures yet to be eased, the pandemic has never felt as oppressive and as demoralising as during these weeks in early spring. Why is this the case?*

Betsch: It's an enormous load to bear, and pretty much continuously, too. A pattern of intense psychological strain and declining risk perception has developed; even those who sup-

port the measures are losing their faith in the government. The result is pandemic fatigue. People have started to be less disciplined, giving rise to a very challenging situation given the rising incidences and spread of new mutants. All in all, people are less prepared to adopt precautionary behaviours of their own accord during the shutdown. There has been a lack of a clear, transparent perspective.

Since the beginning of the pandemic, you've been looking into the soul of the population by carrying out bi-weekly surveys as part of the COSMO study (see box). The level of confidence in politicians' pandemic management has fallen dramatically ...

60 percent of the respondents trusted the government at the beginning of the pandemic in 2020, and this dropped to 30 percent by mid-March

2021. Looking at the data as a whole, we see falling confidence despite initial easing, a relatively large share of those who think the measures don't go far enough, widespread health concerns, increasing pandemic fatigue and a perception that the third wave is almost upon us. This suggests we might have achieved greater acceptance with more conservative easing, more uniform procedures and more stringent protective measures.

What started as a "wave-breaker" shutdown has become a permanent lockdown. Why were you quick to advocate a change of strategy and a clear opening strategy?

We presented various exit scenarios to respondents – and we found that switching to a transparent strategy had the potential to motivate people and give them a sense of relief. We also see this with young people, who tend to be less compliant with the measures while at the same time suffering more from the restrictions caused by the pandemic. In terms of the psychology of motivation, you have to have a clearly defined goal if you want to dedicate your energy to achieving something. Unfortunately, the current step-by-step plan has not yet been successful here.

The current phased plan for openings – there has been talk of trial easing – is mainly incidence-driven, backed up by rapid tests, self-tests and vaccination. Is this a paradigm shift from a social-psychological perspective?

Over the entire duration of the pandemic, the nitty-gritty detail of the measures as implemented in the various German federal states has not been viewed favourably. Consistent, overarching strategies are viewed more positively, such as the proposals put forward by the NoCovid Group.

In the case of vaccination, slow implementation damages trust. In terms of rapid testing, there is a lack of sound communication: the test results are widely distrusted, though it is true to say that negative test results do give some people a little hope of a slightly more normal life.

A lot will depend on rapid progress in vaccination. How will coronavirus vaccine acceptance develop into autumn 2021?

Vaccination acceptance increased when the first vaccines were approved in December. Further development is difficult to predict, but

there are a number of factors we can look at here: trust in the safety of the vaccines is one of the most important. If things continue to go well with the vaccine programme, acceptance may increase further. It is also very important to remove any organisational or practical barriers that still exist.

What makes vaccination a "social contract" from the perspective of behavioural science?

Vaccination is something that helps protect others – though in the case of the COVID-19 vaccine, we don't yet know this conclusively of course. If what I do has a positive

Professor Dr. Cornelia Betsch ...

... has been Heisenberg Professor of Health Communication at the University of Erfurt since 2017. Having graduated in psychology, she obtained her doctorate in Heidelberg in 2006 and completed her postdoctoral lecturing qualification in Erfurt in 2013 with a thesis entitled "The role of risk perception and risk communication in prevention decisions based on the example of vaccine choices".

Betsch, who was awarded the 2021 German Psychology Prize,

is an expert on the psychology of individual vaccine choices and has conducted research on this topic, some of which has been funded by the DFG; she is also involved in health-related policy consulting. She has been a member of the DFG's Commission on Pandemic Research since 2020 and was one of the advisers to the Federal Chancellery and the State Premier Conference on pandemic-related issues.



Keyword: COSMO Study

COVID-19 Snapshot Monitoring, led by Cornelia Betsch, has been collecting data on "knowledge, risk perception, protective behaviour and trust" among the population since the beginning of the pandemic. The bi-weekly live online surveys are supported by bodies such as the Robert Koch Institute (RKI) and the Federal Centre for

Health Education. The study's "Findings and Recommendations", which are freely accessible on the web, are aimed at authorities, politicians, journalists and interested members of the public and seek to provide empirical information on psychological challenges during the pandemic.

www.corona-monitor.de

effect on others, I automatically expect other people to do something to benefit me – the social contract is based on reciprocity. If the other person violates the contract, I get angry, disparage that person or punish them. We see the same thing when it comes to wearing masks.

You've investigated the motivations of vaccine sceptics and anti-vaxxers. Why do vaccine hesitancy and conspiracy theories seem to go hand in hand?

First of all, there aren't that many anti-vaxxers, but there is a lot of coverage of them in the media, which is why we have that impression. There are unanswered questions concerning vaccines, such as the long-term effects of the COVID-19 vaccine. This is precisely where the conspiracy theorists take hold by offering simple explanations to address complex issues. Times of great uncertainty always provide the best breeding ground for ideology and misinformation.

Does compulsory vaccination make sense?

I would advise against it. We looked at the "psychological side effects" us-

ing measles vaccines as an example. People get angry when their freedom is restricted – it's a psychological phenomenon known as reactance. It may result in them re-asserting their freedom when it comes to other decisions relating to prevention – they might wear masks less or opt out of other voluntary vaccines.

A new term has emerged in the non-stop where-do-we-go-from-here discussions: expectation management. Is this simply the new code word for acceptance?

(laughs) That's a good question. One issue that has arisen at many levels over the past weeks is: who is actually managing the crisis? And who is communicating this? There's one advert for the coronavirus early warning app that I personally think is awful: "Support us in the fight against corona!" This is saying: the government is managing the situation – we citizens simply have to do what we're told. But the more we lose trust, the less we can rely on this kind of acceptance. A rethink is needed here. We need even more of a debate on whether sports clubs, churches, associations or employers can be crisis

managers, too. This is about getting the protagonists of society on board to pursue a common goal in response to the pandemic. Joint expectation management of this kind is what is really called for here.

Your research topic on vaccination has been coolly catapulted into the media spotlight, turning you into a public figure yourself. What does that do to a psychologist?

I find it hard to switch off. I come across my work everywhere, in all aspects of my life. Before all this happened I was already trying to get involved in politics in an advisory capacity on the issue of compulsory vaccination. On the one hand it's nice to see that the work you've been doing is actually needed out there. But I also see a certain arbitrary quality in how research findings are dealt with – sometimes they're used, sometimes they're just left to one side. This has probably been the same for all scientists who went public during the pandemic.

Am I mistaken or do you have a lot of confidence in evidence-based health communication?

Communication can achieve a lot, but not everything. This is something I become very much aware of in my work for the WHO. The issues at stake are always: what can communication actually achieve, where are the limits? And where do we need a change in the situation? This is where politics comes into play – the capacity to make rules or create frameworks. I'm thinking of the obligation to wear masks from April 2020 onwards: this could never have been achieved through communication alone.

In January, the DFG's Commission on Pandemic Research published a dossier



Vaccination as "the" exit strategy from the pandemic crisis. On the way to the vaccination centre – here at the Berlin Velodrom.

entitled "Know more – make informed decisions". Is that your mantra too?

Yes, definitely. If vaccination is not compulsory, you can make an informed choice. And that's something that has to be taken seriously. When measures are justified and people understand them, they are better able to comply with them. Information campaigns are important here. This is about information – not marketing a certain behaviour.

What expectations do you have of your involvement in the DFG Pandemic Commission?

The Commission brings together an incredibly rich body of knowledge. I think it's important and also very exciting that the perspectives of other disciplines such as the behavioural sciences are being addressed in addition to virologists and modellers – and that the DFG is deliberately focusing on broad, interdisciplinary expertise.

The Commission not only wants to stimulate research but also identify research desiderata. Where do the priorities lie?

We're seeing researchers from all kinds of disciplines who previously had nothing to do with infection research and are now focusing their attention on this area, looking at how they can contribute from the perspective of their particular subject specialism. After the pandemic, it'll be important to see how the insights gained can be tapped into on a lasting basis. In my field, we mustn't allow the psychological body of knowledge that we have established to be viewed in isolation. How can it be incorporated into broader models that allow better predictions? If all this could be collated not only nationally but internationally as well, we will have unearthed a great treasure.

What long-term psychosocial consequences do you expect from the pandemic?

There could be an increased need for psychological support – that will definitely be an acute problem. An infection can have serious physical and psychosocial consequences – think of such aspects as long COVID, loneliness and stigmatisation. On the

other hand, humans are adaptive beings: to some extent they have the capacity to gain in strength through a crisis. We just have to make sure that individuals and groups don't get left behind, such as in the area of school education, for instance.

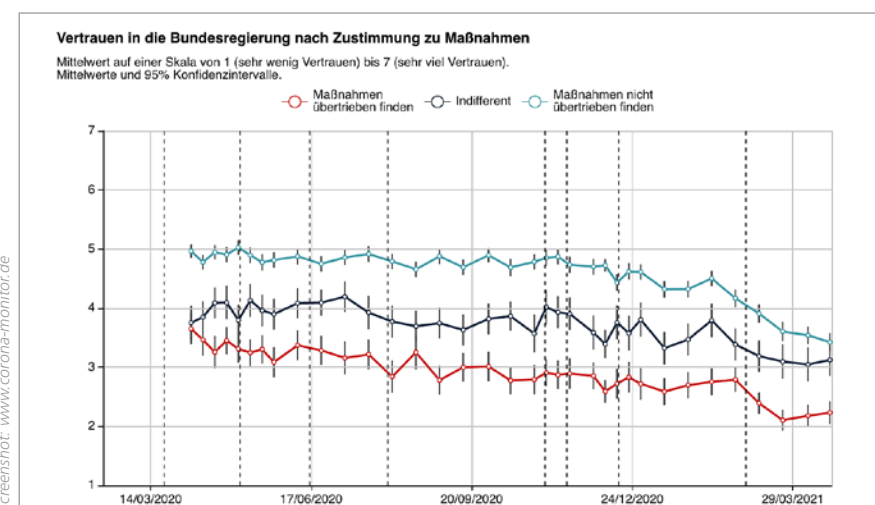
Are there any constructive insights we can draw on for the much longed-for post-corona era?

From the point of view of society, we can learn that crisis management should start proactively, precisely because political decisions often come later or as a reaction – here I'm thinking of the climate crisis. And we can gain a new appreciation of how research and science are of particular value, for example for the individual who comes to realise that scientific findings might actually have something to do with his or her own life – not just during a pandemic.

Thank you very much for taking the time for this interview!

Interview: Dr. Rembert Unterstell,
Publishing Executive Editor of german research.

As reflected in evidence-based figures and curves: confidence in the German federal government as a function of approval of pandemic measures through end of April 2021.



Detlef Müller-Mahn

Connected by Water?

Development geography: By constructing new dams, Ethiopia hopes to increase food production, respond to growing energy demand, drive forward modernisation and economic growth, and manage the consequences of climate change. Yet among both local communities and experts, there is disagreement as to whether so much can be achieved at once.

Impressive dimensions: the site of the Grand Ethiopian Renaissance Dam in the north west of the country, where construction began in November 2017. The dam is being built on the Blue Nile and will be the largest in Africa.

The dam allows me to have a good life, thank God”, says the Ethiopian smallholder. “I don’t have a house in town like rich people, but at least I can provide sufficiently for my family and send my children to school.” This personal testimony stands for all those who have benefited in recent years from the expansion of irrigation in the Ethio-

pian highlands. But there are other voices in the villages along the Blue Nile: “The construction of the dam has brought us nothing but hardship. They took our land from us. Many people have to look for work elsewhere, it’s tearing families apart. We are neither dead nor living.”

These two statements from interviews carried out in situ present



Sourcing water the hard way: with a hand pump from a well (above) or transported in containers by donkey over long distances – often a task for children.



Illustrations: AG Müller-Mahn

a contradictory picture of change in relation to water supply and social living. They reveal that water has the power not only to connect, but also to divide. At the centre of the DFG-supported Nile Nexus project is the question as to the connections or “nexus” between water, energy and food security in the context of current changes in land use.

With their abundant rainfall, the highlands of Ethiopia are the source region for major trans-boundary rivers, enthroned like a water tower above the dry regions of north-eastern Africa. In the face of climate change, population growth, rising energy demand and increasing pressure on resources, the highlands and their inhabitants are confronted with complex problems. Water is the element that links all these problems, and could therefore also be the key to their solution.

For some years, the government in Addis Ababa has been making enormous efforts to exploit the country’s water resources for the development of Ethiopia. The construction of dams is part of an ambitious national programme of growth and modernisation. Spectacular large-scale projects have attracted particular international attention, notably the Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile. While the Ethiopian government regards this dam as a symbol of national renewal, among communities living further downstream, especially in Egypt, there is disquietude. Meanwhile, there is a tendency to lose sight of the fact that numerous smaller dam and irrigation projects in the country add up to at least equal importance as far as the transformation of rural

areas is concerned. This is the topic being examined by the Nile Nexus project, funded since the summer of 2016, in a socio-ecological system analysis focusing on the example of medium-sized dams in the highlands of the Blue Nile.

As the name suggests, the nexus perspective focuses on connections in relation to water use. The Nile Nexus project is analysing these connections on four axes. Firstly, it is concerned with aspects of water use in relation to energy and food production and its ecological and social impacts. Secondly, the project is looking at geographical connections in the relationship between communities located upstream and downstream of dams. Thirdly, the nexus perspective serves as the basis for interdisciplinary cooperation at the interface between the natural and social sciences, examining both the natural basis of water use (such as seasonal availability) and socially important issues (for example, access rights or ownership arrangements). And finally, the interaction of research and practice also plays a role, ensured by the involvement of both rural communities and policy and planning experts in the research process.

In 2011, the nexus approach was presented at the World Economic Forum in Bonn. It is being used in a wide range of research projects investigating complex global challenges such as climate change, population growth and resource scarcity. In scholarly discussion there have since been calls to refine the concept, because to date water use has often, quite uncritically, been regarded as a management and security problem. This is where the



In the Nile Nexus project, rural communities are surveyed on their expectations and experiences. This involves focus group interviews (above) and in-depth discussions (below) on future soil and water use.



Nile Nexus project comes in, linking technical aspects of water use with policy issues relating to regulation and distribution.

The German component of the Nile Nexus project is being supported by the DFG as part of a programme run by the Belmont Forum, an international alliance

of major research funding providers. The Belmont programme Mountains as Sentinels of Change is based on the idea that mountain areas react with particular sensitivity to climate change and other global changes and therefore serve as monitors or indicators – “sentinels” – of change.

The project team consists of researchers from Germany, the USA, Italy and Ethiopia, who have expertise in agronomy, climatology, hydrology and geography. The German contribution, which focuses on socio-ecological transformation, is based at the Department of Development Geography at the University of Bonn. Dr. Million Gebreyes, who is participating in the German project, is himself from Ethiopia, earned his doctorate in Bonn and is now coordinating the research on the ground. The team also includes three doctoral researchers, two of whom are from Ethiopia.

The area under investigation encompasses the upper reaches of the Blue Nile, including Lake Tana

and the Choke Mountains, which rise to more than 4,000 metres. Here, small-scale agriculture, supplemented by animal husbandry, is practised up to high altitudes. In recent years, the steep slopes and inappropriate forms of land use have resulted in many fields being exposed to erosion. An ever-growing proportion of the rural population is unable to earn a secure livelihood from farming.

In the past, poverty and vulnerability have repeatedly resulted in food shortages and famine in many parts of Ethiopia. From a national perspective, therefore, there is tremendous interest in increasing agricultural production by expanding irrigated cultivation. The area

of suitable land in the catchment area of the upper Blue Nile in the Ethiopian mountains is estimated at 760,000 hectares, of which less than 5 percent is currently irrigated.

In the Nile Nexus project, three dams were chosen and investigated in terms of their impact on ecology and local communities. The oldest is the Fincha dam, built in the 1960s and later enlarged, which produces hydroelectricity and irrigates a large state-owned sugar cane plantation. The Koga dam project to provide irrigation for nearly 7,000 hectares of land for smallholder farming was completed a few years ago, and the Tana Beles project to deliver both hydroelectric power and irrigation is currently being enlarged.

A meeting place for agricultural producers and consumers: The weekly market offers seasonal products for daily needs.



This image of a livestock market in the Ethiopian highlands under the scorching sun makes for an almost archaic scene.

Using the nexus approach, researchers conducted focus group interviews in the catchment area of the dams to identify basic problems from the perspective of local communities. Administrative officials and representatives of planning institutions also answered questions in expert interviews. Using a standardised questionnaire, the research team was able to record quantitative data on household and smallholding structures. The data was then aggregated at higher spatial level and scaled up with agroecological information based on remote sensing data. Finally, the data is brought together in a model that makes it possible to describe relationships between different factors and describe scenarios for future developments. By way of conclusion, the results will be discussed and evaluated in a series of

workshops with village assemblies and institutional decision-makers.

The Nile Nexus study is also providing new insights with respect to conflicting goals in the planning and implementation of dam projects. But how should these be handled in situ and in the country? At local level, the research findings give smallholder families a better understanding, helping them to make decisions on the crops they grow and the strategies they adopt. People themselves are carefully monitoring the changes brought about by dam projects and, in a sense, functioning as sentinels of change.

But they are also willing to learn and try out innovations, as summarised by a man living near the Koga dam: "Before, I only ever grew wheat and maize. But now I want to give onions a try, because I've seen

that people in my area have earned money with them. I only have a small piece of land, but this year I want to plant a small part of it with onions. If I'm successful, then next year it will be more."



Prof. Dr. Detlef Müller-Mahn

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www.geographie.uni-bonn.de/forschung/ags/ag-geographische-entwicklungsforschung/research-projects/nile-nexus

www.futureruralafrica.de





Illustration: DFG/Rainer Unkel

Working Together as a Team to Achieve the Best Results

After six months in office: Heide Ahrens on how she sees her role as DFG Secretary General, agile working at the Head Office, strategic issues in research funding and the challenges of the digital transformation both now and in the future

german research: Ms. Ahrens, you took up your position as Secretary General of the DFG in autumn 2020 – during the pandemic and under remote working conditions at the Head Office. That must have been very different from what you originally expected?

Ahrens: Absolutely, but I'm still very happy to be here! Starting a new job in such a large organisation with complex processes is always a

challenge – all the more so in times of the coronavirus pandemic. Although I've been able to have many conversations, so far I've only actually met most of the staff via video. That does make a difference.

Your appointment was preceded by an interim period lasting more than one and a half years and a lengthy search process – which you yourself were able

to observe from the outside as Bremen's Joint Committee representative. When you were approached about the position, what were your thoughts and why did you say "yes"?

I was Head of the Department for Higher Education and Research in Bremen when the search committee approached me, so I was very busy with internal issues – including setting up new departmental

structures after the elections to the state parliament. So I quickly saw the potential of this new position in terms of being able to get actively involved. At the same time, it was clear to me that after a two-year interim period and the change in presidency from Mr. Strohschneider to Ms. Becker, this position and the work it involved would be quite a challenge. But I also could envision working within the well-balanced division of roles and responsibilities between the President and the Secretary General in the DFG Executive Board – and personally alongside Katja Becker. Of course I also thought about how I could fill the position in a new and different way.

You've now been in office for six months – what has your overall impression been so far?

Even before I took up my current position, I had a very positive impression of the DFG through my involvement in committee work. For me, the DFG is a fascinating organisation that combines research funding with structure-building and involvement in research policy. That has always been something that has held great appeal for me. I was aware of the expertise at the Head Office, and this was quickly confirmed. One thing that particularly impressed me was that funding operations had continued in full despite the pandemic – with additional calls for proposals, new focus funding programmes and the Commission for Pandemic Research that was set up early on. This was thanks to many individuals, not least the four interim department heads. So on my first day I was happy to express my satisfaction at having been able to join such a well-ordered and efficient organisation.

Does that mean that everything runs smoothly, perhaps almost automatically?

In part, my admiration for the work done here has actually grown even more from my inside perspective, also in terms of the numerous connections between the areas of expertise. When you see the sheer range of topics that are being worked on by the committees – such as statements on the Animal Protection Act or the digital turn – there's such a diverse spectrum of subjects spread across very different fields within the various research communities. This gives you some idea of our colleagues' expertise – from the outside, people are not often aware of this thematic breadth and diversity, not to mention the way the various areas are interlinked. From my point of view, this gives me the chance to focus

more on strategic topics in running the Head Office.

How do you go about the job, what is your style of work and how do you draw on your previous experiences in research funding, ministerial bureaucracy, university management and science policy?

I have my own personal style, of course. I'm a good decision-maker, but I'm open to other arguments, too. One thing I'm very keen on is agile working. This is an area where the President and I have similar thoughts. Of course I'm able to draw on useful experience from research and science funding, and I've worked at two universities, so I'm familiar with the situations and problems facing both applicants and presidents and chancellors. Another key factor is that I've been actively

Dr. Heide Ahrens ...

... has been Secretary General of the DFG since 1 October 2020. Ahrens studied political science, communication research and phonetics as well as contemporary German literature at the Rhenish Friedrich Wilhelm University of Bonn, where she also obtained her doctorate in 1994. She started her career in research funding as Head of Division in the General Policy Department of the Alexander von Humboldt Foundation and as Programme Manager in the Programme and Funding Division of the Stifterverband für die Deutsche Wissenschaft in Germany. In 2004 she was appointed Head of Academic Affairs at the University of Bremen. From there, Ahrens

moved to Carl von Ossietzky University of Oldenburg in 2007, where she was Vice President for Administration and Finance, as well as being entrusted with the duties of President from the end of 2008 to the beginning of 2010. From 2011 to 2017 Heide Ahrens worked in the area of science policy in the state of Schleswig-Holstein as Head of Section and Head of the Science and Research Department. She then served as Senate Director and Head of the Department of Higher Education and Research with the Senator for Science and Ports of the Free Hanseatic City of Bremen before being appointed Secretary General of the DFG Head Office in 2020.

involved in a number of negotiations between the German federal government and federal states in recent years. This is definitely a beneficial combination. Familiarity with hierarchies is important when you join an institution like the DFG, which has become increasingly hierarchical due to its sheer size. I have a good sense of that. Personally, I like to work quickly and efficiently. But at the same time I'm well aware that change requires a lot of patience – and I'm a patient person. I am aware that research communities thrive on debate, so this is where we need time and space for dialogue. It's important to me for everyone to be able to contribute their perspective so as to arrive at innovative solutions.

That's your working style – is it your leadership style, too?

Absolutely! This organisation has highly expert employees and it's my aim to foster their expertise and motivation. I see myself in the role of

bringing together and moderating processes, of being aware of the outside perspective and defining certain goals – naturally in dialogue with the President and the Executive Committee. End results shouldn't be predetermined, they have to be elaborated by means of a process. Responsibility lies with the management, of course. My goal is always to find the best outcome together with all parties involved.

Can the DFG be run like any other administrative institution? If not, what makes it different?

The DFG is not a purely administrative institution. It has some administrative processes, and there may be certain things that could be optimised here. But first and foremost it's a self-governing organisation for science and research in Germany, so it has a distinct mandate that requires different processes. The DFG is currently confronted with very varied demands, which is why it's essential for us to talk about a con-

temporary mission statement for the organisation. Everyone I've spoken to has agreed that this is something we're in urgent need of.

That was the view from the inside. Looking at the DFG from the outside, what needs changing?

I think it's unfortunate that not enough is known on the outside about much of what we do. What can we do to change this? Communication is a big topic for me in general. How can you reach younger and middle-aged researchers who communicate through different channels more effectively? That's why I very much welcome the fact that we're now expanding our social media communication.

The pandemic has not just changed the public's perception of science but also the role of scientific policy advice – demonstrated, for example, by the DFG Commission for Pandemic Research. Will policy advice take on an increasingly important role for the DFG?

separated by plexiglass panes, the interviewee and interviewers actually sat opposite each other physically – something that was much appreciated in view of the otherwise ubiquitous video conferences.



Illustration: DFG/Rainer Unkel

One point that would not have been worth mentioning before the coronavirus is something of an event after more than a year of the pandemic. Since mid-March 2020, the vast majority of the more than 800 employees at the DFG Head Office have been working from home. Since then, the quarterly magazines *forschung* and *german research* have also mainly been produced at the editors' desks at home, in collaboration with the copy editors as well as the layout, printing and distribution specialists. So it was both an exception and a welcome change when Marco Finetti and Rembert Unterstell met physically with Secretary General Heide Ahrens for an interview at the end of March this year. The preliminary talk and photo shoot took place on a socially distanced basis in the empty courtyard of the Head Office on Kennedyallee in Bonn, while the interview itself was held in one of the large meeting rooms. Though

Yes, and the work being done to address the coronavirus pandemic is itself a very visible example of this. Further moves are underway to boost internationalisation, and there are new approaches in science diplomacy by the President. We're also contributing our expertise to climate and climate impact research. Since the DFG is so broadly based, we have a wide spectrum of knowledge that is relevant to a whole range of major challenges.

What is the role of the Secretary General in all of this?

The Secretary General's job is firstly to run the Head Office and manage its business operations. Secondly, my role is to support the strategic activities developed by the Executive Committee, the Senate and the members. Take the digital turn, for instance: A commission of experts has elaborated a Senate research policy recommendation and the impulse paper "The Digital Turn in the Sciences and Humanities". The Head Office now has the job of implementing this – again, in cooperation with the research community, of course. As we move ahead with the open access transformation, I represent the DFG on the DEAL Advisory Council. My role also means that, in consultation with the President, I'm also involved in political debate, Joint Science Conference negotiations and the Pact for Research and Innovation. This arises to some extent from my responsibility for the budget.

What strategic issues are on your agenda, both now and in the near future?

One is precisely the so-called "digital turn", which I use as a generic term, and the "digital transformation", which I interpret in a nar-



Illustration: DFG/Unterstell

The DFG Head Office in the evening, seen from the Wissenschaftszentrum Bonn.

rower sense – in particular the transformation at the Head Office itself. The pandemic has led to a surge in digitalisation at the DFG, too. But what will the new world of work and the "new normal" at the Head Office be like in the long term? We've developed a mobile work concept and adopted a guideline resolution to introduce SAP. These are topics that involve organisational development processes as well as human resources, not just information technology. So it has to be based on teamwork. Strategic human resources planning is also a key concern in this context.

What kind of administration do you envision?

The goal is certainly to modernise the administration and achieve greater flexibility. After all, an agile approach is more than just feeling your way forward, then perhaps taking a step back again, i.e. an iterative process. It's also about guidance towards common goals. Motivated employees are crucial here

– their skills need to be recognised, appreciated and fostered. This might involve further qualification and professionalisation within the DFG.

When the pandemic is over, will the Head Office return to its day-to-day routine?

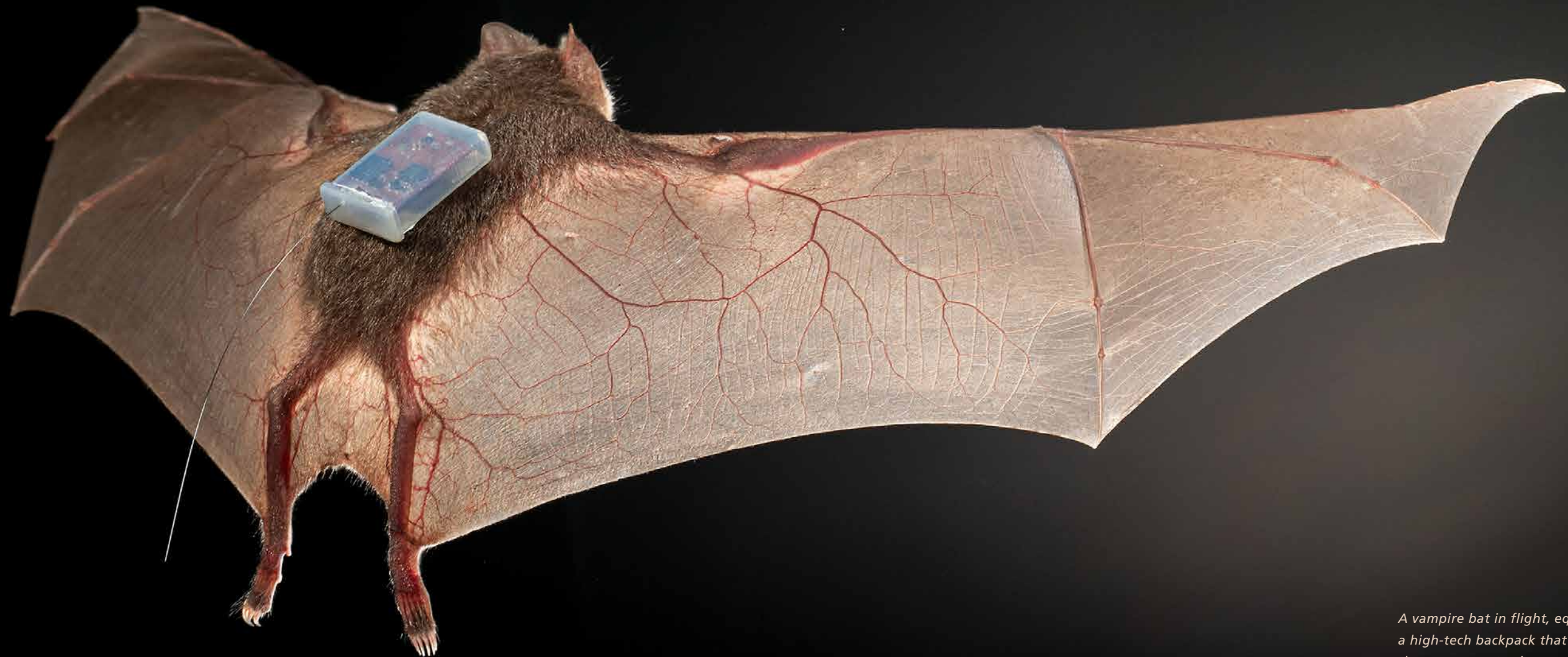
We'll certainly see a mixture of both old and new routines, with old and new work formats. Some meetings will continue to be held via video conference, or at least in hybrid form. But there has to be some attraction to coming into the office, too. That's why we want to continue to offer all employees a permanently resourced workplace. The sense of identification with the DFG is different when you work from home. We all know that interpersonal exchange and coming up with creative ideas is simply more effective when people get together face to face and talk to each other. Otherwise it would be hard to keep everyone together.

This interview was conducted by Marco Finetti and Dr. Rembert Unterstell.

Simon Ripperger and Alexander Kölpin

A New Approach to Wildlife Watching

Small, speedy and nocturnal: Bats are air acrobats that are tricky to watch. Miniature high-tech backpacks and a matching intelligent network of sensors now allow for new insights into the social life of the elusive hunters.



A vampire bat in flight, equipped with a high-tech backpack that weighs less than a one cent coin.

The sun sets behind Berlin's skyline. A mild summer night begins and the city slowly comes to rest. This is also the case in the district Treptow-Köpenick. Meanwhile, there is plenty of activity in the bat box in the Königsheide city park. Its residents, a group of common noctule bats, are about to take off to hunt. Cohabitation in the bat box is merely a convenient arrangement. Like many European bat species, female common noctules gather in groups in early summer to raise their young together.

These youngsters are going on their first night-time excursion tonight, as life begins in earnest for them. The adolescent insect eaters must find rich hunting grounds and a place to sleep, when they return in the small hours. The problem is that the members of their species that rely on each other for warmth,

tend to relocate frequently. Common noctule bats regularly use a number of different shelters.

The bats' search for accommodation is carefully monitored, as the common noctules carry little high-tech backpacks that weigh less than a one cent coin. These contain sensor electronics, a miniature computer and a radio interface that allows for fully automated recording of any interaction among the individuals of the group. It is recorded second by second, who is flying around with whom and who is out and about on their own. The team of researchers hope to use this social network data to understand how exactly the young animals become successful hunters, and how they stay in contact with their group.

Using the Internet of Things as a model, the sensor nodes organise themselves to form a wireless sensor

network. They were developed by the inter-disciplinary research group BATS: a collaboration of researchers from the areas of electronics, computer science and biology. The fully automated monitoring system is able to record a diverse range of values directly from bats in the wild. The measured data is pre-processed and temporarily stored directly on the sensor nodes. Upon reaching a ground station they are transmitted to a database via radio.

Using the system on bats living in the wild, is a particular challenge. Owing to the low body weight of most bat species, the total weight of the sensor nodes is limited to 1 to 2 grams, including power supply. In addition to the mobile miniature sensor nodes, there are various stationary units. The result is a network of sensors that automatically and wirelessly gather data from

bats: directly from their resting place as well as across distances of several kilometres. The network allows for the sensor nodes to be configured while in use, and ground-based technology is used to record the flight paths of the bats in their hunting territories at high resolution.

In Forchheim in Upper Franconia, the team has set up a ground-based network of tracking stations and has documented the flight paths of the greater mouse-eared bats that hunt ground beetles here. As soon as the animals carrying the sensor nodes fly into the tracking field that is about the size of three football fields, the bat backpack will go into tracking mode. Using two frequency bands with eight signals per second each, the sensor network reconstructs the flight paths among the thick oak and beech trunks and under the dense canopy with an ac-

curacy of a few metres. This is far more precise than has been possible in the past, using conventional trackers, as the previously used technology reached its limits here.

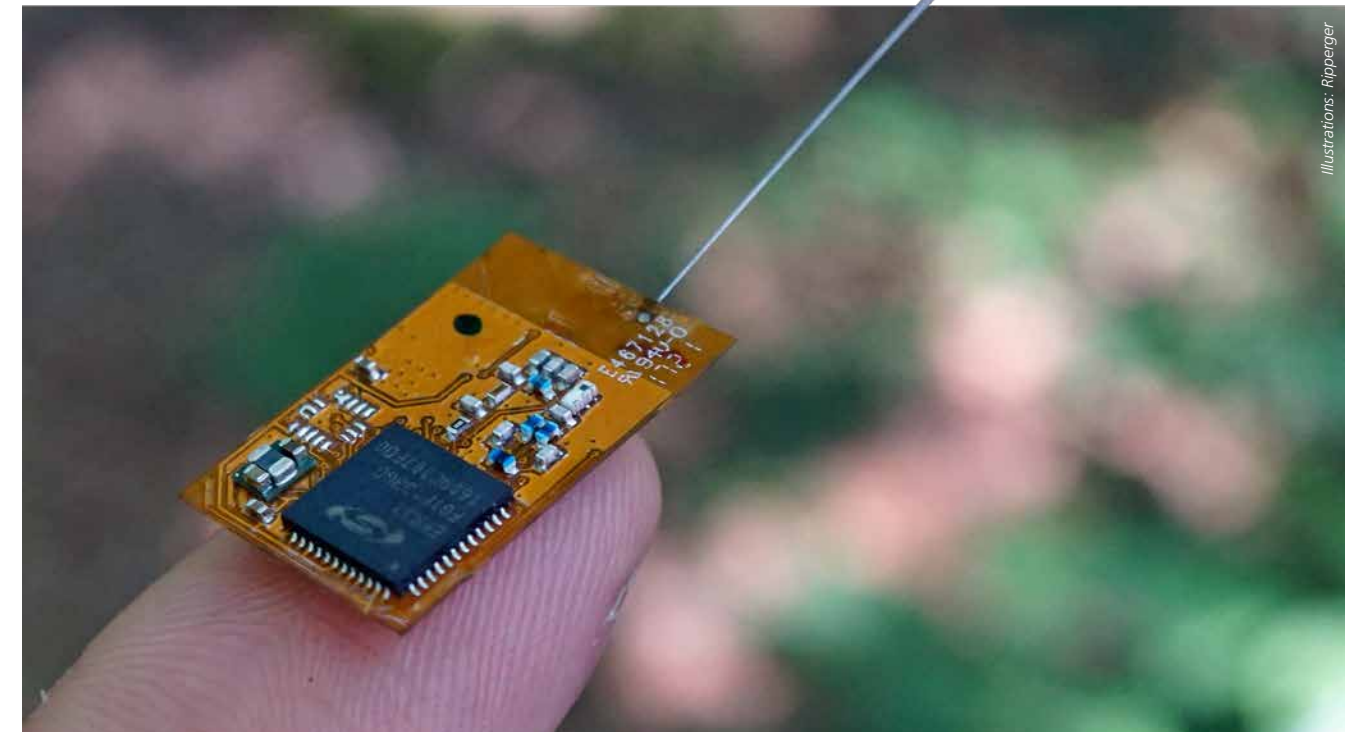
Mouse-eared bats, a species of bat that is part of the Vespertilionidae family, are now rare in Germany, as old, natural deciduous forests that these bats need as hunting grounds, have suffered considerable human impact resulting in extensive habitat fragmentation. It is therefore important to understand the impact that different landscape elements have on the behaviour of these nocturnal hunters. Experience has shown that only evidence-based strategies are suitable for protecting endangered species such as greater mouse-eared bats against man-made risks such as the fragmentation of connected habitats.

In addition to domestic species, the team also examines Latin American vampire bats. These are among the most social of bat species. If an animal fails to obtain a night-time meal of blood, other more successful members of the colony will share their scavenged blood with the hungry animal after the hunt. A particularly noteworthy aspect is that even unrelated animals will display this cooperative behaviour. Their social relationships are therefore compared to friendships between human beings. However, it remained unclear for a long time, how stable these relationships are in the wild, as the majority of studies had been conducted in captivity. It is difficult to directly observe social ties between individuals in their natural colonies that often comprise hundreds of these elusive animals. A crowd of animals like this is simply too complex to observe.

The researchers use ground-based tracking stations to record the flight paths of bats – here in Forchheim Forest in Upper Franconia. These process the movement data of the animals fully automatically and at high resolution.



Miniature technology: the mobile sensor node is attached to the bat's back in a backpack. Planning provides for the technology that is smaller than a fingernail to be used for other small animals in the future.



The research group found a solution to this problem, too: The seemingly chaotic situation in the vampire bat roost is set in order using sophisticated communication protocols. Each sensor checks within two seconds, which other sensors are within its reach. This allows for the behaviour of 50 tagged animals to be tracked precisely. It can then be observed, which individuals tend to stay close to each other. The strength of the received signal even allows for conclusions regarding the context of the association: Did animals have close body contact, or did they merely stay in the same roost?

The innovative technology enables the team that cooperates with colleagues from the USA to exam-

ine the social relationships among vampire bats in captivity and in a natural environment in Panama. Cooperative behaviour of 23 animals was examined meticulously in the laboratory for almost two years. The team then equipped the test group with sensor nodes and released them to their original colony along with another 27 control animals that were tagged with the same sensor nodes.

Within eight days, the network of sensors recorded more than 400,000 “events”. The analysis of this data showed: Friendships formed in the laboratory lasted! Even following dramatic changes to their environment and their social context, many of the animals

sought contact to their preferred cooperation partners from their two years of joint captivity at the laboratory. This is an important finding that will help to understand the evolution of social relationships in the animal kingdom in the future, possibly all the way to the nature of human friendships.

There are further applications for the smart sensor network even now: The sensor nodes work based on a modular principle and can therefore be extended. Acceleration measurements indicate an animal’s activity state, the terrestrial magnetic field shows its direction of flight, and atmospheric pressure indicates the flight altitude. Using electrodes attached to 13 bat species from Central and South America,

Night-time outdoor work in Panama: Samples are taken from the vampire bats before they are equipped with sensor nodes.



Secret social life: Fringe-lipped bats and short-tailed bats concealed in a hollow tree.

the team has even been able to record electrocardiograms.

“Adaptive radiation”, as was observed in Darwin’s finches, also occurred in the family of leaf-nosed bats that are only found in America. This means that one ancestral species developed into multiple new species that are adapted to different ways of life: For example in the form of different diets such as fruit, flower nectar, insects or blood. The team wanted to understand more about the connection between the species’ respective heart rates and their size. In the aviary, bigger bats had a pulse rate of just over 300 and smaller ones of as much as 600 heart beats per minute. The fact that the electrodes were attached with adhesive, rather than implanting them under the skin, enabled the researchers to reduce the stress involved for the test animals. This approach could be

used to improve animal welfare in physiological experiments with other animal species, too.

Planning provides for the sensor nodes to be used for reptiles in the next step, in a research project regarding sand lizards living along railway lines. The goal is to better understand the use of these man-made habitats by the strictly protected “Reptile of the Year 2020”, to be able to improve planning for necessary construction and restoration measures. The system has been commercially available since 2020 and it will continue to be an important tool also in the future. It can be used for applied as well as basic research conducted with wild animals and with livestock kept in captivity. There is great demand, as the small scale of the miniature sensor nodes allows for studies involving small vertebrates.

The examination of the young common noctule bats in Berlin

showed, for example, that these can count on their mother’s support when moving to a new roost. Meanwhile, they are left to their own devices on their first flights looking for rich hunting grounds. It is quite likely that common noctules use a trial and error approach to learn where to find prey.



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www.for-bats.org



Katharina A. Zweig and Melanie Löw

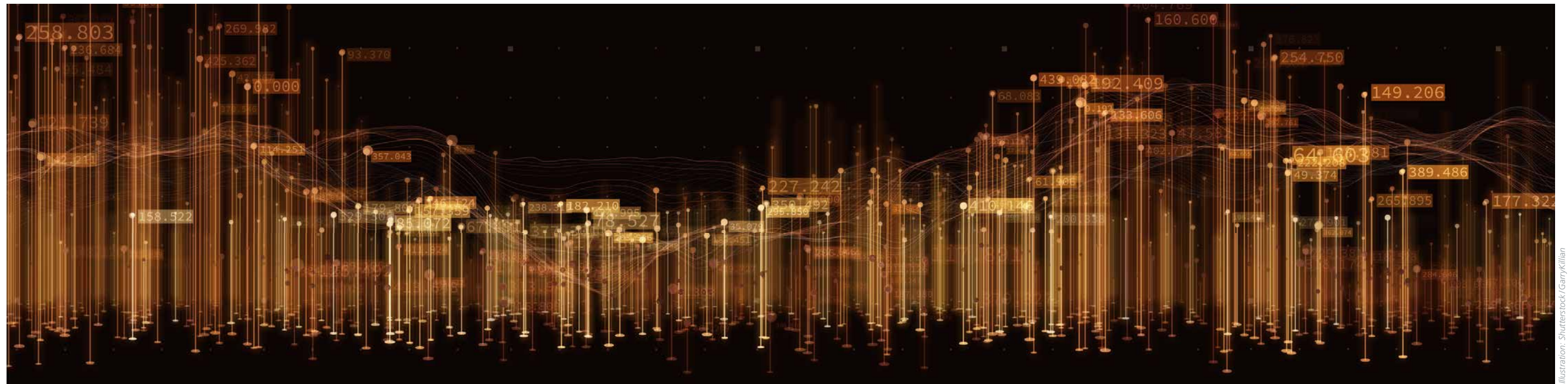


Illustration: Shutterstock / Garry Killian

Smart Algorithms: The Human Factor

Artificial intelligence as a driver of innovation is becoming ever more visible. But what about the rights of individuals and the security of society? The field of social informatics considers the ethical dimensions of AI.

Artificial intelligence, or AI for short, is a matter that concerns all of us. We frequently encounter it in everyday life. For example when we are surfing the net and a search engine shows us a list of hits, or if we receive shopping recommendations from our trusted online retailer. In the business world, this technology has been used by many corporations for a long time. It helps, for example, to analyse buyer behaviour or to predict purchasing decisions. The latest AI technologies are used

in factory halls to make industrial production fit for the future.

AI is going to increasingly shape our everyday life. It will be making decisions that will directly affect us. This is why it is all the more important for us to consider in advance, what characterises a correct or a wrong decision. Which data is a decision-making process like this based upon? Into which categories is this information divided? For example: Who is going to be denied acceptance by the health insurance company, due to poor health

forecasting models? Where should we draw a line? What is fair or deserved? What is ethically appropriate and what is highly discriminatory? More generally speaking: Can a computer handle decisions in any given area, or is it more expedient to continue relying on the human mind?

This thematic field is so complex, it is impossible to quickly find any universal solutions. It is necessary instead, to consider isolated cases. What exactly do we actually describe with the term “artificial

intelligence”? Will machines soon be able to think, feel and act like human beings? Will the scenario of Stanley Kubrick’s masterpiece “2001: A Space Odyssey” come true? In this film, the super computer Hal contributes to fulfilling the mission, and it does not even shy away from killing people.

At this point, machines are definitely not capable of this type of complex planning. What they can do, however, is to learn from experience in the form of data, and this is a fact that computer scientists like to make use of. After all, it was only thanks to the methods of machine learning combined with a sharp increase of computing capacities and the availability of vast amounts of data that AI has experienced a renaissance. AI celebrated its initial successes back in the 1950s, and was then forgotten again.

These learning methods enable machines to detect patterns in data. Human beings dictate, whether

these patterns do or do not make any sense. This assessment usually takes place in that machines make predictions about data they do not have or, for example, about whether a product that was captured by a camera is faulty. If humans know the correct result, it is possible to assess the quality of these predictions. Two types of mistakes can occur in this context: Faulty products may be missed, or functional ones may be sorted out.

As long as the quality is not high enough, programmers of an AI application will continue to slightly adjust the various parameters of the learning methods used, change methods, or compile more data for training the technology. This “iterative process” that comprises a great number of decisions, will only stop when the human beings in charge are satisfied with the level of quality achieved by the machine.

How successfully the computer is able to learn, depends directly on

the data provided. Processes that can also detect complex patterns, in particular, must draw upon a large pool of data. Artificial intelligence can be used in a meaningful way, if enough data of sufficiently high quality is available, and if this data covers all relevant contexts. In addition to industrial production, this also applies to other areas, such as processing and finding knowledge.

The latest generation of translation technologies is capable of giving us a quick overview of foreign-language texts found online. This is convenient and useful, for example, for reading a menu on a trip to Cambodia without needing to take on the tedious task of trying to identify the unfamiliar writing in a dictionary. Thanks to AI, all of this is achieved within fractions of seconds nowadays.

Smart algorithms will soon allow us to directly talk to devices, without needing to use communication

aids such as a keyboard or a mouse. Automated environment recognition can help visually impaired people and travellers to find their way around unfamiliar places. Smart programmes are helping us in many areas, even now. So why should they not take care of decision-making in other, more complex areas? Machines are impartial, after all, so should they not be able to make fair and just decisions regarding human beings, too?

This is where the field of social informatics comes in. The course of study offered at the Kaiserslautern University of Applied Sciences (TU Kaiserslautern) is unique in Germany. The discipline of social informatics deals with the interaction between human beings and software that can give rise to unintended consequences that are only foreseeable, if the complete picture

is considered. The approach of social informatics is therefore to consider individuals, organisations and society together with software as a complex overall socio-technical system.

The discipline is therefore a part of the area of technology impact assessment, as well as of the scientific field referred to as “complex systems science”. One of the main focus areas addressed by complex systems science are so called emergent phenomena. These are aspects that only become comprehensible through the interaction of the individual elements of a complex system.

An interesting example of an emergent phenomenon in the public sphere occurred during the presidential election in the USA in 2016: Young people from Macedonia interfered with the election

campaign. They programmed websites with scandalous news about the presidential candidates and generated profit through the sale of advertisements on these pages. Donald Trump ultimately benefited from these activities. How could this happen? The economic situation of these young people is easy to describe: Unemployment among young people was particularly high in Macedonia that summer, and at the same time there were enough computers to fiddle with. One must understand the ways in which algorithms distributing advertising in social media work. They act as intermediaries between website operators on the one hand, and advertisers on the other hand, by analysing demographic characteristics of website visitors, and therefore providing data about readers demographics. Advertisements are

Many of the things that we visually perceive nowadays are characterised by fleeting images from the world wide web.



Illustration: pixabay/PIRO4D

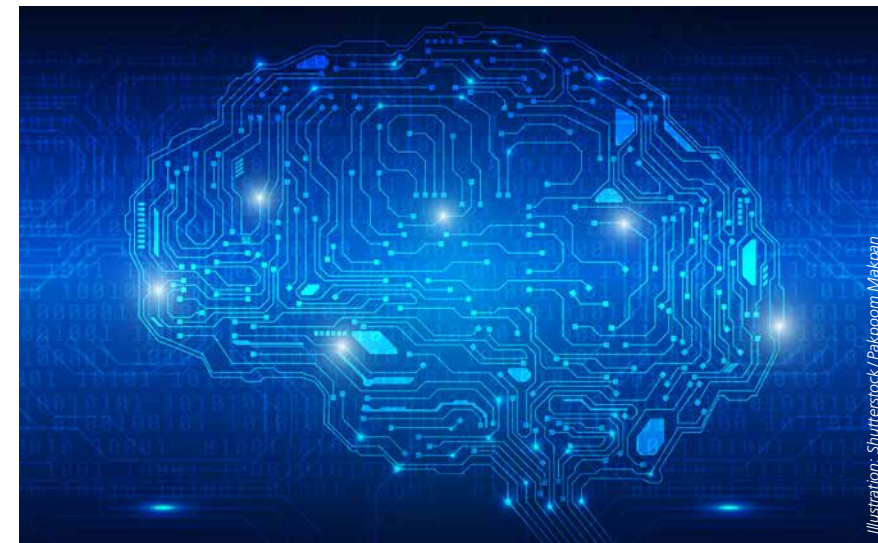


Illustration: Shutterstock/Pakpoom Makpan

Human being and machine: a stylised brain constructed out of circuits.

sold, for example, on websites that are visited by a particularly large number of 40-year-olds with average purchasing power, or by people who have just gone through a divorce. In the case of traditional advertising in printed magazines or journals, advertisers tend to know little about the quality of the media. In summer 2016, the youngsters from Macedonia soon realised that a website with political news concerning the election could attract a broad readership. They also found out that people are more likely to look at news items related to scandals than at those based on facts. In addition to this, they were unemotional regarding the two candidates, and were willing to also post news on their pages that were clearly untrue.

A short experiment conducted by the young people finally showed that websites with scandalous content about Hillary Clinton attracted more readers than similar news about Donald Trump. These websites were therefore more successful with regard to advertising bookings, and this is how they decided

to fill their websites with this type of content. There are multiple credible reports stating that a number of groups generated thousands of dollars of advertising income per month this way.

This is a textbook example of emergent behaviour that was shaped by the software, by existing economic and legal conditions, and by human psychology.

Software and social agents are therefore always regarded together, in an overall analysis in the field of social informatics. Findings from the areas of social sciences, psychology and legal sciences are taken into account to understand the general incentives that motivate the social agents, and the ways in which these can change through the use of software. This in turn can lead to a change of behaviour in these social agents.

Clever ideas are needed to avoid the detected unintentional side effects from the outset, and to change incentive structures to adjust the resulting behaviour of the system to match the intended

goals. This means, we are talking about cybernetics here, which is the control of complex systems through incentives. These can often be solved on the technical side. This is why social computer scientists are always excellent software developers, too.

However, this is not always enough, which is why legal regulations should also be considered. In this day and age, software and its usage have a great impact on the way in which we live together as a society, after all. Side-effects must be considered in a timely manner, and the rights of all affected people must be carefully balanced. The main parameters of software development and use require democratic legitimation in this context. Ultimately, there is only one way in which ethical considerations can enter computers, and that is through the people who create and use the software.



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Professor Zweig was awarded the Communicator Prize of the DFG and the Donors' Association in 2019.

aalab.informatik.uni-kl.de/en/gruppe/zweig



Henrik Jäger

The Interweaving of Text Cultures

At the beginning of the 18th century, Jesuit François Noël and scholar Christian Wolff – taking their inspiration from Leibniz – introduced classical Chinese philosophy to Europe. By engaging with the key writings of Confucius, in particular, they opened up important sources of philosophical reflection and inspiration that even had an influence on the Enlightenment.

At the threshold between the Renaissance and the Early Modern period, there was an astonishing degree of openness in Europe with respect to encounters with Eastern intellectual traditions. Arabic and Jewish thinking had been highly influential since the high period of scholasticism (13th century), and beginning with the Jesuit mission in the early 17th century, Chinese philosophy began to have a considerable influence on prominent scholars such as Pierre Bayle, Nicolas Malebranche and Gottfried Wilhelm Leibniz. In 1697, Leibniz (1646–1716) published his highly successful work “News from China” (Novissima Sinica), in which he describes China as an “anti-Europe” and a cultural countermodel from which the West had much to learn.

Leibniz’s vision of a Confucian mission in Europe was thus a logical complement to the Christian mission in China. He also envisaged the establishment of academies in Hannover and Beijing to enable the comparative study of Chinese and European culture. To promote deeper understanding between the two cultures, Leibniz ap-

pealed for the basic works of Confucius to be translated. Given the enormous linguistic and cultural barriers, there were doubts, particularly among opponents of such a cultural exchange (the “Sinophobes”) that it was even possible to translate classical Chinese into Latin. How could

anyone learn from Chinese culture, they argued, when no one could even translate Chinese writings?

When the Jesuit François Noël published his translation of the “Six Classic Books of the Chinese Empire” in Prague in 1711, Leibniz’s project began to be realised. The foundation

had been laid for Europeans to engage with Confucian thinkers. Although the translation has many flaws from a modern perspective, it does demonstrate a comprehensive knowledge of Chinese philosophy, its history of commentary and its core themes.

During the Ming dynasty (1368–1644) and the Qing period that followed (1644–1911), during which the Jesuit Matteo Ricci (1552–1610) laid the intellectual foundations for the China mission of the modern period, a thorough knowledge of the “Four Books” (Sishu) was an essential basis for all Confucian education as well as ethical and political discourse. Jesuits newly arrived in China had to be able to recite and interpret the “Four Books” if they wanted to debate with Confucian scholars on an equal footing. The most important writings of this canon, which was defined in



Portrait of the philosopher Christian Wolff, engraving by Johann Georg Wille. Left: Page from Confucius Sinarum Philosophus (“Confucius, the Philosopher of the Chinese”), a translation of three of the “Four Books” of Confucian teaching.



孔夫子 CVM FV CŪ SIVE CONFVCIVS, qui et honoris gratiā 17 R. CHVM NHJ dicitur, Philosophorum Sinenſium Princeps; Oriundus fuit ex oppido KIO FEV Provincia XAN TVM. Patrem habuit XO LEAM HE Praefectum CEV ditionis, Matrem CHIM dictam e prenobili ſenſu familia Natus eſt autem Imperantis LIM VAM (qui fuit e tertiā CHEV domo Imperiali Princeps 23) anno primo et vigesimo, et ante Chriſtum 553. dicitur pulos numeravit ter mille, quos inter eminebant duo et 70, et hos inter rurius decem ſelectiſſim, quorum nomina ſui tabellu tns cripta, Viſuntur in Imperii gymnaſij. poſt irriſos conatu et laboreſ deſperatā temporum ſuorum et principum reformatione, migravit e vita anno aet. 73 et KIM NAM Imperatoris 25^o anno 49. huius proſapia non interrupta ſerie propagata, hoc anno 1627. quo Nepoſ ordine 68 in Natali Confucij Sede cum Ducis titulo reſidet. Computat Annos 2238.

A Paris. Chez Nolin Rue S. Jacques A L'Enſeigne de la Place des Victoires. Avec Privilège du Roy.



Left: Portrait of Kangxi, the second emperor of the Qing dynasty, in law court attire. Right: The Jesuit Matteo Ricci, regarded as the founder of the Chinese mission in the modern period, portrayed in 1610 by Emmanuel Pereira.



Illustration: Creative Commons / Unknown

the 12th century, were the Analects of Confucius (551–479 BC) and the Mencius, by the philosopher of the same name (also known as Mengzi, 4th/3rd century BC). For over 2,000 years, these were the sources for ethical and political thought in China.

The first complete Latin translation of this canon appeared in 1711 in the edition “Imperii Sinensis Libri Classici Sex” by François Noël (1651–1729), a Jesuit missionary who spent 20 years working on this translation, adding two further translations to the “Four Books”. Noël translated the Confucian classics with the aim of conveying to Europeans “what the peoples of eastern Asia [had] taken into their minds over the millennia”. In other

words, he saw his translation work as a project of cultural mediation. His “Preface to the Reader” begins with these words: “Reader, my dear friend, I herewith present to you the Latin version of the six classic books of the Chinese, not so much that you may learn what they have written, but that you may put into practice in your life what they have rightly perceived.”

Noël was concerned with exploring Chinese culture from an inner perspective and, through this very perspective, inspiring the European reader: “Reader, use the fruits of this not inconsiderable patience, and as you read the words of the Chinese, consider (the meaning of) the life of the Christian. May Christ be a cornerstone of both.”

Noël’s engagement with the Confucian tradition was motivated by the desire to convey Chinese thought as part of a practical philosophy. In this sense, he honoured Leibniz’s vision of a Confucian mission in Europe. The Enlightenment scholar Christian Wolff (1679–1754) was, presumably, directly convinced by this desire to make philosophy useful for the cultivation and shaping of life. Wolff, whose development was closely associated with the thinking of Leibniz, had penetrated to the core of Chinese thinking in his own way. While Leib-

Right: In the manuscript version of the first book of Mencius (dating from 1700, Bibliothèque Royale de Belgique), the revisions made by François Noël can be identified and documented.

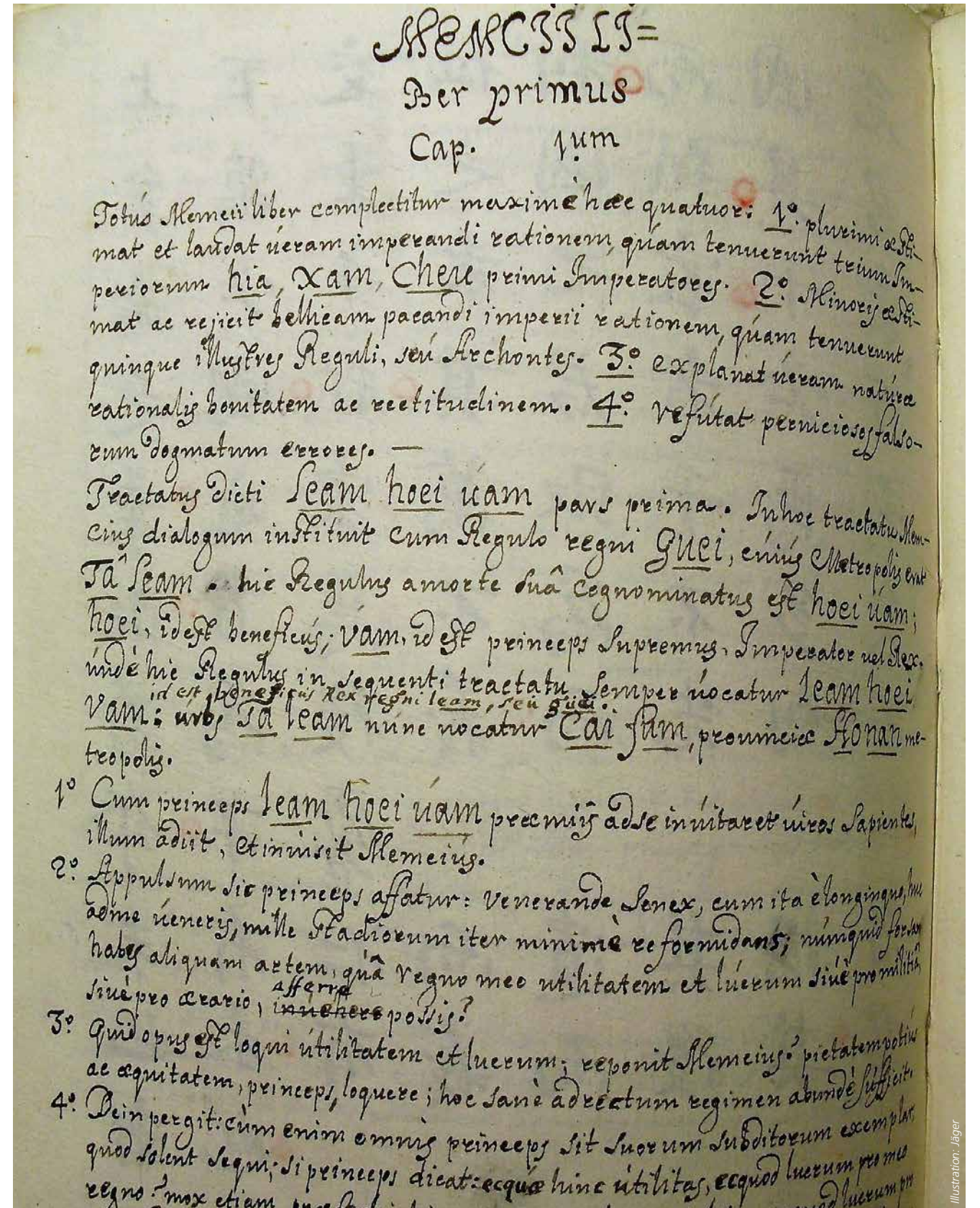


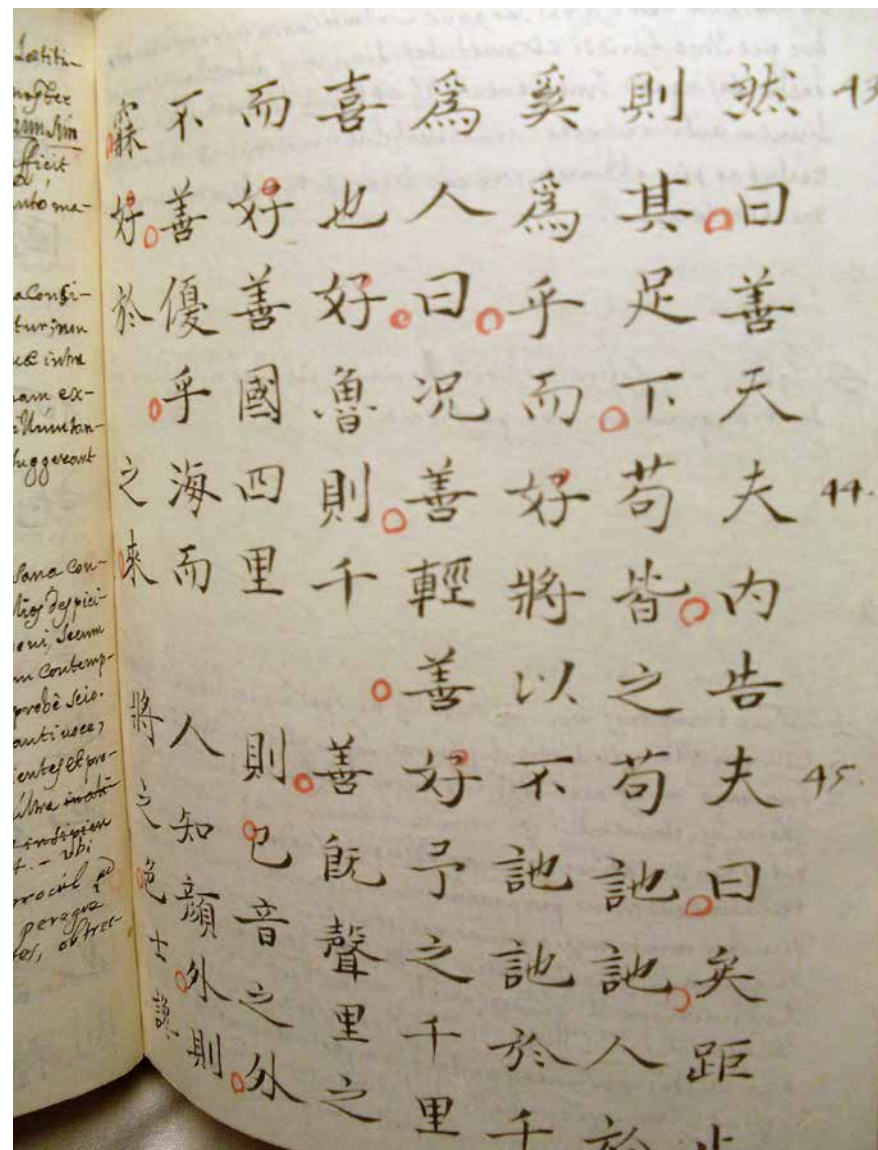
Illustration: Jäger

niz owed most of his knowledge to extensive correspondence with the Jesuits of the China mission, attempting through this means of communication to participate in the dialogue between the missionaries and the Confucian scholars, Wolff spent decades studying the translations of Noël.

This reading of the “Libri Classici”, as Wolff called them for short, influenced his early writings in German and led to insights that he expressed

in 1721 in his “Rede über die praktische Philosophie der Chinesen” (“On the Practical Philosophy of the Chinese”). This oration, which historian of philosophy Norbert Hinske has described as the “greatest university scandal of the 18th century”, not only shook the University of Halle but also attracted vociferous criticism all over Europe. It ultimately led, in 1723, to Wolff being banished from Prussia on pain of death.

The Jesuit François Noël handwrote large parts of the canonical “Four Books” himself. Experts regard his calligraphy as less accomplished than that of Chinese calligraphers.



But what was it about Wolff’s oration that was so dangerous? Why could an admiration for Confucius have such dramatic consequences? It is likely that several different reasons were involved, including university politics. The most important reason was presumably the fact that in Confucius’ (and Mencius’) writings, Wolff saw a rationale for a universal ethics that was accessible to all people “regardless of all religion”. In so doing, Wolff fundamentally called into question the philosophical and religious superiority of Europe.

Thought out to its logical conclusion, this produced new perspectives. It made the China mission itself a pointless undertaking: to Wolff, the Chinese were already on the right path and did not need to become Christians. From Wolff’s point of view, Confucius was the equal of the Greek philosophers and could be considered side by side with founders of religion such as Mohammed, Jesus and Moses. This made his writings of tremendous importance as a source of reflection and inspiration.

The extent to which Wolff’s ideas shook the very foundations of the Western-Christian self-understanding is clear in these words written by the philosopher, lexicographer and economist Carl Günther Ludovici in 1737:

“In the same (oration), Mr. Wolff demonstrated the complete accordance of a vaunted philosophy with his own. [...] A heathen philosopher and a Christian philosopher are both creatures of worldly wisdom, both use the light of reason in their teachings: but who would deny that one has a great advantage over the other, as he in his teachings has happily benefited from the light of revelation. The light of reason and the light

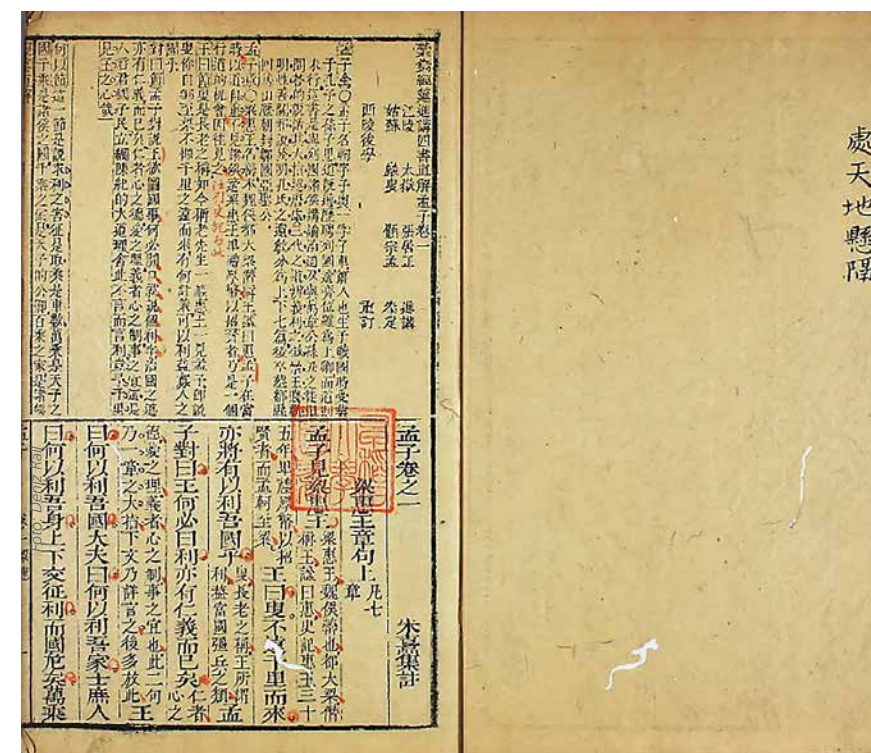
Through the “Colloquial Commentary on the Four Books”, a commentary by Zhang Juzheng (1525–1582), Grand Secretary and mentor to the Wanli Emperor, the Jesuits read and interpreted key Chinese texts. Many passages in Noël’s text followed or paraphrased this model.

of revelation may be compared to the light of the moon and that of the sun. For just as the moon’s light is not its own, but that of the sun, which gives it its light, so also is corrupt reason unable to boast of any light unless it is illuminated by revelation. [...] It would therefore be a poor philosophy of any Christian creature that boasted of nothing more than that it resembled fully the teachings of a heathen creature.”

Here a dismissive view of Confucius is clearly evident, as it is in other pamphlets written in criticism of Wolff and his oration – of which there were around 130. None of the authors of these pamphlets dealt with Noël’s text itself. Such an atypical attitude for the humanist study of texts almost certainly also accounts for the fact that so little research has been done on Wolff’s oration and that his Chinese sources are therefore still unknown.

Future extensive research into this fruitful encounter between German and Chinese philosophy may also enable us to answer the vital question: Should it be regarded as a bizarre oddity, an exotic aberration, in the history of European philosophy, or as the confirmation of a rule? Was the reception of Eastern sources in intellectual history a random extravagance, or were there regular encounters and continuities?

There is one insight that could provide a useful starting point.



Since antiquity, European culture has interacted in many ways with the cultures of the Middle East and, since the 16th century, with those of the Far East. This cultural exchange began with Egyptian and Indian influences on Greek philosophy, continued with movements such as gnosis and Christianity, and from the 8th century onwards experienced a revival from the Arab world.

When cultural and philosophical history is viewed from this perspective, Wolff’s reception of Confucian thought would seem to be a completely “normal” phenomenon. It is a typical example of an “interweaving of text cultures” which has always taken place since the dawn of European philosophy.

In the future study of and interaction with non-European cultures, it would be desirable to raise awareness of this story of interweaving and exchange over thousands of years.

This would fulfil Leibniz’s vision of the exchange of trade goods being supplemented by an “exchange of light”. This is the only way to develop constructively – both in our own affairs and in our understanding of other cultures – and address the world’s most pressing problems.



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Illustrations: Jäger

The Deutsche Forschungsgemeinschaft

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There’s digital and there’s digital – not all virtual alternative formats are the same: Last spring, the presentation of the Gottfried Wilhelm Leibniz Prizes, which has been one of the most prestigious public events of the DFG and German research for more than 30 years, was first postponed after the outbreak of the coronavirus pandemic and then, after several unsuccessful attempts to hold it in person due to containment measures, recorded as a film in autumn. Again this year, the ceremony could not be held live because of the pandemic – but it did take place as a virtual livestream. The ten award winners, their families and staff as well as other virtual attendees were welcomed on 15 March from the Norbert Elias Hall at the DFG Head Office in Bonn, which had been transformed into a recording studio for this purpose. The occasion was different in other ways, too. In addition to DFG President Katja Becker, the afternoon event had a presenter for the first time, Kilian Reichert, and the award winners also had the chance to give brief live interviews. This helped show even more clearly how the award-winning research is linked to current social debate and global problems – another part of the reservoir of knowledge arising from research curiosity that will enable future challenges to be addressed more effectively.