

Portal Wissen

The Research Magazine of the University of Potsdam

Two 2014



Time

The Photographer of “Time”

Thomas M. Massie took the cover photo and the pictures introducing the five themed sections of the magazine.

Time defines everything. It is everywhere. Sometimes it is relative. When I take a photo, I encounter time in many different ways. I choose the shutter speed of my camera and the time of the day for the right light; I try to find the right moment for the best shot. And of course, time reflects itself in the objects in innumerable facets. For me, time offers a wonderful paradox: The transience of the moment, whose very brevity we often deplore, makes it unique, unrepeatable and complete.

I started taking photos like most people, perhaps. The low quality of the snapshots I was taking eventually annoyed me, so I tried taking better pictures. I have been doing this on-and-off for 10 years now and am continuing to learn.



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THE SCIENTIST



Dr. Thomas M. Massie is a biologist and has worked at the University of Zurich since 2012. As an ecologist he deals with populations and species communities as well as their interaction in the environment. He wants to know to what extent we can predict how these communities behave – and also why exact prognoses often fail. Before moving with his family to Zurich, he studied and completed his PhD at the University of Potsdam.

Contact

Institute of Evolutionary Biology and
Environmental Studies
University of Zurich
Winterthurerstrasse 190
CH-8057 Zurich
✉ thomas.massie@ieu.uzh.ch

Dear Readers,



"What then is time?", Augustine of Hippo sighs melancholically in Book XI of "Confessions" and continues, "If no one asks me, I know; if I want to explain it to a questioner, I don't know." Even today, 1584 years after Augustine, time still appears mysterious. Treatises about the essence of time fill whole libraries – and this magazine.

However, questions of essence are alien to modern sciences. Time is – at least in physics – unproblematic: "Time is defined so that motion looks simple", briefly and prosaically phrased, waves goodbye to Augustine's riddle and to the Newtonian concept of absolute time, whose mathematical flow can only be approximately recorded with earthly instruments anyway.

In our everyday language and even in science we still speak of the flow of time but time has not been a natural condition for quite a while now. It is rather a conventional order parameter for change and movement. Processes are arranged by using a class of processes as a counting system in order to compare other processes and to organize them with the help of the temporary categories "before", "during", and "after".

During Galileo's time one's own pulse was seen as the time standard for the flight of cannon balls. More sophisticated examination methods later made this seem too impractical. The distance-time diagrams of free-flying cannon balls turned out to be rather imprecise, difficult to replicate, and in no way "simple". Nowadays, we use cesium atoms. A process is said to take one second when a caesium-133 atom completes 9,192,631,770 periods of the radiation corresponding to the transition between two hyperfine levels of the ground state. A meter is the length of the path travelled by light in a vacuum in exactly $1/299,792,458$ of a second. Fortunately, these data are hard-coded in the Global Positioning System GPS so users do not have to reenter them each time

they want to know where they are. In the future, however, they might have to download an app because the time standard has been replaced by sophisticated transitions to ytterbium.

The conventional character of the time concept should not tempt us to believe that everything is somehow relative and, as a result, arbitrary. The relation of one's own pulse to an atomic clock is absolute and as real as the relation of an hourglass to the path of the sun. The exact sciences are relational sciences. They are not about the thing-in-itself as Newton and Kant dreamt, but rather about relations as Leibniz and, later, Mach pointed out.

It is not surprising that the physical time standard turned out to be rather impractical for other scientists. The psychology of time perception tells us – and you will all agree – that the perceived age is quite different from the physical age. The older we get the shorter the years seem. If we simply assume that perceived duration is inversely related to physical age and that a 20-year old also perceives a physical year as a psychological one, we come to the surprising discovery that at 90 years we are 90 years old. With an assumed

life expectancy of 90 years, 67% (or 82%) of your felt lifetime is behind you at the age of 20 (or 40) physical years.

Before we start to wallow in melancholy in the face of the "relativity of time", let me again quote Augustine. "But at any rate this much I dare affirm I know: that if nothing passed there would be no past time; if nothing were approaching, there would be no future time; if nothing were, there would be no present time." Well, – or as Bob Dylan sings "The times they are a-changin".

I wish you an exciting time reading this issue.

PROF. MARTIN WILKENS
PROFESSOR OF
QUANTUM OPTICS



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Matthias Zimmermann, Heike Kampe

Contributions: Dr. Barbara Eckardt, Petra Görlich,
Antje Horn-Conrad, Sophie Jäger

Translation: Susanne Voigt

Address of the Editorial Office:

Am Neuen Palais 10, 14469 Potsdam
Tel.: (0331) 977-1675, -1474, -1496 · Fax: (0331) 977-1130
E-mail: presse@uni-potsdam.de

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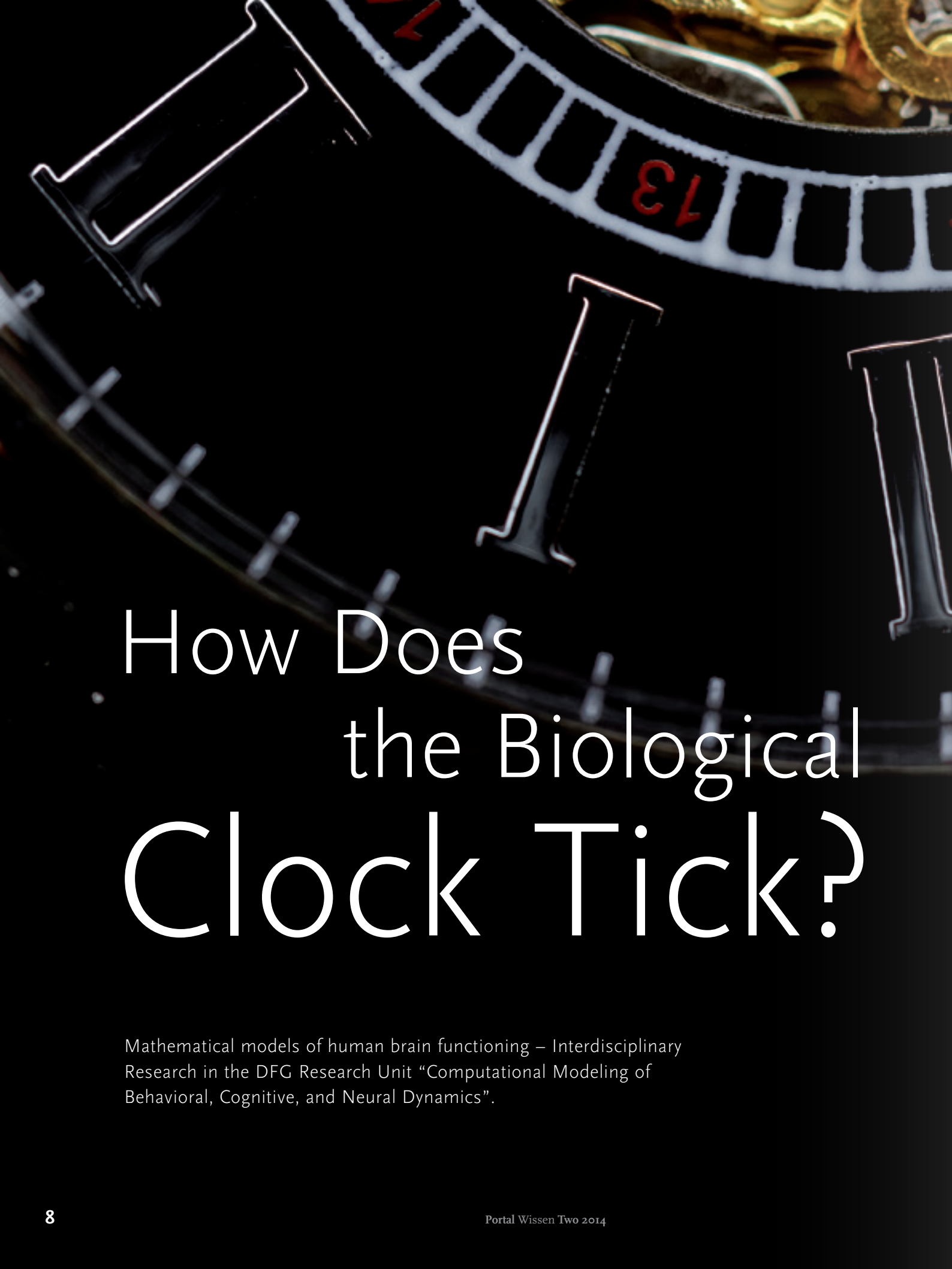
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Frozen **Time**



A close-up, artistic photograph of a mechanical clock. The focus is on the clock face, which features Roman numerals. Some numerals are in red, including '1' and '13'. The clock hands are made of polished metal. In the background, the intricate gears and mechanical components of the clock are visible, creating a sense of depth and complexity. The overall lighting is dramatic, with highlights on the metal surfaces and deep shadows in the recesses of the clock mechanism.

How Does the Biological Clock Tick?

Mathematical models of human brain functioning – Interdisciplinary Research in the DFG Research Unit “Computational Modeling of Behavioral, Cognitive, and Neural Dynamics”.



Physicists and psychologists have collaborated in interdisciplinary projects in Potsdam for about 20 years. What might at first glance seem surprising makes sense upon closer examination, because many biological and neurophysiological processes can be described using mathematical and physical methods. From a physical point of view, the rhythmically pumping heart is an oscillator – and might serve as a clock for perceiving short time intervals in the brain.

We can see, hear, smell, taste, and touch, but lack a sensory organ for perceiving how time passes. Nevertheless, we are often confronted with situations where we have to estimate duration: How much time is left before I have to hand in my exam? Is the egg already hard-boiled?

In most cases this works quite well. But how? This is what the researchers want to find out in their experiments. Subjects hear two acoustic signals in different, very short intervals and can determine quite precisely the respective interval's duration, despite having to complete tasks between the signals aimed at preventing mere counting.

Do we have something like an internal clock after all? Most likely not in the form of specific body parts or cells but perhaps indirectly: Apart from many other bodily signals, our brain's "insular cortex" also registers and processes the rhythm of our heartbeat and respiration. Thus we can perceive the passing of time at least for intervals between 2 and 25 seconds.

This, at least, is the assumption of psychologist Olga Pollatos. She led a research project dedicated to the "search for the influence of heartbeat and respiration on the perception of time and the production of rhythms". Pollatos was in charge of the experimental design and measurements. Arkady Pikovsky, Michael Rosenblum, and Azamat Yeldesbay, who work at the Institute of Physics and Astronomy, did the mathematical modeling.

To a layperson, this collaboration might be surprising at a first glance. What does the psychology of perception have to do with non-linear dynamic and statistical physics? This question makes Rosenblum smile. "We have always had interdisciplinary interests," he answers. "We have the methods for data analysis and modeling. We have been dealing with oscillators and their weak interaction for 20 years."

An oscillator, to physicists, is any system that behaves periodically, i.e. that swings rhythmically back and forth between two states. Oscillators are found in all fields. The clock pendulum is the best-known model. A violin string begins to oscillate when the bow draws against it. The metronome ticks the meter for musicians. Business cycles also follow periodic patterns.

“What does the psychology of perception have to do with non-linear dynamic and statistical physics?”



People are good at intuitively estimating short time intervals. Why is this?

DFG Research Group “Computational Modeling of Behavioral, Cognitive, and Neural Dynamics”

The Deutsche Forschungsgemeinschaft (DFG) regards Research Units as a “medium-term collaboration, in which those involved collaborate closely on specific medium-term research projects, whose anticipated findings would not be able to be achieved within the scope of the individual grants program”. The research group 868 “Computational Modeling of Behavioral, Cognitive, and Neural Dynamics” brings together more than 20 scientists from the University of Potsdam and Humboldt-Universität zu Berlin. Prof. Ralf Engbert from the Department Psychology of the University of Potsdam is the group’s spokesperson.

The human body has several oscillators: Apart from heart and lungs constantly pumping blood, air, and carbon dioxide up and down, the electrical activity of the brain’s neurons mounts up to an even rhythm that appears as a wave-like pattern in an electroencephalogram (EEG). As soon as two or more independently swinging oscillators are loosely connected, their different rhythms approximate, and, after some time, they oscillate in a common mode. Physicists call this synchronization.

“The heart might serve as an ‘internal clock’, at least in the ‘feeling’ of short time intervals.”

To explain the phenomenon, Rosenblum takes us on a journey through time back to the 17th century. Dutch mathematician and physicist Christiaan Huygens designed the first functioning and highly accurate pendulum clock. These high-tech instruments were meant to solve a difficult naval problem – establishing the exact longitude. Huygens used two instruments to make sure that at least one timing device would work if the other stopped.



THE SCIENTISTS



One of the research interests of physicist **Prof. Arkady Pikovsky** is synchronization. Since 1997, Pikovsky has been head of the working group Statistical Physics and Theory of Chaos at the Institute of Physics and Astronomy of the University of Potsdam.



Apl. Prof. Michael Rosenblum, at Potsdam since 1995, focuses his research on synchronization and the analyses of time series.



Prof. Olga Pollatos was Junior Professor for Emotion and Motivation Psychology in the Department Psychology at the University of Potsdam from 2009 to 2012. Today she is teaching and researching at the University of Ulm.



Contact
Prof. Dr. Ralf Engbert,
Spokesperson of the DFG Research Group 868
Department Psychologie
Karl-Liebknecht-Straße 24-25
14476 Potsdam

Tel. 0331-977 2140/2874
✉ ralf.engbert@uni-potsdam.de

He fastened both to the same wooden beam with a hook – and unwittingly established a coupling. One day when the scholar was sick in bed, he observed something strange. At first the pendulums of both clocks moved independently but eventually began oscillating precisely in time. This also happened when the synchronous oscillation was disrupted by holding one of the pendulums. Huygens spoke of an “odd kind of sympathy” between the two clocks and identified imperceptible movements of the wooden beam as the cause.

Mathematicians and physicists have since developed formulas to describe and calculate not only the synchronization of two or more coupled oscillators but even of a great many and also if they behave chaotically. It was reasonable to ask whether the perception of time observed in the experiment described above might be based on the synchronization of brain waves, heartbeat, and respiration because, from a physical point of view, biological oscillators are “dissipative non-linear systems” that can be represented with the help of “autonomous differential equations”.

This is what Pikovsky and Rosenblum did with the data from Olga Pollatos' tests – in a process that is only somewhat comprehensible to non-physicists and just superficially visible. It requires coffee as fuel, chalk for the scientists to sketch symbols and figures on a big blackboard, and computers. “The biggest challenge is to identify the tiniest of synchronization properties,” says Pikovsky, “because things do not work as exactly as with Huygens.” The preliminary findings, published this spring in a scientific journal, said that the heart might serve as an ‘internal clock’, at least in the ‘feeling’ of short time intervals.

Although this specific study in this project has ended, some other examinations are ongoing, like the other six projects of the research group “Computational Modeling of Behavioral, Cognitive, and Neural Dynamics” funded by the Deutsche Forschungsgemeinschaft (DFG). The participating scientists of the University of Potsdam and Humboldt-Universität zu Berlin come from different fields of research: experimental psychology, cognitive sciences, computer science, theoretical physics and applied mathematics. The aim of this multidisciplinary collaboration is to bring together the results of psychological experiments with brain processes. This means identifying basic patterns of human behavior, perception, and information processing and expressing them in mathematical and computer models.

“All of these experimental findings, time series, and recordings are traceable to mathematically delineable processes.”

How we comprehend language is one of the issues being examined. For example, scientists of the research group in Potsdam-Golm record eye movements during reading to find out how we make sense of individual words, whole sentences and texts. Others deal with the influence of movements and gestures on our cognition and how, with the help of small changes in our posture, we unconsciously maintain our body's balance. Yet others examine brain activity during certain tasks to determine brain signal transmission duration and individual response times. All of these experimental findings, time series, and recordings are traceable to mathematically delineable processes that can determine whether they follow a specific rhythm or occur by mere chance, whether in a controlled sequence or erratically.

Physicists Pikovsky and Rosenblum have already turned to project number 7 in the research group. Together with the PhD student Azamat Yeldesbay, they are working on a model that describes the mutual influence of “non-linear oscillators” in the brain and neurons and their electrical activity.

SABINE SÜTTERLIN



Reading: Pleasure for Some, Torment for Others

Visitors to the exhibition “Forschungsfenster” can see the principle of the “Moving-Window Paradigm” at the newly opened exhibition floor of science at the Potsdam Bildungsforum. In addition to the EyeLab’s research work, interactive presentations introduce current research topics at academic institutions of Brandenburg and Potsdam. The exhibition is open from 10 am to 6 pm on weekdays and 10 am to 2 pm on Saturdays.



For the eyes, reading is a fine motor skill, jumping in quick jerks from one word to the next in just fractions of a second. Depending on one's reading proficiency, the eyes rest on individual letters of a word for 200 to 450 milliseconds and even skip some words altogether. Experts speak of saccades and fixations when characterizing the fine-tuned eye movements controlled by the eye muscles. Tracking these rapid eye movements is a standard procedure in cognitive psychology. Experts in this field study the factors that control our perception. They examine how we gain and process knowledge and how emotions influence our actions. Analyzing eye movements offers scientists numerous answers to a wide variety of questions.

“Duration, frequency, and goal of eye movements tell the researcher how children process texts and how their reading competence develops.”

It is a bit like at the eye doctor's when laboratory supervisor Petra Schienmann positions the head correctly for eye tracking – the measurement of eye movements. Here in the EyeLab at the University of Potsdam stands the EyeLink® 1000 – a rather bulky device with highly sensitive technology. The integrated high-speed camera focuses the right eye and takes up to 1000 pictures per second. During the measurement, the head rests on a frame that is equipped with chin and forehead pads. The eyes look onto a monitor from which participants are instructed to read example sentences. “Afterwards we can say where you looked for how long,” Schienmann explains.

Anja Sperlich is a PhD student at the University of Potsdam and examines the eye movements of primary school children during reading. Duration, frequency, and position of eye movements tell the researcher how children process texts and how their reading competence develops. She also wants to find out what factors influence learning to read.

Anja Sperlich is doing her PhD together with 11 other young academics at the University of Potsdam within the Research Training Group “Intrapersonal Developmental Risk Factors in Childhood and Adolescents: A Longitudinal Perspective”, which was launched in 2011 and is funded by the Deutsche Forschungsgemeinschaft (DFG). The empirical data is collected as part of the large-scale PIER (Potsdamer Intrapersonale Entwicklungsrisiken) Study. About 3100 children and adolescents from about 220 schools in Brandenburg have taken part in this study.

Anja Sperlich began her study in 2012. “We contacted about 300 families and eventually got 141 children to participate in the elaborate laboratory testing,” she tells us. We invited 1st, 2nd, and 3rd graders to the University's EyeLab, where they were asked to read short sentences on a monitor, such as “Dinosaurs lived many million years ago. The biggest dinosaur was bigger than a house.” Then the children chose which of the two pictures matched

what they had read before. A sun appeared on the monitor for correct answers and a dark rain cloud for incorrect ones. The scientist tested the same children a year later and observed how reading competence had changed. “Children often remembered how many suns and rain clouds they had collected the year before,” Schienmann says and smiles.

“The scientist tested the same children a year later and was able to observe how reading competence had changed.”

Sperlich uses the moving-window paradigm. Sentences are manipulated in such a way that subjects can only read the text in a small variable-width window of 7-29 letters. The window moves across the sentence at the speed of the participants' eye movements when reading. Letters outside the window are altered and masked by Xs. This method enables the researchers to determine the perceptual span, the size of visual field within which we can take in information for processing. “Our visual field is limited,” the researcher explains. The experts call the area of sharpest central vision the fovea centralis.

The fovea centralis is surrounded by the parafovea, where visual acuity is lower but still allows for taking in textual information. While the gaze remains on a word, experienced readers already start preprocessing the next

Taking measurements with the EyeLink 1000.





one. “We experimentally manipulate the extent to which readers can preview by showing only a pre-defined window of useful information,” Sperlich describes the procedure. “If we expand the window up to a size that does not hinder the normal flow of reading, we know how many letters can be processed with one gaze.”

After the reading test, Sperlich opens a file showing the previously read sentences with a fine red line on them – the visual track. In most cases a little knot lies on each word. This is where the eye rested for a few milliseconds before moving on to the next word with a saccade. Longer and more difficult words show several knots. Short function words like ‘in’ or ‘of’ have no fixation points. “Experienced readers skip almost every third word,” Sperlich says. The red line sometimes shows backward movements – regressions – if individual words or passages were reread. On a large data sheet, the psychologist inputs details about each recorded fixation – duration, length of the following saccade, the within-sentence and the within-word position, etc. The analyses are based on about 165,000 fixations.

Sperlich links the data of the eye-tracking experiment to results of other reading tests usually used to diagnose dyslexia. Children took these tests at school, supervised by young scientists of the PIER study. Statistical analyses show whether the measurement of eye movements produced similar results as the other reading tests. “Reading problems in children can be easily detected with the usual tests”, Sperlich underlines, but tracking the eye movements allows a direct observation of the reading process. “There are already many programs that can help pupils with dyslexia,” says Sperlich. After all, 5% of the population is affected. However, these programs have to be further optimized. “Only after we have understood the sequence of processes involved in reading, we can begin to improve these programs to fit the needs of poor readers and help them more efficiently.” Her examinations provide the basis for it.

“Tracking the eye movements allows a direct observation of the reading process.”

Highly sensitive technology is used for tracking eye movements.



Photo: Fritz, Karla (2. top); Gensel, Hannelore (bottom)



Initial results have confirmed the prevalent hypothesis: “Children who have just started reading make longer and more frequent fixations and shorter saccades than experienced readers.” While first graders fixate on each word several times, a third grader often needs only one fixation per word. The perceptual span increases the more experienced a reader is. “After about sixth grade, it is fully developed, at least in the English language. Our experiments will show whether this also holds true also for German,” says Sperlich. This parameter can also vary depending on the difficulty of the text. “When I read a demanding text, my cognitive capacities are more exhausted, and the perceptual span decreases,” Sperlich explains.

“If children do not find an approach to literature in their leisure time quite early, school can hardly make up for the difference between passionate and reluctant readers.”

However, the scientist was surprised that the differences in reading performance increase within a grade level as the children get older, an interpretation which other research also suggests. “When children are exposed to books before going to school, it promotes their interest in reading. How often they read seems to increasingly affect their reading performance,” Sperlich clarifies. The more often a child reads, the faster certain partial processes of reading are automatized. “This releases cognitive capacities that can be used for a deeper reading comprehension,” the scientist explains. In further examinations, Sperlich will analyze the connec-

tions between automatization, text processing, and size of perceptual span at different points of measurement. The initial data already suggests, however, that if children do not find an approach to literature in their leisure time quite early, school can hardly make up for the difference between passionate and reluctant readers. Performance drifts further apart and consolidates. Whether children are bookworms or ‘hate’ reading – “the foundation for a successful development of the reading skill seems to be laid at preschool age,” Sperlich explains. Teachers and parents should observe and promote children’s interest in reading at a young age.

HEIKE KAMPE

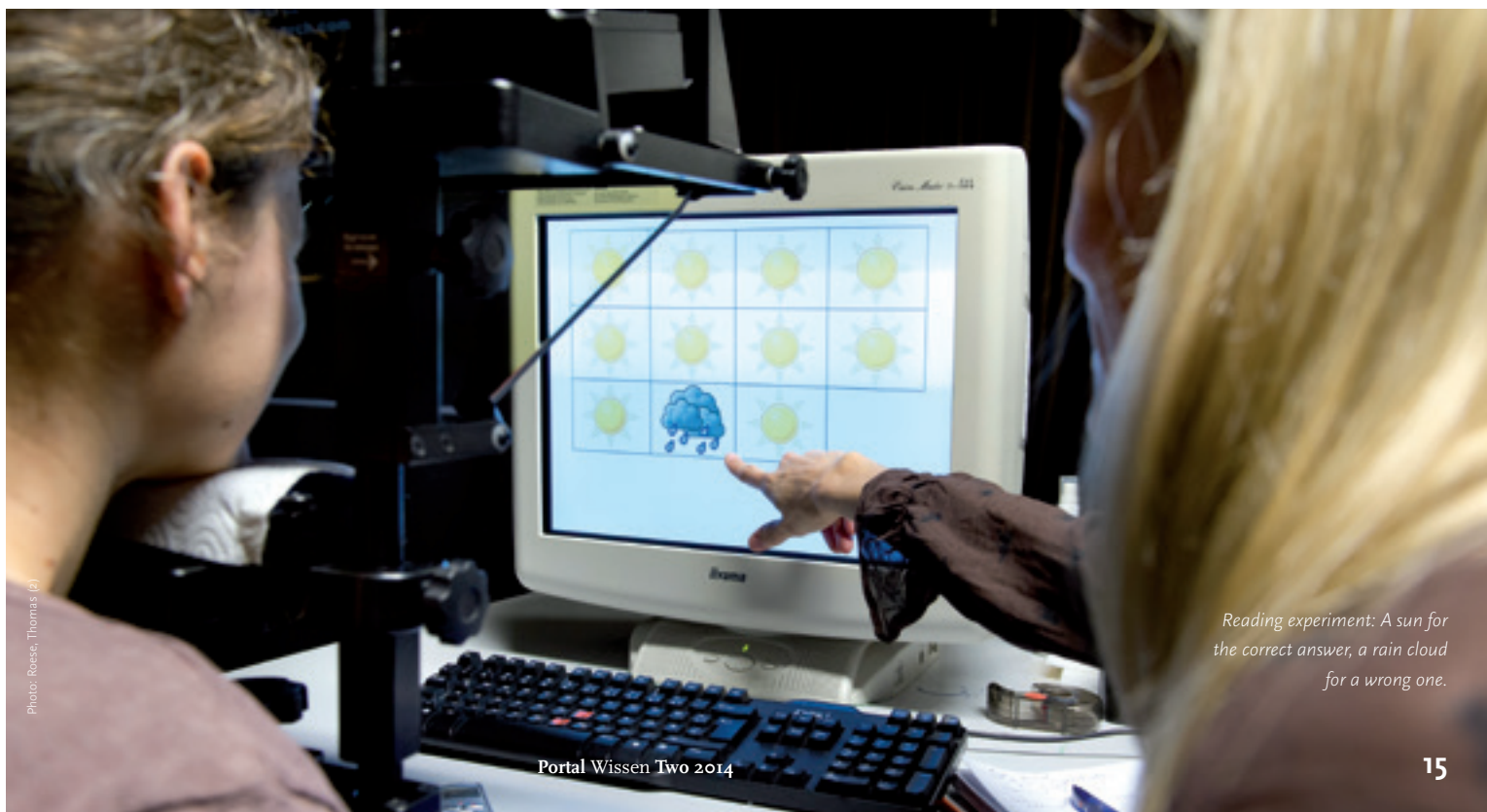
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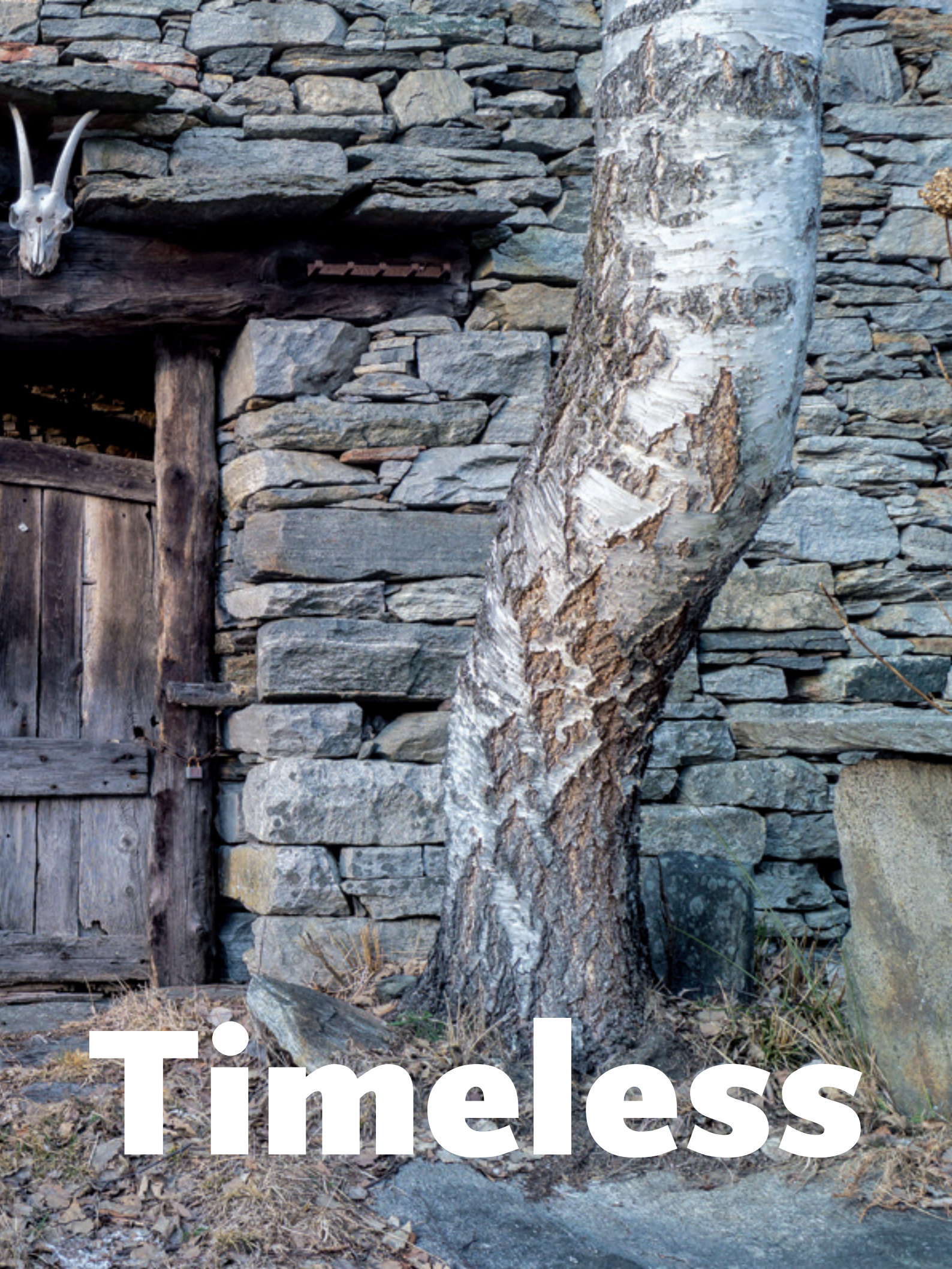
Anja Sperlich studied psychology at the University of Potsdam and has been doing her PhD since 2011 under the supervision of Dr. Jochen Laubrock and Prof. Ulrich Schiefele within the DFG Research Training Group “Intrapersonal Developmental Risk Factors in Childhood and Adolescents: A Longitudinal Perspective”.

Contact

Universität Potsdam, Department Psychologie
Karl-Liebknecht-Straße 24-25
14476 Potsdam OT Golm
✉ anjasper@uni-potsdam.de







Timeless





Molecular Fossils as Climate Witnesses

Lake Sediments Reveal
Climate Changes

Climate change and its possible consequences are widely discussed among experts and the lay public. Dr. Dirk Sachse, a geologist, addresses a specific aspect of this issue: as leader of the Emmy Noether Research Group Paleohydrology he and his team examine past changes in the hydrologic cycle and its influence on climate. They analyze molecular plant remnants from lake sediments. These so-called “molecular fossils” tell researchers about the climate history in the study region.

When Dirk Sachse and his team head out for field expeditions, they look for traces of past climate. Their research field is paleohydrology, aiming at unraveling past changes in the hydrologic cycle as an important part of past climate variability. Specific chemical or sedimentological data, so-called proxies, from lake sediment cores provide information about changes in a region's precipitation – the main interest of Sachse and his research team. They examine paleohydrological changes, for instance in the Meerfelder Maar, a volcanic lake in the Eifel. “There are few direct proxies of changes in the hydrologic cycle. Most are somewhat indirect,” Sachse says. Vegetation, for example, changes with fluctuations in precipitation. Scientists can reconstruct such changes in plant growth by analyzing pollen in the sediment. However, it may take decades before vegetation responds to climate changes.

“Decades may pass before vegetation responds to climate changes.”

To assess past changes in the hydrologic cycle directly, the research team analyzes samples from lake sediment cores with novel molecular methods. The geologists extract molecular plant remnants from those lake sediment and analyze the abundances of the stable hydrogen isotopes in these molecules. Through this, they can reconstruct changes in the isotopic composition of



Taking samples in Cameroon.

ancient precipitation water and draw conclusions about changes in precipitation and dry periods. Nevertheless, systematic collaboration with plant physiologists and examinations of modern plants grown in a greenhouse are necessary to interpret the sedimentary record. “In a greenhouse we can influence and measure the climatic conditions and measure which hydrogen isotopes accumulate in the plants and their molecular components,” Sachse explains the procedure. The geologists cooperate closely with plant physiologists at the University of Basel to understand the behavior of hydrogen isotopes during plant biosynthesis. They also collaborate with the Institute of Biochemistry and Biology of the University of Potsdam, for instance with Prof. Ralph Tiedemann, on other projects.

In some lakes, like in the investigated Eifel region, sediment layers form annually consisting mainly of mineral particles and dead organic matter like dead zooplankton remnants and algae. Counting the individual layers, just like tree rings, enables scientists to date the sediment precisely. Each sediment layer contains remnants of

the lacustrine ecosystem – for instance shells and pollen. Researchers use these microfossils as an “archive” of climate history. Sachse’s working group is specifically interested in organic matter, like lipids. These compounds remain in the sediment for extremely long periods, sometimes for millions of years, and hardly change. “This is a great advantage and also the reason we are investigating these so-called ‘molecular fossils’ or biomarkers,” says Sachse. Biomarkers are organic substances in sediments that are indicative for their biological origin. Researchers can identify whether they were produced by a land plant or by algae. The substances contain mostly carbon and hydrogen. The hydrogen comes from the water taken up by plants and algae. The isotopic composition of hydrogen in water records various processes in the hydrological cycle. Thus they are direct indicators for hydrological changes. Changes in the composition of hydrogen isotopes in the biomarker

“Systematic collaboration with plant physiologists and examinations of modern plants grown in a greenhouse are necessary to interpret the sedimentary record.”



molecules enable the researchers to map droughts as well as fluctuations in humidity and precipitation. This analytical method used by the Potsdam scientists is relatively new.

Sachse and his colleagues use their findings to reconstruct hydrological changes during past climate changes, which is relevant for a better understanding

“During his studies, he was fascinated how climatic processes form the earth’s surface and sediments from the past offer clues about the climate of that time.”

of the effects future climate change may have on us. Climate models predict future changes in temperature as a result of manmade climate change, and there is no doubt that the average global temperature will rise. While this will lead to a higher percentage of water vapor in the atmosphere, it does not necessarily mean that temperature equally rises everywhere. Climate models are less precise when it comes to predicting changes in precipitation.

This raises the question of the effect of temperature changes on the hydrological cycle in specific regions. A better understanding of past climate changes, and their effect on the water cycle, will help to improve the predictions by these models.

Sachse and his team do not only work within Germany but also worldwide. Their research takes them to Mexico, Africa and the Himalayas. “Tropical regions are important for us because there is a lot of water in the atmosphere, and we expect stronger changes in the hydrological cycle there.”

Dirk Sachse studied geology in Jena. Although he was interested in natural sciences rather early, he did not have a clear idea about his professional development as a child. His “appetite” for it came only while “eating”. “I had no idea when I began my studies that there was something like what I am doing now.” Traveling to the USA and Latin America, visiting national parks and the phenomenon of volcanos fascinated him so much that he turned to geology. During his studies, he was fascinated how climatic processes shape the earth’s surface and how sediments from the past offer clues about the climate of that time. He wanted to understand climate changes. He worked for his PhD at the Max-Planck-Institute for Biogeochemistry in Jena. “There were always people who gave me the opportunity to work on completely new topics,” Sachse says. Born in Halle, he definitely wanted to go abroad after his PhD. His scientific work since, has also taken him to Boston and Seattle.

Since 2009 Sachse has led the Emmy Noether Research Group Paleohydrology at the Institute for Earth and Environmental Sciences, which is funded by the Deutsche Forschungsgemeinschaft. The geologists in his team

study past climate changes on the continents throughout the more recent geological history – with a special focus on the Holocene (roughly the last 11,000 years). Sachse decided to work at Potsdam because of the terrestrial working groups there as well as good analytical facilities because he needs rather complex laboratories and analytical instrumentation for his analyses. “I do not know of many other places in Germany where I could work in such an environment,” he says.

DR. BARBARA ECKARDT

THE SCIENTIST



Dirk Sachse studied geology in Jena and Granada, Spain. He received his PhD from the University of Jena in 2005. In Potsdam he is leading the Emmy-Noether Research Group Paleohydrology at the Institute for Earth and Environmental Sciences. His scientific interests are the interactions of geospheres, biospheres, and hydrospheres and their influence on the climate – and vice versa.

Contact

Universität Potsdam
Institut für Erd- und Umweltwissenschaften
Karl-Liebknecht-Str. 24-25
14476 Potsdam
✉ dsachse@geo.uni-potsdam.de



Sediment being analyzed in the lab.



*Vulnerable island country –
the Philippines.*



When the Flood Comes

Catherine Abon Develops a
Flood Early Warning System for
the Philippines

With its 7000 islands, the Philippines is the world's fifth largest island country – and a holiday paradise. Lying at the border of the Philippine and Eurasian Plates, the archipelago is vulnerable to volcanic activity and earthquakes. The United Nations University – Institute for Environment and Human Security ranked the Philippines as having the third highest disaster risk in the 2012 WorldRiskIndex – after Vanuatu and Tonga. During the rainy season from June to November, typhoons and the Southwest Monsoon bring heavy rainfall, resulting in floods. The disastrous enormity of typhoons has been known at least since Haiyan in November 2013. To mitigate the consequences of devastating flood waves, researchers are developing an early warning system.



After the storm: People in the Philippines wait for help after typhoon Haiyan in 2013.

Catherine Abon knows the danger all too well. She comes from the north of the Philippines. Since the fall of 2011, she has been at the University of Potsdam. As a PhD student she is working to improve an early warning system for floods in her home country. A lecturer at her university, the University of the Philippines, encouraged her to look for a PhD program abroad and to bring her specialized knowledge back home, of course. Catherine, 30 years old, became aware of the graduate school Geo-Sim of the Helmholtz Association through an advertisement. Interdisciplinary scientists at the German Research Center for Geosciences in Potsdam, the Freie Universität Berlin, and the University of Potsdam have joined forces to provide training and conduct research in the field of Explorative Simulation in Earth Sciences.

Abon's project also reflects this interdisciplinary idea. "I use mathematical tools to make geoscientific processes

“Catherine Abon came to Potsdam to examine if weather radar systems can be used for hydrological simulations.”

visible,” the young scientist says. At the beginning, she still struggled with the mathematics. Although she had taken some basic courses during her studies, she required a more comprehensive knowledge for concrete application. She is able to discuss her questions and problems in the 'flood group', as she calls it, which consists of PhD students and postdocs. They

all deal with floods in some way. Her PhD advisors also have an open ear for her. "It is ideal to be supervised by a geoscientist and a mathematician," says Abon, refer-

ring to Professor Axel Bronstert from the Institute of Earth and Environmental Science at the University of Potsdam and Professor Ralf Kornhuber from the Department of Mathematics and Computer Science at the Freie Universität Berlin.

Catherine Abon came to Potsdam to examine if weather radar systems can be used for hydrological simulations. "The Philippines has new radar systems that register storms but they are not yet completely suitable for other application like flood warning," Abon says. "I am trying to cover this field by using the software at the University of Potsdam." She monitors the rainfall measured

THE SCIENTIST



Catherine Abon is a PhD student at the Institute of Earth and Environmental Science at the University of Potsdam. As a member of the research group Hydrology & Climatology led by Prof. Axel Bronstert, she is working on developing a flood early warning system for the Philippines.

Contact

Universität Potsdam
Institut für Erd- und Umweltwissenschaften
Karl-Liebknecht-Str. 24-25
14476 Potsdam
✉ cabon@uni-potsdam.de



“Abon hopes to get more reliable and timely flood forecasts by evaluating radar information.”

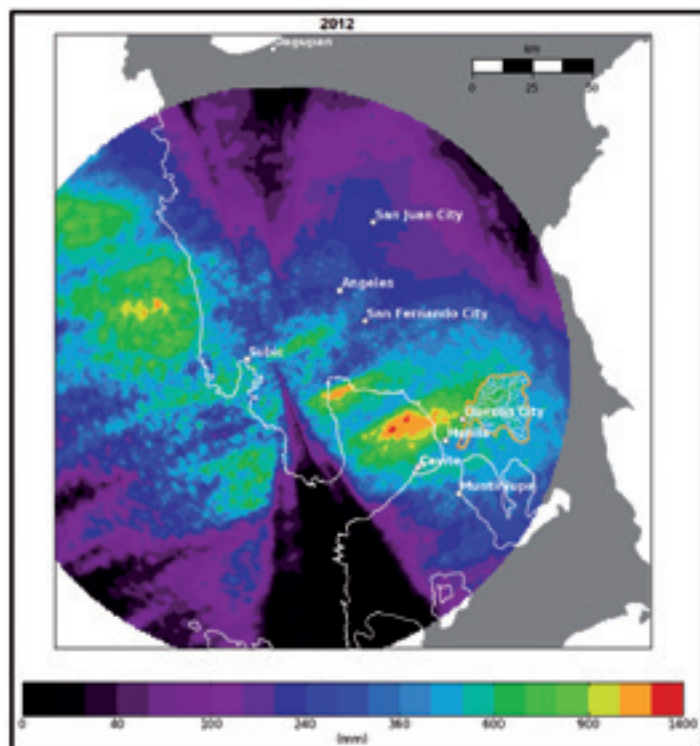
by radar in such a way that it can be used to make prognoses for flood waves. For this, she also uses “wradlib”, a program developed by earth and environmental scientists of the research group Hydrology and Climatology at the University of Potsdam. It is available online as an open source library. “At the chair of the University of Potsdam, the program has been mainly used for Germany. Now it is also working with data from the Philippine systems. Programs have to be made robust initially so they also work reliably for other cases. The software has already more than 40 users around the globe.”

Her findings during the process of her work make it so fascinating, Abon explains. On the one hand, there is the clear practical use of flood warning systems. On the other, she is gaining scientific knowledge from her work with the data that helps her to better understand hydrological processes. “To discover something new makes sitting here at my desk so exciting. The workday life consists of sitting. The highlights are coffee breaks and lunch, but when I get the results I want, I could kiss the whole world.”

So far, prognoses about rainfall in the Philippines have only been possible through selective rain gauge measurements. Abon hopes to get more reliable and timely flood forecasts by evaluating radar information, because radar systems can measure the amount of precipitation more precisely.

The Filipina wants to prevent such disasters because the people in her country are severely affected by them again and again. When typhoon Haiyan devastated the country, she also suffered a kind of trauma in Germany. “Although my relatives were left unscathed by the typhoon, it was terrible for me to see the people of my home country suffer so much. And this because the storm was much stronger than expected.” In Germany, she attentively followed the relief actions, and it touched her how many people joined hands to help. She herself organized donation campaigns to help at least a bit from a distance.

A number of good early warning systems have since become available, Abon says. The “Philippine Institute of Volcanology and Seismology” is very active in exploring volcanoes and earthquakes. The “Effective Flood Control Operation System” in Metro Manila monitors rainfall and regulates the floodway. “Chaos still breaks out during such a catastrophe.” The omnipresent danger of natural disaster is still not yet present in people’s minds. “They do speak about typhoons and floods in primary school but too little about the damage they can cause.” Abon



Radar image of rainfall in August 2012. Monsoon rains triggered catastrophic floods and landslides.

remembers the massive earthquake of 1990 after which all schools had to conduct disaster exercises several times a year but these were discontinued after a short time. “People tend to erase terrible events from their memory. We lack a culture of remembering.” Measures insufficiently implemented include regulation for earthquake engineering and designating flood-prone areas as uninhabitable. Abon nevertheless looks optimistically into the future. “Awareness of natural hazards has changed due to the many floods and typhoons over the past years. Relief organizations have also provided good awareness training. They go into the communities to inform people about potential hazards and the measures they as individuals can take to limit possible damages.”

Catherine Abon does not know whether she will directly return to her home country in the fall. She has no plans yet for the time after her dissertation. She is not worried about finding a job because scientists are sought after in the Philippines. “I somehow have the romantic idea that I will grow old in my home country, but now I am still young and want to travel the world.”

SOPHIE JÄGER

“They do speak about typhoons and floods in primary school but too little about the damage they can cause.”



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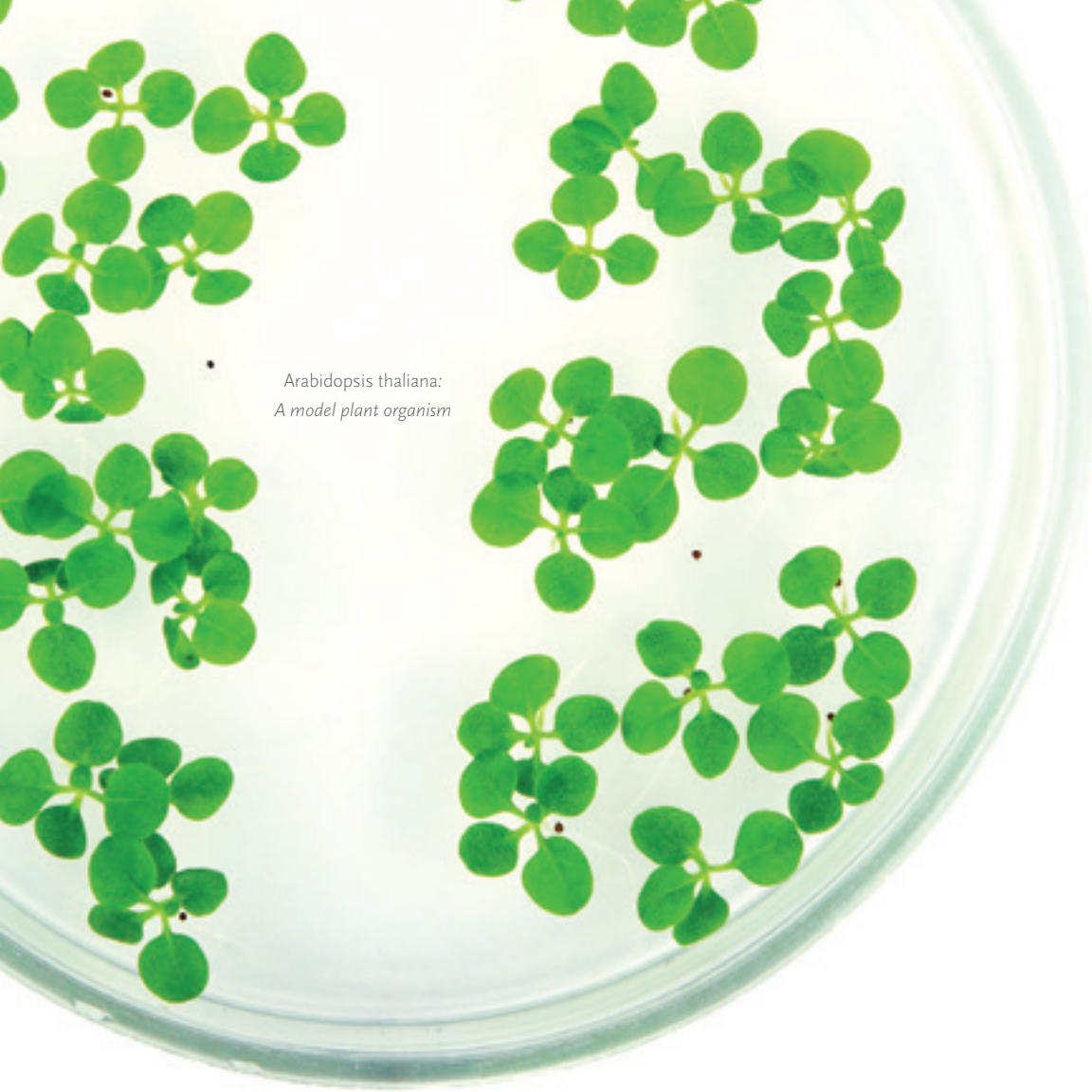
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A night scene of a coastal road. In the foreground, there are traffic lights on poles. The left traffic light has a red light illuminated. To the right, there is a circular blue sign with a white arrow pointing down and to the right. Below it is a rectangular sign with a blue arrow pointing left and the word "BUS". Further down the pole is a small sign with the number "411". In the background, there is a body of water and a dark, silhouetted shoreline with trees. The sky is dark with some light clouds. The overall lighting is a mix of the cool blue of the sign and the warm orange of the traffic light and distant lights.

SPRIT OF THE TIMES



Arabidopsis thaliana:
A model plant organism

Without Laboratory and Pipette

Biology from the Computer



She works with a great deal of data every day. Her working tools are algorithms, statistical analyses and mathematical models. Specialists in bioinformatics answer questions that molecular biologists or biochemists cannot answer solely by experimental work. Today decoding genotype or predicting protein folding and structure are hardly imaginable without bioinformatics. The vast amount of data generated in molecular biology in particular have to be managed, analyzed and visualized.

An Excel file of 22,810 lines and 12 columns is the basis for Dhivyaa Rajasundaram's research work. Each line stands for one of the 22,810 genes of a small, unassuming plant with white blossoms – the common thale cress. *Arabidopsis thaliana* – its scientific name – is not an especially beautiful plant but is very important to genetic research and is regarded as the model organism per se. *Arabidopsis* has a small genome, is easy to cultivate and needs just eight weeks from germination to mature seed. Its complete genome was mapped in 2000.

For the bioinformatics scientist Dhivyaa Rajasundaram *Arabidopsis* is a rewarding object of research. The Indian researcher, who has been writing her PhD thesis at the

“ Her working equipment is the computer; her world is the analysis of data and recognition of underlying patterns. ”

Institute of Biochemistry and Biology since 2012, is interested in the plant's root tissue, the gene activities of the cell walls' root tissue, to be exact. She analyzes when which genes of the six different types of *Arabidopsis thaliana*'s root tissue are switched on and off. However, the scientist does not have to do menial tasks like cultivating plants,

preparing tissue sections, DNA extraction and sequencing herself. “I am not a fan of laboratory work,” the researcher admits, smiling. Her working tool is the computer; her world is analyzing data and identifying the patterns they are based on.

She gets this data from other researchers, because Rajasundaram is one of 13 young academics analyzing plant cell walls in the EU project WallTraC (The Plant Cell Wall Training Consortium). Nine leading European research teams are taking part in this project coordinated by the French National Institute for Agricultural Research (INRA). WallTraC is part of the Initial Training Networks (ITN) of the Marie Skłodowska-Curie Actions that funds EU projects that help young academics embarking on a research career. WallTraC brings together the universities of Copenhagen, Leeds, Lisbon, and Newcastle, the INRA and Max-Planck-Institute of Molecular Plant Physiology (MPI) in Potsdam-Golm as well as Bayer CropScience and CP Kelco from the private sector. Joachim Selbig, Professor of Bioinformatics at the University of Potsdam and group leader at the

MPI, is supervising Rajasundaram's research work. “An important aspect of all Marie-Curie-ITNs is their practical focus,” Selbig explains. The participants concentrate not only on research but also its application. The current project is to develop new molecular methods and tools that will make analyzing the structure and components of the plant cell wall easier, and it focuses on the utilization of research results by the industry.

“Plant cell walls are presently of enormous significance for research because their properties are important for the production of biofuels and for the textile industry,” Rajasundaram explains. One of the 13 young WallTraC

“ Plant cell walls are presently of enormous significance for research because their properties are important for the production of biofuels and for the textile industry. ”

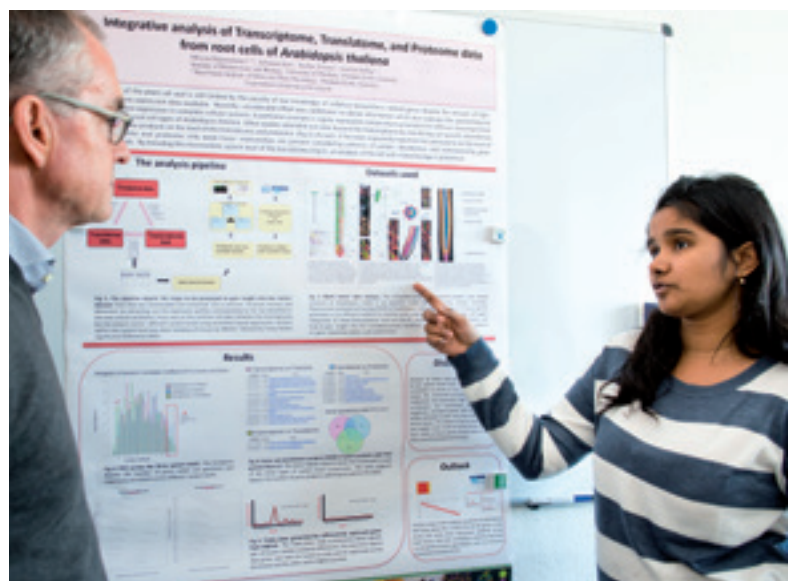
THE PROJECT

The Plant Cellwall Training Consortium (WallTraC) is a project of the Marie Skłodowska-Curie Actions and is funded by the European Union. Its aim is to develop new molecular methods and tools to analyze plant cell walls.

Participants: Research Group Bioinformatics of the University of Potsdam, Max-Planck-Institute of Molecular Plant Physiology, the universities of Copenhagen, Leeds, Lisbon, Newcastle, INRA, Bayer CropScience (Belgium), CP Kelco (Denmark)

Duration: 2011-2016

www.walltrac-itn.eu



Dhivyaa Rajasundaram and Prof. Joachim Selbig in discussion.



PLANT CELL WALLS

They contain a large part of the terrestrial biomass. Plant cell walls comprise celluloses, pectin, hemicelluloses and other complex carbohydrates. Scientists also call them polymers because they consist of many identical components. The individual cell wall components determine the shape and mechanical properties of a plant cell. They are also important for the industry, for instance in the production of food and textiles. The exact composition and function of the individual polymers in a plant cell wall are important fields of research in plant biology.

scientists is dealing with cell wall components that influence the color of cotton fibers. Others are analyzing different types of pectin from plants to find out which pectin under what extraction conditions has the best properties for the food industry.

Dhivyaa Rajasundaram's task in the research network is to analyze a part of the copious amount of data generated by the other participants in the experiment. A part of this data is the Excel file with 22,810 lines. Each line

that stands for an *Arabidopsis* gene has 12 values in the chart. Two of these values stand for one of the six types of root tissue. This data comes from DNA analyses at the MPI. By using statistical methods Rajasundaram extracts that data from almost 300,000 values that give some indication of the gene activity in the different types of root tissue. Each root cell – from the root apex to the vascular cylinder – contains the complete *Arabidopsis*

“Each root cell – from the root apex to the vascular cylinder – contains the complete *Arabidopsis* “assembly kit” with its almost 23,000 genes.”

“assembly kit” with its almost 23,000 genes. The information encoded by these genes is read from enzymes and translated into proteins. “From the approximately 23,000 genes in the root ball, about 1000 are active,” Rajasundaram explains. These genes give themselves away due to their higher values in the data sheet.

The researchers have to go one more step to identify those of the 1000 genes critical to the cell wall structure and processes. “Our goal is to identify groups of genes that show a certain activity pattern,” Joachim Selbig points out. Using these patterns, the scientists determine the genes involved in the cell wall's biosynthesis. They are able to distinguish between the genes that they just read but whose information has not been translated into proteins and the others whose codes actually lead to protein products. “This intermediate step has been the subject of intensive research for about five years,” Selbig reports.

The first results that Rajasundaram can glean from this pile of data show that the genome of *Arabidopsis thaliana* contains almost 900 genes active in the composition and decomposition of the cell wall, transport processes, and the synthesis of cell wall components. About 200 genes are active but the corresponding proteins are hardly produced. The opposite is true for another 200 genes, whose information is often disproportionately changed into proteins.

Even bioinformatics cannot explain why the *Arabidopsis* genome shows this pattern. Additional examinations are necessary – in the laboratory

HEIKE KAMPE

THE SCIENTISTS



Dhivyaa Rajasundaram studied biotechnology at Tamil Nadu Agricultural University in Coimbatore (India) and Quantitative Genetics at Cornell University in New York (USA). Since 2012 she has been working on her PhD thesis at the Institute of Biochemistry and Biology at the University of Potsdam. Within the EU project WallTraC, she is analyzing gene activities of plant root tissue.

Contact

Universität Potsdam
Institut für Biochemie und Biologie
Karl-Liebknechtstraße 24-25
D-14476 Potsdam
✉ rajasund@uni-potsdam.de



Prof. Dr. Joachim Selbig studied physics in Leipzig and did his PhD in informatics in Berlin. Since 2004 he has been research group leader of bioinformatics at the University of Potsdam, and researches, among other topics, the connection between genetic information and phenotype as well as the coupling of regulation and metabolism.

Contact

Universität Potsdam
Institut für Biochemie und Biologie
Karl-Liebknechtstraße 24-25
D-14476 Potsdam
✉ jselbig@uni-potsdam.de

Guest Commentary

BY DR. BERNARD COAKLEY

ASSOCIATE PROFESSOR IN THE GEOPHYSICAL INSTITUTE, UNIVERSITY OF ALASKA FAIRBANKS



I live in Alaska, which is, to put it mildly, a different place than Berlin. By the expectations of winter I have grown accustomed to, there was no winter here this year. Since October we have had a very long Spring. This was confirmed for me when I found some trees blooming in mid January near Greifswalder Str. in Prenzlauer Berg. I was glad I was not alone in my confusion.

People ask: “How cold is it in Alaska?” Being a scientist, I tend to use numbers and physics to explain the many differences. The only advantage of -40° is that it is the same in Celsius and Fahrenheit. About the time I begin talking about the temperature inversion, people's eyes glaze over. They are lost. Lately I have settled for just telling them; “Your freezer isn't cold.” That seems to be something they understand.

There are other differences, of course, in Fairbanks, I live surrounded by a huge wilderness, extending in all directions, bisected by one of the four roads that lead out to

the east, north and south. But Berlin is not unfamiliar. It reminds me of New York City, where I lived for about 13 years as a student and research scientist at Columbia University. I liked New York very much, but, in some ways I like Berlin more. It is greener than New York. It is also less crowded. In some parts of Manhattan, you have the sense that there is no more room for anyone. I have not felt that way in Berlin, but I have not gone to a football game.

Working at the Institut für Erd- und Umweltwissenschaften in Golm has been wonderful. I selected it for my sabbatical because the work being done there complements work I did as a PhD student. For that work I studied the history of foreland basins, the thick accumulations of sediment that form in front of mountain ranges as they move, like bulldozers, across the continents. This is the geology of long time scales (1-100 million years). I sought the connections between the deformation in the mountains and the accumulation of sediments in the adjacent basin, hoping to see a “signal” encoded in the rocks that would tell me more about this history of deformation.



My colleagues in Golm, led by Prof. Dr. Manfred Strecker, also work on the connection between deformation and the generation of sediments, but with a focus on shorter timescales. They look in much greater detail than I ever considered into how deformation and uplift lead to the generation and transport of sediments. They are using tools (dating, isotopic analysis, etc.) that did not exist when I was doing my PhD to study the source of the sediments that filled the basins I studied. These processes have shorter timescales (1-1000 years), but are no less profound in geologic terms. What we observe in the thick preserved records in sedimentary basins is the net accumulation of these smaller-scale processes. In many cases, we can expand our understanding of the macro-processes in space and time by appreciating the net effect of the micro-processes.

I am looking forward to my remaining time at The University of Potsdam. I will be here until the end of July. Then I will board the AWI icebreaker Polarstern to visit a poorly known feature in the Arctic Ocean, the Alpha-Mendelev Ridge. In my work, the greatest excitement is to see things no one has ever seen before. Sometimes you do that by visiting a place no one has ever been before. Sometimes you do it by using a technique no one has used before. I have been fortunate to work in the Arctic Ocean and to visit the Institut für Erd- und Umweltwissenschaften and have both opportunities.



THE PROJECT

The PhD program “International Doctorate for Experimental Approaches to Language and Brain” (IDEALAB) investigates the relationship between language and brain since 2012.

Participating institutions: University of Potsdam, Macquarie University Sydney, Newcastle University, University of Trento, University of Groningen, and 15 other partners from industry and science.

Funded by: European Union
(Erasmus Mundus Program)

 <http://em-idealab.com>



Look Me in the Eye!

What the Pupil Tells Us about
Language Acquisition

At the IDEALAB doctoral program, an international group of young academics study the relationship between language and brain. They conduct research on typical and atypical language processing and representations. Katalin Tamási, an IDEALAB student from Hungary, focuses her research on the development of early word representations.

While two-year-old Lena is making herself comfortable in her mother's lap, it does not seem to bother her that she is in the midst of an experiment at the University's Babylab. She is captivated by various objects and figures on the screen. A female voice labels each object that appears: "fish", "sun", "baby", etc. Sometimes the words are slightly mispronounced: "fish" becomes "pish", "sun" becomes "dun", and "baby" "taby".

As Lena watches the film, Tamási observes the child's reactions on a monitor in an adjacent room. The 28-year-old researcher wants to find out how Lena's pupils react to words, correct and incorrect alike, when presented along with a corresponding picture. The central question Tamási asks in her thesis is what children know about words before they learn to speak. She hypothesizes that even if children cannot produce some words correctly, they are able to perceive the difference between correct and incorrect pronunciations. From her previous work with autistic children, she compares their abilities to those of young typical children, commenting that "autistic children understand much more than they let on by talking."

Tamási studies this question as part of IDEALAB (International Doctorate for Experimental Approaches to Language and Brain), funded by the Erasmus Mundus Program of the European Union since 2012. Apart from the University of Potsdam, participating universities include Trento (Italy); Groningen (Netherlands); Newcastle (Great Britain); and Macquarie University, Sydney (Australia). Among the 15 associated partners are other universities, health institutions, publishing and technology companies. At the moment, 21 PhD students from Russia, Mexico, Portugal, the Netherlands, Iran, Spain, Turkey, Ukraine, Hungary, USA, Pakistan, Italy, Serbia, China, and Germany are conducting research at IDEALAB.

“These children understand much more than they let on by talking.”

Language and brain are the major foci the young academics examine from various angles. "The program addresses how language is processed by and represented in the brain," explains Barbara Höhle, who is a professor for Psycholinguistics/Language Acquisition and coordinator of the project. Participation in the program is highly attractive for the fellows because of the methodological diversity the five universities can offer. "Moreover, the universities' expertise is multifarious," says Prof. Höhle. For example, Macquarie University contributes its research strength in dyslexia, while Potsdam provides its specialization in language acquisition.



Katalin Tamási and Carolin Jäkel in the BabyLab.

The expertise offered by the University of Potsdam motivated Katalin Tamási to apply for a scholarship. In her year, eight candidates were selected from among 60 young applicants. The application procedure is demanding: "In addition to the standard requirements,

"We still don't know exactly how words are represented in the child's mind."

applicants have to submit a detailed outline of what they want to research in their PhD project," explains Prof. Höhle. Do they know the respective literature? Can they formulate concrete hypotheses, and do they have a clear idea of how to pursue the study of what

they want to examine? These are the crucial dimensions on which the admissions committee evaluates the researchers. "We then conduct a Skype interview with the shortlisted candidates. Due to the time difference this is sometimes quite a challenge," adds Prof. Höhle with a smile.

Katalin Tamási presented a persuasive proposal. She is particularly interested in language acquisition during the first years of life. "We still don't know exactly how words are represented in the child's mind," she explains. How precise are Lena's concept of a word? Can she distinguish between "fish" and "pish"? Can she do this even though she cannot pronounce this word correctly yet? To answer these questions, Tamási is using a method that has found its way into cognitive and neurosciences in recent years. With the help of pupillometry, i.e. measuring the change in pupil diameter, researchers can make inferences about cognitive effort.

"This method has only recently been used to examine linguistic issues," stresses Tamási. The assumption is that if Lena notices that there is something wrong

with a word, the cognitive effort with which the word is mapped to the image increases, which in turn causes the pupils to widen. While watching the objects on the monitor, Lena's pupil diameter is constantly being reg-

THE SCIENTISTS



Prof. Dr. Barbara Höhle studied linguistics, psychology, and social sciences at the Technische Universität (Berlin). Since 2004, she is a professor for Psycholinguistics/Language Acquisition at the University of Potsdam.

Contact

Universität Potsdam
Humanwissenschaftliche Fakultät
Karl-Liebknecht-Straße 24-25
14476 Potsdam
✉ hoehle@uni-potsdam.de



Katalin Tamási studied English and Theoretical Linguistics in Budapest, Hungary and Tromsø, Norway and Psychology in Boston, USA. Since September 2013, she has participated in the IDEALAB program.

Contact

Universität Potsdam
Humanwissenschaftliche Fakultät
Karl-Liebknecht-Straße 24-25
14476 Potsdam
✉ tamasi@uni-potsdam.de



“Establishing networks is crucial for career development.”

istered and measured by a camera. In this study, the doctoral candidate tested 24 children to determine the degree of sensitivity of pupillometry. “If this method turns out to be appropriate to measure minute linguistic differences, the whole psycholinguistic community will have a new tool at its disposal,” explains Katalin Tamási. She would use such a tool herself for further and more comprehensive studies.

Tamási will not only conduct her studies at Potsdam, but also at Newcastle University, mobility being an important component of the PhD program. The doctoral candidates have the opportunity to spend at least six months at another university of the consortium in order to get acquainted with various experts of their fields and their preferred methodologies. At Newcastle, Tamási will learn about the linguistic applications of the ultrasound device, i.e. essentially the same device used for medical purposes. She is interested in capturing the tongue’s position during speaking. “We can identify whether certain inaudible movements are existent,” explains the researcher. This method may complement the existing acoustic measures in language acquisition.

IDEALAB not only places great emphasis on mobility, but also on providing collaboration opportunities. Participants meet twice every year at winter and summer schools hosted by universities to present their progress and results. The University of Potsdam hosts the summer schools, while the venue for winter schools rotates between the consortium members. Tamási regards the exchange of ideas extremely “rewarding and helpful”. “We are on the right track with the program,” confirms Prof. Höhle. The candidates are especially excited about the opportunity to visit their mobility and internship institutions. “This is a challenge, of course: relocation, visa, new contact persons – all this requires excellent organizational skills,” says the professor. On the other hand, the change offers a unique opportunity to establish networks. “This is crucial for career development.”

Lena has completed her experiment; the film has finished. Using a picture book, she is asked to produce the words she heard during the experiment. At the end, Lena can choose a little book to take home.

HEIKE KAMPE

*Lena is requested to name pictures.
The researcher wants to find out which
words she already knows and uses.*





F R O M T I M E
T O T I M E





THE KING, THE COUNTESS & THE BISHOP

A New Perspective on the Enlightenment and Relations
between Poland and Prussia



Power games, machinations, political alliances and betrayal – the period of European Enlightenment was eventful with many ups and downs. In a research project funded by the Deutsche Forschungsgemeinschaft (DFG) cultural scientist Agnieszka Pufelska examines this period's hitherto rarely studied Eastern European perspective. With her work she also wants to spark a new way of dealing with historical sources and research methods.

She was smart, young, and beautiful – and a welcome guest at the court of Frederick the Great. Marianna Skórzewska was enthusiastic about the ideas of the Enlightenment and science. This combination has fascinated cultural scientist Agnieszka Pufelska. She came across the story of the Polish countess's life in a 1930s article and began to dig deeper. "How did it happen that a Polish countess was often a guest at the court of Frederick II? That really interested me," Pufelska says, who herself was born in Poland. Friendly relations between Poland and Prussia are hardly rooted in the prevailing historical perception. "World War II often taints our perception that the Poles and the Germans have never liked each other. I wanted to examine whether this has always been so and how Polish-Prussian relations worked in

the 18th century," Pufelska explains. She has also set off in search of the less investigated influences of Poland on the Enlightenment.

She traveled to the places where those documents that shed light on this eventful period of Polish and European history are stored. She spent weeks and months in court, state, and private archives in Berlin, Warsaw, Krakow, Vienna, and Poznań. She pored over thousands of files, letters, and notes and looked for evidence for the exchange between Poland and Prussia that has received little attention. She was mainly interested in the correspondence of noble families written mostly in French, because these documents clearly showed the writers' relations to and opinions on the Prussian court. "It is tedious and dusty," she admits with a smile. Sometimes it took her weeks to find a single paper in the archives relevant to her studies but it was worth it. The scientist found documents that shed new light on Prussian-Polish history and show that relations between these two are often presented in a negative and biased way.

“World War II often taints our perception that the Poles and the Germans have never liked each other.”

THE PROJECT

“Prussia's Image in Polish Enlightenment – On the History of a Forgotten Cultural Transfer (1764 – 1795)”

Participating: Agnieszka Pufelska, University of Potsdam

Duration: 2009 -2014

Funded by: Deutsche Forschungsgemeinschaft (DFG)



She sees the reason for this in the methodology. "Inter-state relations are often examined on the basis of political relations. I wanted to know whether there are relations apart from political ones. Was there any exchange on a cultural level? Because you cannot separate cultural and political activities." Pufelska used the concept "cultural transfer" to analyze relations from a national perspective rather than a personal one. "At that time they did not think in terms of national categories. You moved in certain circles, keeping in mind the interests of certain noble families or the court", the scientist clarifies.

Poland experienced a severe crisis at the end of the 18th century. "Poland was not an independently acting state at that time," Pufelska emphasizes. It resembled a pawn being moved at will by the former major powers Russia and Prussia.

"Studying the Enlightenment as a Western European intellectual trend does not suffice."

After the Seven Years' War, fought from 1756 to 1763 between European powers to gain hegemony, Frederick the Great was concerned with strengthening relations with Russia. The issue of Poland became the guarantor for the Russo-Prussian alliance. Frederick renounced his political and territorial claims, at least officially. Behind the scenes he maintained his relations with the enemies of Russian policy who wanted to dethrone the unbeloved King Stanisław August Poniatowski who had been instituted by Russia. "Those who opposed the king tried to get the support of Prussia. I was interested in this group," Pufelska explains.

Marianna Skórzewska was among those critical of the Russian influence on her country and turned to Prussia for support. The countess was in her early 20s when she came to Berlin for medical treatment. There she was able to pursue her scientific and political ambitions. As an affluent patroness, she established contacts with the Berlin Academy of Sciences, the royal court and prominent members of the society. Since she had estates in the Polish-Prussian border region, she was also interested in good relations with the court for pragmatic reasons. "It is not easy to separate private interests from cultural or political ones," Pufelska says. The official contact between Skórzewska and Frederick the Great ended when the countess became pregnant in Berlin. She named her son Fryderyk. Marianna Skórzewska died from tuberculosis in 1773 in Berlin at the age of 32.

The Polish bishop Ignacy Krasicki is another protagonist of the Enlightenment in Poland. His name appears repeatedly in the documents that Pufelska examined during her research. Like Marianna Skórzewska, the bishop had close relations with the Prussian court. "It has been reported that Frederick liked Krasicki very much, because he had a similar sense of humor," Pufelska explains. The king and bishop discussed philosophy, literature, and religion.

"Legend has it that probably the most important work of the Enlightenment in Poland, Monachomachia (War of the Monks), was inspired by conversations between the bishop and Frederick," Pufelska says. In this mock-heroic poem, Krasicki criticizes the dissolute life of Polish monks and clergy.

Marianna Skórzewska and Ignacy Krasicki represent the vivid exchange between Polish and Prussian intellectuals at the Prussian court. They also show that studying the Enlightenment as a Western European intellectual trend does not suffice. "What truly annoys me is the special emphasis always placed on France and Prussia and that everything else is considered unimportant. This idealizes the common image," says Pufelska. Already in the 18th century Prussia was concerned about propagating a rather negative image of their neighbor to the east to justify its own political activity, she underlines. "It is sad that this remains true."

"Prussia never treated Poland as an equal partner but rather as a Russian vassal state," Pufelska explains. With one exception: In 1791, after the death of Frederick the Great, Poland, supported by Prussia, created its own constitution. It went down in history as the "Constitution of May 3" because Poland was the first European state to create its own modern written constitution. "May 3 is still the Polish national holiday," Pufelska points out. It is barely known today that the May Constitution probably would not have happened without the short but intensive alliance between Poland and Prussia, because the alliance broke up shortly afterwards. Prussia betrayed Poland to Russia, who invaded its neighboring state in 1792 and revoked the Constitution of May 3. In 1793, Poland lost significant territory to its neighboring states. By 1795, the Polish state no longer existed. Russia, Austria, and Prussia invaded the country simultaneously, dividing it amongst themselves.

HEIKE KAMPE

THE SCIENTIST



Dr. Agnieszka Pufelska studied German language and literature, cultural sciences, and history in Płock, Frankfurt (Oder), and Tel Aviv. Since 2008 she has been researching the cultural relationship between Germany and Poland, the Enlightenment and Jewish cultural history at the University of Potsdam.

Contact

Universität Potsdam
Historisches Institut
Am Neuen Palais 10
14469 Potsdam
✉ pufelska@uni-potsdam.de

Grassfielder's Guide to the English Language

Working on a Dictionary
of West African English



THE PROJECT

Dictionary of West African English

Main participants: Professor Dr. Hans-Georg Wolf (University of Potsdam), Dr. Lothar Peter (Humboldt University zu Berlin), Dr. Frank Polzenhagen (University of Heidelberg)
Duration: Since 1999



English is an international language; in most countries, you can get by with “world English”. However, in many regions of the world, English is no longer only an international lingua franca, but, as a second or third language, has become a part of the local culture. And almost everywhere, English is being spoken a little differently. More than 70 “World Englishes” – varieties of the English language – are known and documented worldwide. To understand them, you often need a special dictionary. It is one such dictionary – for West African English – that Professor Hans-Georg Wolf of the Institute of English and American Studies at the University of Potsdam is working on. What makes this dictionary special is that it covers six regional varieties – from The Gambia, Ghana, Cameroon, Liberia, Nigeria, and Sierra Leone, i.e., the whole of anglophone West Africa.

The time of the British Empire as the world’s most important colonial power may be over, but its legacy is certainly alive – not the least in the diversity of “World Englishes.” The Caribbean, Australia, South Africa, and New Zealand were only the first regions in which colonial civil servants and settlers injected the English language with new life through novel grammatical peculiarities, pronunciation, and – most importantly – words. From South Asia across the Pacific region over to Africa there are now varieties that differ so drastically from Standard English that you need special dictionaries to understand them.

Outbacker, outporter, grassfielder – three English words that have two things in common. None originated in Great Britain – the motherland – or the US – the second major shaper of the English language. To some extent, they are not even well known in these countries. On the other hand, each of these three words describes a person living in a very characteristic region, namely where the word itself resides: the Australian hinterland (*outback*), Canadian fishing ports located far from civilization (*outport*), and the vast grassy landscapes of western Cameroon (*grassfield*). These words could not have developed elsewhere simply because they would not have been needed anywhere else. Such examples show that the English language was adapted to regional needs and peculiarities around the world, differentiating

“These words could not have developed elsewhere simply because they would not have been needed anywhere else.”

itself into many local varieties. To linguists, these varieties are interesting for a number of reasons, as Professor Wolf explains: “The regional varieties of English illustrate many different processes of linguistic change. In most of these countries, English is extremely important, but it is by no means the only language. As a result, there is an active exchange between the often multiple mother tongues and the locally spoken English. This is a fascinating field of research.”

While Asian varieties of English, especially Indian English, have been studied for many decades, African Englishes have remained “in the shadow.” “Even though there had been some analyses and dictionaries of English in South and East Africa, African Englishes were still mostly new ground until fairly recently,” says Professor Wolf. “For a long time, it was contested whether they were even legitimate varieties. Since then, however, they have been institutionalized, also in terms of language policy, and they now serve important functions. Sometimes they even constitute the neutral lingua franca, which different population groups are most willing to agree on, like in Nigeria.”

Wolf was part of one of the first comprehensive projects, launched in 1999 at Humboldt University zu Berlin, which examined six West African varieties of English comparatively. Since an initial internship at the Goethe-Institute in Cameroon in 1993 and while still working on his PhD, the topic has continued to fascinate him. The project supported by the Federal Office for Migration and Refugees (then called the Federal Office for the Recognition of Foreign Refugees) initially wanted to collect as much language material as possible, Wolf recalls. “In the beginning, we compiled everything and put it into a database: language samples on tape, first essays, books, newspapers, every type of written material we could lay our hands on. It was not always easy. We traveled several times to many of these countries to be able to access material on-site and interview speakers. Now the internet has become one of our most valuable resources.” The researchers also owe much of the material to local researchers, with whom they have built stable networks over the years. These researchers continue to provide material.

Although the collecting process will probably never end, the scholars can now begin combing through the language material for words and phrases that do not appear in the “common core” of the English language or only with a different meaning. The dictionary contains only those words that exist exclusively in West African English. The pickings differ greatly from country to country. All in all, the database currently holds more than 9,000 entries, including around 2,500 exclusive to Nigerian English, 1,300 exclusive to Cameroonian English, and about 900 exclusive to Ghana. Exclusive words from Liberia (about 500), Sierra Leone (about 350), and The Gambia (about 260) are even fewer. The remaining entries appear in several varieties of West African English. Some of the differences can be explained by the size of the countries and their populations and speakers: Nigeria’s over 150 million citizens speak 500 different languages, many of which have left their mark on the national variety of English. In The Gambia, with about



Professor Hans-Georg Wolf
in his office

1.7 million citizens, “only” 20 languages exist. In countries like Sierra Leone and Liberia, civil wars have impeded the compilation of a suitable corpus.

When a word turns out not to be part of the “common core” and is therefore included in the dictionary, the analysis can begin: What does it mean? Where did it originate? From which language and which cultural context did it derive? Which unique cultural concepts and models does it mirror that apparently could not be conveyed with an existing English word? So far, most of the words are part of a few central culture-specific and country-specific domains. Many terms for local plants and animals as well as food made it into the local English language. Other expressions describe traditional social hierarchies or administrative systems or are part of a youth language. It is remarkable that although there are lexemes common to different varieties, e.g. shared between Cameroonian and Nigerian English, there are virtually no words that all varieties of West African English have in common, as Wolf notes. “Of the more than 9,000 entries, only six are documented for all countries: *chief* (traditional ruler, elected leader of a community), *dash* (bribe, small gift), *brown envelope* (bribe), *petty trader* (small-time street merchant), *fufu* (a cereal dish), and *pepe* (hot pepper).” To the linguist Wolf, the fact that two of these words describe corruption indicates not so much that these societies are more corrupt, but that they perceive corruption as an urgent problem and process this linguistically.

The dictionary is a mammoth project, carried out by a small team and – now mostly – its enthusiasm. The participating researchers are dispersed throughout the

world. Thanks to modern technology, they are able to access and work on all databases simultaneously. “Right now we are writing the entries for all words – with specifications about the source languages, definitions, examples from actual usage, and explanations of the cultural concepts behind certain idioms,” Wolf explains.

The project has been going on for 15 years, but Wolf is certain it will not take another 15 years to complete it. He hopes the dictionary will be finished in three to five years. The search for a publisher has already begun. And Wolf knows how to go about this. He has just published a dictionary of Hong Kong English

“Of the more than 9,000 entries, only six are documented for all countries.”

MATTHIAS ZIMMERMANN

THE SCIENTIST



Professor Dr. Hans-Georg Wolf studied American Studies, German Studies, and Pedagogy at Johann Wolfgang Goethe University in Frankfurt am Main. He has been Chair Professor of the Development and Variation of the English Language at the University of Potsdam since 2008.

Contact

Universität Potsdam
Institut für Anglistik und Amerikanistik
Am Neuen Palais 10, 14469 Potsdam
✉ hgwolf@uni-potsdam.de



The Shaking on the Ground

Prof. Torsten Dahm Investigates Earth with Geophysical Methods

Pearls of Science

The foundation "pearls – Potsdam Research Network" is a unique, interdisciplinary research collaboration between the University of Potsdam and 19 leading extramural research institutions in Brandenburg, each of which is a "pearl" of science. Founded in 2009 on the initiative of the University of Potsdam, "pearls" will use synergies, promote young researchers and attract groundbreaking third-party funded projects. Prof. Torsten Dahm is one of the scientists in this network.

The **Helmholtz-Centre Potsdam – GFZ German Research Centre for Geosciences** focuses on research of the earth system. Over 460 scientists and nearly 200 PhD students are investigating the history of our planet and the processes that occur on its surface and within its interior. They also study the manifold interactions between the geosphere, cryosphere, hydrosphere, atmosphere, and biosphere.

An essential part of its research activities focuses on the influence of human activities on "System Earth" and the influence of "System Earth" on human society. The geoscientists will use their findings to reduce the risk of natural disasters and sustainably exploit natural resources to ultimately preserve them for mankind. The GFZ develops technological concepts and provides practical knowledge for a sustainable "earth-system management". The GFZ is affiliated with the University of Potsdam through 23 joint professorships.

 www.gfz-potsdam.de



A deadly 8.2-magnitude earthquake devastated the Chilean north-west coast in early April 2014. It claimed many lives.

The risk of after-shocks was very high. Torsten Dahm is among those who have a scientific interest in such events. Given the dramatic consequences of seismic events, the professor of geophysics faces high expectations by the public, but it is still impossible to predict the location, time, and magnitude of an earthquake, a fact often difficult to convey. "An exact and complete forecast does not work because of the earthquake's phenomenon," the scientist explains. You would have to be able to measure a clear, generally valid, and reliable precursor signal that explicitly indicates an earthquake. Obviously, scientists have been looking for precursors for a long time. In fact, such signals have already been measured in some regions but not everywhere. Nowadays we

merely have a kind of statistical predictability of the earthquake rate, which is not ubiquitous and does not allow for any deterministic predictions.

Torsten Dahm studied geophysics and seismology. Even as a child he was interested in the natural sciences and was very happy to have the opportunity to study these subjects in Karlsruhe. Earthquakes and geophysics impressed him from the beginning. Using geophysical methods to investigate the earth fascinates him. In his PhD thesis, he developed a procedure to determine earthquake mechanics. In his theoretical work, he analyzed the geometry of ruptures in the earth's



crust and the waves radiated from earthquakes. For his studies, he used data from the Rhine Graben, which is a part of a rift that is still seismically active. People living in the immediate vicinity frequently feel weaker tremors. The scientist was able to collect seismological data back then. He was in charge of surveying seismic stations and analyzing data. "I was able to gain valuable experience for my later research," Dahm says.

He came to Potsdam to explore new scientific paths, which is why he successfully applied for a joint professorship for geophysics at the University of Potsdam and the Helmholtz-Centre Potsdam – GFZ German Research Centre for Geosciences. This professorship includes the leadership of the "Physics of Earthquakes and Volcanoes" section at the GFZ. Dahm is very interested in this research field and the

combination of university and research institution. In Potsdam he can continue working on the issues that interest him "thematically with better possibilities than before." He had already worked with colleagues at the University of Potsdam on some projects before being jointly appointed to his professorship.

A strong earthquake like in Chile is just one of many possible earthquake processes. Experts studying the physics of earthquakes use a wide spectrum of methods to examine and research such events. The seismic waves following such earthquakes around the world can be recorded in far distance to the epicenter by seismographs. "Equally exciting as teleseismic recordings are strong motion data measured near the epicenter." Chile, for instance, uses such measuring stations operated by the GFZ. Dahm and his colleagues analyze the recorded data. However, the Potsdam

seismologists focus not only on spectacular, strong earthquakes. An important part of their research involves weaker earthquakes, including induced seismicity. In contrast to natural earthquakes, these occur due to man-made changes to nature – e.g. through deep mining or other geotechnical operations. Induced seismicity has been known in mining for centuries. Seismic events have been discussed recently in connection with other activities, like the use of geothermal energy and fracking, and are facing increasing public attention.

Volcanic activity also triggers earthquakes. This is why one of Dahm's fields of work is the physics of volcanoes, which deals with the basic physical processes of volcanism. Here Dahm and his team are looking for new scientific challenges, because volcanoes are in Germany not often analyzed using geophysical methods. This concerns in particular volcano-magmatic processes in the subsurface.

Even if Dahm is mainly concerned with research, he sees himself as a university lecturer in the literal sense and teaches with passion. Although teaching has to take a backseat to research at the moment, "it is very important to me not to lose contact with the students and to continue teaching on a regular basis."

DR. BARBARA ECKARDT

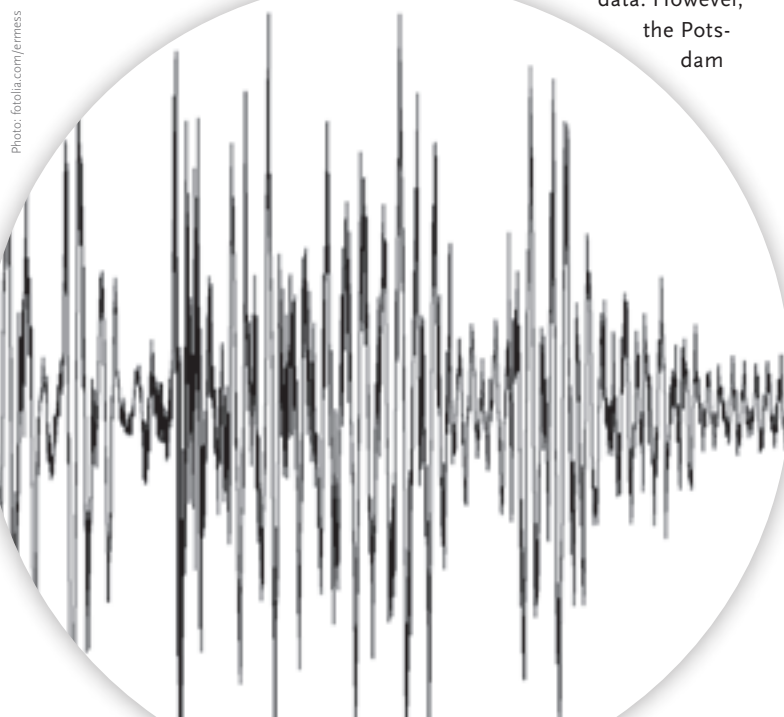


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Time Signal







LITERATURE AS NOURISHMENT

Research on a New Spatial Understanding of the Holocaust

Trauma and space – literary scholar and philosopher Judith Kasper brings these two terms together in a research project funded by the DFG about the Holocaust and its ‘aftermath’ in literature and at real places. Geographical space implies dispersed trauma and memory of the horrible event of the Holocaust.

“Geographical space itself implies dispersed trauma and memory of the terrible events of the Holocaust.”

At the beginning were “astonishment and horror”. In a Berlin exhibition about the war of extermination in the East, Judith Kasper saw a map that marked the known labor and concentration camps. And there were many. Underneath it said that determining the actual number would probably never be possible. This sight – “a huge territory patterned like a carpet with many black dots” – made Kasper reflect on the spatial understanding of the Holocaust: Institutionalized memorials at places of crimes and public monuments convey the impression that you could limit extermination to specific, nameable places. Even very thorough historical research has not yet managed to completely depict the system of camps because it constantly changed, had varied structures, and was often closely connected with its civil environment. Historiography sometimes even calls these “campified regions”.

There were two other observations. One was the literary descriptions of survivors: They found the camp of all places, with its total cutoff from which there was no escape, to be an abysmal place, a “place beyond geography” or a “void area”. Secondly, burning as a method of extermination also has a spatial dimension. Smoke and ashes spread far and wide. Thus remembrance and grief are not limited to specific places as memorials and cemeteries suggest.

Geographical space itself implies dispersed trauma and memory of the Holocaust’s terrible events – this outlines the idea of Kasper’s present research project “Traumatized Space. Topography, Dissemination, and Transference of the Holocaust”. The scholar, who holds two doctorates, wants to contribute to “a fundamentally new spatial understanding of the Holocaust” with this project, which is funded by the Deutsche Forschungsgemeinschaft (DFG) and grants her a temporary research project at the Institute for Romance Languages and Literature at the University of Potsdam.

Trauma and space – these two terms with their idiosyncratic reminiscence have a different meaning for insiders than in our everyday language. “You often come across the term ‘trauma’ in the field of cultural and literary studies,” Kasper explains. “It has become increasingly imprecise.” That is to say: Historians tend to label the singular event of the Holocaust a trauma but ignore the psychological and social wounds it has created, whereas psychoanalytically oriented literary studies are based on Freud’s understanding of psychological trauma. It may remain concealed for a long time but when it surfaces, like in case of the hysterical fits Freud studied, the causal event often remains suppressed.

“I did not merely want to introduce a new term,” the researcher says, “but rather wanted to make the existing more precise.” This is why she initially elaborated on the psychoanalytical meaning in the theoretical part of her project and only then connected it with space. This term has also changed in the academic discussion about the Holocaust. As a consequence of the Nazi ideology propagating an expansion of the “Lebensraum”, thinking about real space was frowned upon for a long time. Only at the end of the 1980s did the opinion that real space always relates to those who live or lived there



and perceive it in their own way became increasingly prominent.

Kasper describes another crucial experience that led her to the idea about traumatized space. At the end of the 1990s, she was living and working in Paris. Just when France had finished the prestigious new four-tower national library

“Exaggerating, one might say that the Auschwitz Memorial is not a traumatized space whereas the French National Library is.”

– symbolizing its “cultural memory” – a German journalist pointed out that there had been a Nazi internment camp at exactly this location. The scholar observed something surprising. The new building and its aesthetics were heavily disputed, with critics often using words like “isolation” and “void” that would be fitting for a concentration camp, but the construction site’s past was never mentioned. The polemical headline “Return

to the Scene of the Crime” apparently referred only to criminal technical deficiencies. “Two worlds collided in this discussion without coinciding – speaking about the Holocaust and about a concrete area and building,” Kasper says. “Exaggerating, one might say that the Auschwitz Memorial is not a traumatized space whereas the French National Library is.”

How does she proceed in practice to support the concept of the “traumatized space”? Using the literary scientific method of systematic text analysis, the researcher took three key texts about the Holocaust. Two were written by survivor witnesses: Primo Levi’s report *If This Is a Man* about the Buna labor camp near Auschwitz and *Fatelessness* by Buchenwald concentration camp survivor Imre Kertész. The third example is the novel *Austerlitz* by W.G. Sebald, in which a young art historian, hidden as a boy with foster parents, gradually comes to understand the fate of his family and is haunted by visions about the camp although he had never been there himself. Based on these three works, Kasper analyzes the linguistic forms and images used to describe the traumatic experience in the camp – that often go beyond the concrete place.

Hell was a very common comparison. “Nowadays, in our own time, hell must be like this,” Levi writes about the moment he arrived at the camp, where the prisoners almost dying of thirst have to wait after four days in a crowded goods wagon, in a great bare room, a tap keeps dripping but above is a card which says that it is forbidden to drink as the water is dirty. A bit later the prisoner, still tortured by thirst, breaks off an icicle outside the window. At once a guard snatches it away from him and when he asks “Warum?” the guard just snaps “Hier ist kein warum” (there is no why here). Levi recalls a verse from Dante Alighieri’s *Divine Comedy* when the narrator, on his journey to limbo, understands that he cannot expect any help.

We find not only this image of Dante’s hell in Levi’s work but also in many other texts about concentration camps. Kasper wanted to find out why this image persists although the analogy between the Nazi camps and the salvation idea of the medieval poet that the path to paradise leads through hell is problematic. As the scholar began studying Dante’s epic more deeply, her perspective became inverted. Her work with the texts on the concentration camps trained her eye for linguistic expressions of the traumatic and enabled her to show to what extent something completely unresolved lies in the *Divine Comedy*. At the same time, Dante’s text appears as a large archive of poetic manners of handling traumatic experience. The authors of the three analyzed works also drew on this source. “I really found a blank spot in the research,” Kasper says, “because Holocaust researchers rarely have an idea about Dante’s philosophy and vice versa.”

One scene in Levi’s book is particularly impressive. He wants to acquaint a French fellow-prisoner with the Italian language. Dante verses he had learnt at school come to his mind but only in fragments. While reciting them, he is deeply moved by the beauty of the language and precision of form. So the prisoner can create some kind of respite for himself and his neighbor in the middle of the camp’s terror on their way to getting their ever-same watery soup. Judith Kasper speaks about this with audible joy. “Literature as a means of life – with this I can oppose horror.”

“Literature as a means of life – with this I can oppose the horror.”

SABINE SÜTTERLIN

THE SCIENTIST



Dr. Dr. Judith Kasper received a PhD in French literary studies from the University of Freiburg and in philosophy from the University of Verona. Her manifold research interests include French and Italian literature as well as Holocaust studies, space and memory theories, psychoanalysis, and poststructuralist theory formation. Since April 2011, she has had a temporary research project at the Institute for Romance Languages and Literature at the University of Potsdam funded by the Deutsche Forschungsgemeinschaft (DFG).

Contact

Universität Potsdam
Institut für Romanistik
Am Neuen Palais 10, 14469 Potsdam
✉ judith.kasper@uni-potsdam.de



Repetitions of the Past

Forms of Reenactments in the Media, Arts and Science

In the summer of 2010, Polish performance artist Rafał Betlejewski set fire to a barn – in remembrance of the Jedwabne massacre. In 1941, the town's non-Jewish population rounded up the Jews in a barn and burned them alive. What does Betlejewski's commemoration have to do with the annual reenactment of James Cook's discovery of the continent on the east coast of Australia or with "The Last Days of the Ceaușescus" by Swiss director Milo Rau? All these reenactment projects repeat past events and bring historical images and history to life.

Reenactment as a form of remembrance. In 2010, Polish artist Rafael Betlejewski set fire to a barn in remembrance of the massacre of Jewish inhabitants in the town of Jedwabne.





Reenactments have been experiencing a boom in pop culture, arts, and the media but also in the humanities for some time now. There are many variations of reenactment: historical roleplaying, reenacting historical battles, and performative restaging of past events. At the University of Potsdam, Slavicist Prof. Magdalena Marszałek and Anglicist Prof. Anja Schwarz are dealing with current forms of reenactment and their significance in modern-day cultures of commemoration. Both taught a course on this topic and organized a lecture series together with the **Centre for Contemporary History** (Zentrum für Zeit-historische Forschung – ZZF) last winter semester. Nina Weller talked to the scholars.

Professor Marszałek, Professor Schwarz, how do you explain the current popularity of reenactment projects?

MARSZALEK: It is not easy to give reasons for this phenomenon. It has something to do with our perception of time. We live in a “broad present” (Hans Ulrich Gumbrecht), no longer believe in progress, and therefore are not very interested in the future. We prefer looking to the past and commemorating history in closed loops of anniversaries and other remembrance rituals. Our present culture of commemoration is also strongly geared toward an emotional sympathy for the past. This is evident in our attitude to contemporary witnesses, places of historical events, and ancient artifacts as traces

of the past that allow us to ‘experience’ or ‘touch’ history. From there, it is only a small step to dressing up and performing reenactment in order to put yourself in the shoes of a historical figure and to experience the illusion of a journey into the past.

SCHWARZ: It is interesting, however, that reenactments can be traced back to much older traditions of presenting historical events and that they share some formal properties with them. Passion plays are also a kind of reenactment, i.e. a performative way of reenacting past events. Religious rituals in general are intended to give presence to events that lie at the imaginary or real origins of the community. In the English-speaking culture, we have

historical pageants as another line of tradition for reenactments. Like passion plays, their origin lies in the Middle Ages but they have increasingly turned to presenting secular historical events since the second half of the 19th century. These mass events, especially popular at the turn of the century, were pedagogically prepared to convey the idea of a common history and regional or national identity.

What is genuinely new about the present development?

SCHWARZ: The current upswing of different reenactment formats is indeed a new phenomenon. Since the 1960s, the term has been used – initially in the English-speaking world – to describe popular



reconstructions of historical events. As opposed to officially organized pageants, laypeople began taking a greater interest in local history. They took up the motto of the oral history movement, which says "Dig where you stand". They also stood for a more democratic and popular way of dealing with history, removed from the expert knowledge of historiography. This change was accompanied by an interest in other historical content. It led to the desire for other forms of research and teaching history.

MARSZALEK: More recently, it refers not only to popular stagings of battles and other historical events by amateur performers, but also to performative reenactments in TV programs, as 'inter-

ludes' in TV documentaries or as a medium in museum education. In the arts, we have been talking about reenactment as a repetition experiment for about 15 years now.

SCHWARZ: A thesis for the reasons behind the current boom that we also explored in our lectures is that our cultural memory is changing, increasingly taking the form of visual memory. The US-American historian Alison Landsberg argues, for instance, that the technological possibilities of mass media increasingly invite people to take on memories of events they have never lived.

MARSZALEK: It is indeed quite striking that many reenactments do not imitate the events themselves so much as the media

images, mainly movies. This is especially true for 20th century events. You somehow get the impression that people are trying to 'revive' media images through physical experience in performative reenactments. Popular reenactments often use media originals very uncritically. In artist reenactments, this aspect is often the most important one of the experiment. Quite interestingly, both Jeremy Deller and Milo Rau said in interviews that they restage events they know from TV from their childhood. So they critically deal with media images when they offer a political corrective of the interpretation of historical events (Deller) or want to force us to take a close look at the events of the revolution of 1989 (Rau).

Are there any striking cultural and local features of reenactments in the eastern and central European and the Anglophone regions?

MARSZALEK: There are certainly unique local reasons for the reenactment wave. In Poland, popular reenactment has become public entertainment. Dressed-up reenactors are part of everyday life, because there is always something to 'reenact'. In my opinion, the enormous boom of popular reenactments in Poland, limited not only to medieval battles but predominantly also WWII events, has a lot to do with the intensive and sometimes dramatic discussion about 20th-century Polish history that was triggered by the political transition in 1989 and mainly broke out after





2000. Most of them are in accordance with politics of memory, like the reenactment of the Polish national Warsaw Uprising in 1944, the bombardments of towns, and the Katyń massacre. But there are also reenactments intended as critical interventions. The previously mentioned project “Burning of a Barn” by Polish performer Rafał Betlejewski is a good example. This project also shows, however, that the border between a popular event and an artistic intervention remains fragile for reenactments. Betlejewski wanted to remind us of the 1941 massacre in Jedwabne – that is, of Polish complicity in the Holocaust. The action was extremely spec-

tacular. Betlejewski set fire to the barn that had been doused in petrol from the inside and saved his own life at the very last minute by escaping the burning barn. Interestingly, Betlejewski also ‘burned’ Polish anti-Semitism in the barn, because he also lit the confessions of guilt that voluntary participants of the project had written on cards. So the performance also became a ‘therapeutic cleansing ritual’.

SCHWARZ: In English-speaking regions, reenactments have had a longer history – both the tradition of staging history officially organized like the previously mentioned pageants, and also the forms of pop-

culture started by amateur performers reenacting battles of the American Civil War. While the latter are a nostalgic revival of an alleged chivalrous past of the lost US South, other examples show that reenactments can be a political tool to create public awareness for counter-memories. Among the best-known reenactments of this kind is “The Battle of Orgreave” of 2001, about the confrontation between miners and police during a strike in Great Britain in the early 1980s. British artist Jeremy Deller ascribes a therapeutic function to his restaging of the historical confrontation. He was convinced that it would ultimately illustrate the defeat-

ed miners’ perspective on the events and initiate a process of reviewing them that might contribute to healing historical wounds. It seems that reenactments sometimes explicitly refer to a popularized knowledge of Freud’s concept of “Remembering, Repeating and Working-Through”.

So artistic reenactments, then, serve not so much as an “authentic” repetition of a historical event but rather as a means of disclosing current potentials in dealing with history?

MARSZALEK: Actually, artistic reenactments rarely follow the naive mimetic format of popular reenactments, although



Reenacted history: The Battle of Tannenberg in 1410.



such artistic forms also exist: Deller's "Battle of Orgreave" as well as Milo Rau's "The Last Days of the Ceaușescu" (2009), a theatrical reenactment of the accelerated trial prior to the execution of Bucharest's dictator couple in 1989. For Polish artist Artur Żmijewski, reenactments are predominantly social experiments with an open end. In 2005, he reenacted Philip Zimbardo's 1971 prison experiment in Warsaw – with a rather unexpected turn. But as for Betlejewski's performance, his burning of the barn is more of a symbolic gesture of repetition that reminds us of a crime.

SCHWARZ: Even if a distinction between popular and artistic reenactments is quite tempting, in our courses we have repeatedly noticed the difficulty of drawing such a distinction based, for example, on aesthetic or formal categories. For his Milgram reenactment, British artist Rod Dickinson had the laboratory rooms in which psychologist Stanley Milgram conducted the experiments for his controversial study "Obedience to Authority" in the early 1960s rebuilt as exactly as possible within a gallery. Milgram wanted to prove up to what limit people would be prepared to obey the instructions of authorities and accept that they might fatally injure others. Dickinson had actors and actresses repeat the original experiment over several hours down to the tiniest detail. Although it was an 'authentic' repeti-

tion of a historical event, it was also, as the spectators witnessed, something very different. Despite the seemingly exact repetition of the experiment, its restaging in the exhibition room focused on questions of scientific ethics and the unintentional continuation of historical structures of violence in the present.

Have the political changes of 1989 also led to a wave of reenactments in other central and eastern European or English-speaking countries?

MARSZALEK: As far as I know, dramatic events from the time of real-existing socialism are reenacted not only in Poland but also in Hungary, but popular reenactment as a kind of public entertainment is a decisively Polish idiosyncrasy that is not easy to explain.

SCHWARZ: In English-speaking countries we observe different types of reenactments depending on changing political conditions. Cook's 'discovery' of Australia and the arrival of the first Europeans aboard the First Fleet were reenacted and celebrated in Australia until the mid-20th century, and the majority of society neither discussed nor problematized the colonial context of these journeys. In 1970, however, 200 years after Cook's arrival, there were significant protests against its reenactment, and in 1988, on the 200th anniversary of European settlement on the continent, the reenactment

of the First Fleet's arrival became a central place of protest for the first time. To me, it seems important that these protests often take the form of counter-reenactments. They take up the setting, historical figures, and the traditional vocabulary and give them a wholly different meaning by changing minor aspects.

Is it not a paradox that the very performance practices that stand for the uniqueness of an event lead to repetitions?

SCHWARZ: Indeed, an interesting paradox, especially if you consider

that reenactment increasingly permeates the performance art scene. The most well-known example might be the latest work of Marina Abramović, who restaged important performances of her career at the Guggenheim Museum in New York in the past years. We can see a similar development in modern dance. Artists increasingly reconstruct performances from the turn of the century. As with Abramović, what seems to be important is examining the archives of performance history and finding forms of historiography for art that are unique in their nature.

THE SCIENTISTS



Prof. Magdalena Marszałek studied Polish philology and drama studies in Krakow; Slavic studies, art history, drama, film, and TV studies in Bochum. Since 2011, she has been Professor for Slavic Literature and Cultural Studies/Polish Studies at the University of Potsdam.

Contact

Universität Potsdam
Institut für Slavistik
Am Neuen Palais 10
14469 Potsdam
✉ magdalena.marszalek@uni-potsdam.de



Prof. Dr. Anja Schwarz studied cultural studies in Lüneburg, Queensland, and Melbourne. Since 2010, she has been Junior Professor of Cultural Studies at the University of Potsdam.
<http://anjaschwarz.wordpress.com/publications>

Contact

Universität Potsdam
Institut für Anglistik und Amerikanistik
Am Neuen Palais 10
14469 Potsdam
✉ anja.schwarz@uni-potsdam.de



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