Universität Konstanz

Zukunftskolleg 2014 Annual Report

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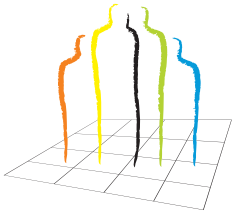

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Foreword

Giovanni Galizia, Director of the Zukunftskolleg

The Zukunftskolleg is a society of Fellows – across generations, disciplines and beyond expectations! Their success can be measured quantitatively, such as by the number of publications, talks and presentations, acquired funding, teaching success, etc. This report illustrates the work of the Zukunftskolleg Fellows in 2014. You will find all of the above, but most importantly, you will find what makes the Zukunftskolleg the greatest place to be, one that pursues a "5-in" strategy: early *in*dependence with an *in*ternational, *in*tergenerational, *in*tra-university and *in*terdisciplinary spirit.

The following articles by our Postdoctoral and Research Fellows present research questions from an international community, in an environment that includes Senior Fellows (intergenerational) and university colleagues (intra-university), or collaborations with members of other disciplines (interdisciplinary).
The Zukunftskolleg's funding programs aim at fostering the university's strategy "towards a culture of creativity." We have calls for interdisciplinary collaborative projects, transdepartmental collaborative teaching or intersectoral cooperations. They enable philosophers to collaborate with linguists or mathematicians, biologists to offer seminars with anthropologists, or philosophers and artists to collaborate with the local community to hold an exhibition. We offer seed money for new ideas, because it is often at the beginning that a project needs help. And we take risks – No risk, no fun. This booklet shows that it's worth it.

Intergenerational exchange between young researchers and renowned professors from all over the world is provided by our Senior Fellowship and Mentorship Programs. Our calls for 2-year and 5-year positions attract scholars from around the world, creating an international community of Fellows.

The report should give you a sense of the diversity and quality of ideas and projects at the Zukunftskolleg. It is in the middle of a large community that includes you, and I would be pleased to hear what you think about it. Please give us some feedback! The Zukunftskolleg, by its very nature, continually reinvents itself, keeping what is good, and exploring new avenues. And I am sure you'll wonder: Why should this place limit itself to 5-*ins*? We could add *in*triguing, *in*novative, *in*spirational,..the place to be *in*! I hope you find this report as inspiring as I do.

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Multiscale modeling of magnetic materials[1]

Unai Atxitia Macizo, Department of Physics

Excitation of magnetic materials by powerful femtosecond laser pulses leads to magnetization dynamics on the timescale of exchange interactions. The emerging dynamics can be explored using conventional magneto-optical methods when the ferromagnet is composed of only one magnetic element. Many ferromagnets, such as permalloy (Py), can exhibit rather complex magnetic structures and are composed of more than one element. For such cases, X-ray circular magnetic dichroism (XMCD) measurements make it possible to access the individual dynamics of the different elements in the alloy. The first example of element-specific magnetization dynamics was measured by the femtosecond-resolved XMCD technique on ferrimagnetic GdFeCo alloys. Distinct demagnetization rates were found for each element. This distinct behavior has been suggested as the driving mechanism behind the all-optical thermal magnetization switching observed on this alloy. Unlike GdFeCo, which consists of two intrinsically different (transition and rare-earth) metals, Py consists of Fe and Ni, which have a rather similar magnetic nature. Thus, it is *a priori* unclear if their spin dynamics should be different.

This raises the question of how the different demagnetization rates in ferromagnetic alloys can be theoretically understood, in particular in Py, where theory can be compared to experiments. To understand the differences in the magnetization dynamics of Fe and Ni in Py, we have developed a model based on a hierarchical multi-scale approach[2] to investigate the sub-lattice dynamics of ferromagnetic alloys and to obtain deeper insight into the underlying mechanisms. First, we construct and parametrize a spin model Hamiltonian for Py on the basis of first-principle calculations. This spin model Hamiltonian, in combination with extensive atomistic spin computer simulations based on the stochastic Landau-Lifshitz-Gilbert equation, are used to calculate the demagnetization process after the application of a step heat pulse [Fig. 1]. The second step of the multiscale model presented links the information gained from the atomistic spin model to the macroscopic two sub-lattices Landau-Lifshitz-Bloch (LLB) equation of motion recently derived by Atxitia *et al.*[3]. The analytical LLB models allow for very inexpensive computer simulations and, most importantly, provide insight into the element-specific demagnetization rates of Py. Our findings suggest that element-specific damping parameters play a crucial role for understanding the ultrafast dynamics of ferro as well as ferrimagnetic alloys.

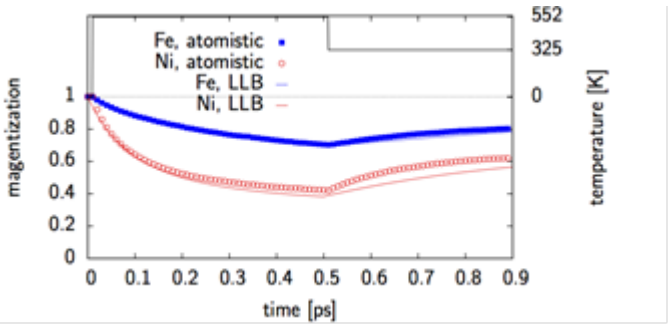


Fig. 1
shows the time-evolution of each sub-lattice magnetization in Py after exposure to a temperature step of 500 femtoseconds duration.

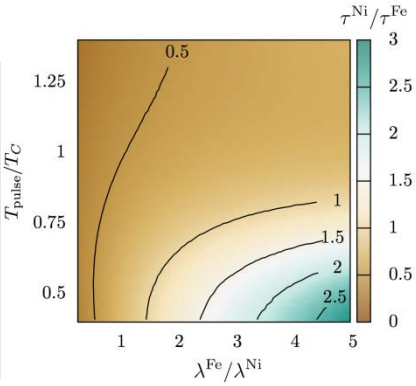


Fig. 2
shows the ratio between the relaxation times of the Fe and Ni sublattice in Py after application of a heat pulse of temperature T_{pulse}.

[1] *"Multiscale modeling of ultrafast element-specific magnetization dynamics of ferromagnetic alloys" (with D. Hinzke, U. Nowak, R. W. Chantrell and O. Chubykalo-Fesenko); pre-print in: "arxiv.com" posted: April 1, 2015:http://arxiv.org/pdf/1504.00199v1.pdf*

[2] *"Towards multiscale modeling of magnetic materials: Simulations on FePt" (with N. Kazantseva, D. Hinzke, U. Nowak, R. W. Chantrell and O. Chubykalo-Fesenko); in: "Physical Review B", (77), 184428, DOI: 10.1103/PhysRevB.77.184428, published: May 23, 2008: http://journals.aps.org/prb/pdf/10.1103/PhysRevB.77.184428*

[3] *"The Landau-Lifshitz-Bloch equation for ferrimagnets" (with P. Nieves and O. Chubykalo-Fesenko); in: "Physical Review B", (86), , 104414 DOI: 10.1103/PhysRevB.86.104414, published: September 10, 2012: http://journals.aps.org/prb/abstract/10.1103/PhysRevB.86.104414*

Foundations of semantics

Brendan Balcerak Jackson, Department of Philosophy & Doris Penka, Department of Linguistics

The Zukunftskolleg brings together a remarkable number of linguists and philosophers who work on issues in natural language semantics, from a variety of backgrounds and methodological perspectives. To take advantage of this unique opportunity for interdisciplinary exchange, in 2014 research fellows Brendan Balcerak Jackson (philosophy) and Doris Penka (linguistics) co-organized a Working Group on the Foundations of Semantics, along with senior fellow Irene Heim (linguistics, MIT), postdoctoral fellow Sven Lauer (linguistics), linguistics department member Brian Leahy, and philosophy department members Arno Goebel and Johannes Schmidt.

The working group conducts an ongoing interdisciplinary investigation into a cluster of related questions about meaning in natural language and its scientific study: what kind of phenomenon is linguistic meaning, and how can it be systematically and fruitfully investigated? These include methodological questions about the interaction between syntax, semantics and pragmatics – the systematic relationships between the form of an expression, its meaning and the ways it is used in interpersonal communication. They also include philosophical questions about the nature of meaning. For example, what is the relationship between linguistic meaning and notions such as truth and mental representation? How does meaning relate to expressivity, the use of language as a vehicle for agents to express their cognitive and conative states? And how are facts about linguistic meaning related to more fundamental social, psychological, biological and other kinds of facts?

Thanks to the co-funding of the Zukunfstkolleg, the working group was able to host a series of distinguished guest researchers doing innovative research on foundational and methodological issues in natural language semantics. Guest researchers who were invited as part of the activities of the working group in 2014 included:

- Prof. Thomas Ede Zimmermann (linguistics, Goethe Universität Frankfurt), *Equivalence of Semantic Theories*
- Prof. Mark Richard (philosophy, Harvard University), *Meanings and Their Evolution*
- Prof. Paul Pietroski (philosophy & linguistics, University of Maryland), *Semantics without Truth-Values*
- Prof. Friederike Moltmann (linguistics, Sorbonne University Paris), *Degree Structure as Trope Structure*
- Prof. Peter Gärdenfors (cognitive science, Lund University Sweden), *The Geometry of Meaning*
- Prof. David Beaver (linguistics, University of Texas at Austin), *Explaining the Projection Behavior of Factives*

During their visits, guest participants engaged in in-depth discussions of work in progress, presentations of new research results, public lectures and presentations at the weekly *jour fixe* meeting of the Zukunftskolleg. These activities were advertised within the Zukunftskolleg and in the university. Zukunftskolleg members, members of the departments of linguistics and philosophy and others were frequent participants.

Fig. 1
Brendan Balcerak Jackson

Fig. 2
Doris Penka

Festival of the imagination – A philosophical retreat

Magdalena Balcerak Jackson, Department of Philosophy

Imagination is a fascinating and puzzling cognitive capacity. At first glance, imagination is the capacity that enables us to be artistically creative. The Wonderland that Alice explores in her adventures is a wondrous product of an impressive, imaginative mind. But imagination is not merely a source of fiction and fancy, but also a cognitive capacity that enables us to discover and to learn important things about ourselves and about the world surrounding us. It enables us to choose appropriate actions in order to achieve our goals, to read the minds of other people in socially significant situations, to perform thought experiments, or to make ethical and aesthetical judgments. Imagination has epistemic oomph!

But while other epistemically significant mental phenomena, such as perception and belief, have received much attention, philosophers have only recently started to devote more attention to imagination as a distinctive and epistemically significant cognitive capacity. The epistemic value of imagination is the focus of my project at the Zukunftskolleg. But interestingly, imagination features in one way or other in the research projects of several philosophers at the University of Konstanz. So, in July 2014, Julia Langkau, another Zukunftskolleg Fellow who works on the role of imagination in fiction, and I brought these philosophers together to spend four days discussing imagination on the beautiful Island of Reichenau in Konstanz, Germany.

The group consisted of three Zukunftskolleg Fellows, one Senior Fellow, two members of our Emmy Noether Research Group "Understanding and the A Priori," two members of the interdisciplinary DFG Research Group "What If" and three international guests. The retreat involved intensive working sessions on four core topics: Imagination and Perception, Imagination and Fiction, Imagination and Hypothetical Thinking and Imagination and the A Priori. But it also gave the participants time to hike and bike around the green island, canoe and swim at the lake and enjoy the summer evenings together with their partners and children, who accompanied us to what we had designed as a family-friendly event. The retreat created a space that not only allowed intensive philosophical discussion, but also time to think about how to shape one's own ideas and opportunities to initiate or strengthen relationships and cooperations with other philosophers interested in the imagination.

Fig. 1
Our working table in the sun at the Mein Inselglück Hotel, Island of Reichenau

The retreat on Reichenau Island was not the last cooperation as organizers for Julia and me: In September 2015, we will co-organize a colloquium on Imagination and Fiction at the Conference of the German Association of Analytic Philosophy in Osnabrück!

Tasting chocolate in China: Medicine, politics and global trade flows during the Kangxi Reign (1662-1722)

Beatriz Puente-Ballesteros, Department of History and Sociology

A legend tells us that the cocoa pod was the "Gods' Gift" to the Mayas. Could this *donum* also have been conferred to the Son of Heaven (*Tianzi* 天子)? Based on unexplored archival documents in East Asian (Chinese, Manchu and Japanese) and European languages (Latin, Italian, Portuguese, French, Spanish, Dutch, English and German) gathered within the last five years, I have reconstructed the largely unsung story of chocolate in early Qing China during my postdoctoral research stay at the Zukunftskolleg. One of the first clues I found is a series of eight tapestries in wool and silk known as "The Story of the Emperor of China,", which Monsieur d'Isrode commissioned between 1697-1705 to be sold to Louis-Auguste de Bourbon, Duc du Maine, Louis XIV's legitimatized son. Among these scenes we discover one entitled "The Collation," in which the Kangxi Emperor proudly holds a Eucharist-like cup full of chocolate while captivatingly observing his beloved wife, who is being served a cup of tea. This *chinoiserie* inspires the following question: reality or fiction? Two Manchu palace memorials provided me with factual evidence that the ruler indeed tasted chocolate or *cokola*, but that it was not to his liking. Why did the Son of Heaven dismiss the Gods' Food (*Theobroma Cacao* L.)?

Fig. 1
Lecturing on chocolate

Fig. 2
The eight ingredients of the "secret recipe" of chocolate prepared by western missionaries for the Manchu Kangxi Emperor.

Fig. 3
Cooking chocolate for the audience using an authentic nineteenth century silver-plated French *chocolatière* with a wooden *molinillo* that is part of my family's legacy.

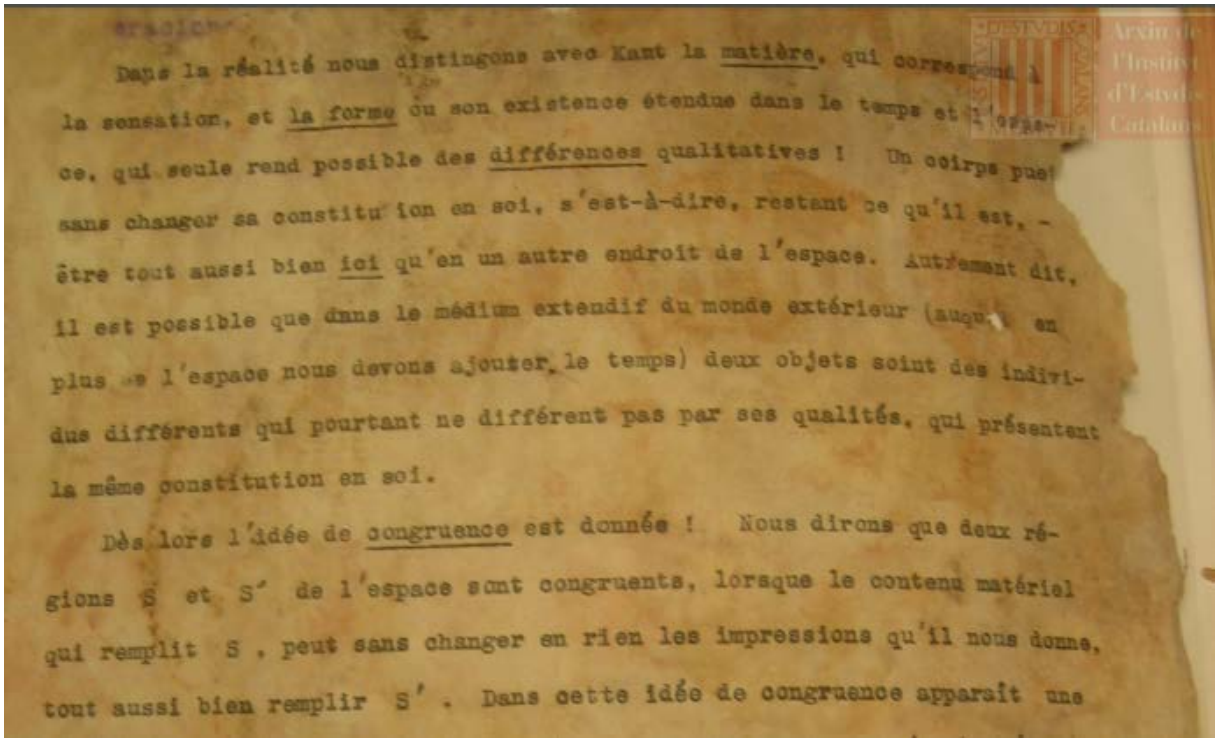
A detailed analysis of this unique information will enable me to design a very distinct tapestry in which medicine, Qing empire politics and global history are interwoven. The concept of "global micro-histories" is crucial for my research, because it incorporates and defines not only the extent of contacts on both sides of intercivilizational encounters, but also their limits. Moreover, it allows me to carry out a two-pronged, actor-based analysis that concerns material phenomena on one hand, such as the global commodity chain of medicinal substances, and the concomitant flow of mental constructs – such as medical ideas – that resulted in new hybrid formations on the other. The entry of chocolate into China as a material object and as a subject of medical knowledge is instrumental for elucidating the kaleidoscopic processes at work during early modern globalization. Its diverse uses and functions as medicine, luxury gift or exquisite food in the hands of the emperor, courtiers, elites or missionaries, as well as its fate in the Middle Kingdom, represents a paradigmatic case study. I had the opportunity to present the initial results of my research in the United States in front of specialists in global history, the history of medicine and science, sinologists and manchurists, first at Brown University, Department of History, by invitation of Professor Harold. J. Cook (Workshop title: "Globalizing Chinese Medicine in the 17th Century: 'Translation' at Work**"**), and then in the China Humanities Seminar (Harvard University), East Asian Languages and Civilizations Department, directed by Professor James Robson, on invitation by Professor Mark C. Elliott. As part of the Harvard lecture, in an exercise on experimental archeology, I cooked – literally – hot chocolate according to a historical recipe. I used in the appropriate amounts of original ingredients from America, Europe, India and China, as well as original utensils, such as the silver-plated *chocolatière* and the *molinillo*.. After the chocolate *dégustation*,we all shared the unique experience of putting ourselves in position of the Manchu Kangxi emperor and while enjoying this "Gods' Gift". *Acta est fabula*.

On the trail of Hermann Weyl

Julien Bernard, Department of Philosophy

Just a few weeks after arriving in Konstanz, and thanks to the collaboration with *the Institute of Catalan Studies* in Barcelona, I rediscovered important typescripts in French, written by the German mathematician and philosopher Hermann Weyl during a stay in Spain in 1922. The typescripts contained significant philosophical and mathematical ideas, linked to the foundations of differential geometry and relativity theories. They were the papers he used as a basis for publishing his German text, *Mathematische Analyse des Raumproblems.* The typescripts were unknown to Weyl scholars, because they were temporarily lost, due in part to the political situation in Spain in the mid-XXth century.

In spring 2014, I wrote an article to disclose this discovery to Weyl scholars and to explore the historical events that explain the status of the typescripts, and the reasons why they were “lost” for more than 80 years.
The article has been accepted and will be published in the course of 2015:
Julien Bernard*, «*Les Tapuscrits Barcelonais Sur Le Probleme De L'espace De Weyl», in *Revue d'histoire des mathématiques,* 21 (2015), p. 147-167.



Dans la réalité nous distingons avec Kant la matière, qui correspond à
la sensation, et la forme ou son existence étendue dans le temps et l'espa-
ce, qui seule rend possible des différences qualitatives ! Un coirps pue
sans changer sa constitution en soi, s'est-à-dire, restant ce qu'il est, -
être tout aussi bien ici qu'en un autre endroit de l'espace. Autrement dit,
il est possible que dnns le médium extendif du monde extérieur (auquel en
plus de l'espace nous devons ajouter le temps) deux objets soint des indivi-
dus différents qui pourtant ne différent pas par ses qualités, qui présentent
la même constitution en soi.

Dès lors l'idée de congruence est donnée ! Nous dirons que deux ré-
gions S et S' de l'espace sont congruents, lorsque le contenu matériel
qui remplit S , peut sans changer en rien les impressions qu'il nous donne,
tout aussi bien remplir S' . Dans cette idée de congruence apparait une

Fig. 1
Photograph of the first page of the rediscovered typescripts

Interactions between philosophy and the sciences in the debate about spatial intuition and the foundations of geometry

Francesca Biagioli, Department of Philosophy

Workshop, **June 27, 2014**, **IMéRA, Institut d'Etudes Avancées d'Aix-Marseille (AMU)**

After scientific developments such as non-Euclidean geometry, the axiomatization of geometry and general relativity, both philosophers and scientists addressed the question of whether the Kantian theory of space ought to be refurbished or even rejected. On the one hand, the possibility of considering a variety of hypotheses concerning physical space appeared to contradict Kant's assertion that Euclidean geometry is a priori knowledge and suggested the view that the geometry of space is a matter for empirical investigation. On the other hand, French and German variants of neo-Kantianism explored the possibility of generalizing the Kantian notion of spatial intuition as a system of hypotheses, including Euclidean geometry as a special case. The workshop offered a discussion of the contributions from leading figures in this debate between the end of the nineteenth century and the first decades of the twentieth century: Henri Poincaré, Ernst Cassirer, Albert Einstein and Moritz Schlick, with special focus on the interactions between philosophy, mathematics and physics from both a systematical and a historical perspective. Speakers included: Jean Seidengart (Paris Ouest Nanterre La Défence), Matthias Neuber (University of Tübingen), Marco Giovanelli (University of Tübingen), Eric Audureau and Gabriella Crocco (Aix-Marseille University).

I had the opportunity to organize this workshop as a Resident at IMéRA/The Mediterranean Institute for Advanced Research of the Aix-Marseille University. I am very thankful for the friendly support I received at IMéRA. Furthermore, I wish to thank the CEPERC / Le Centre d'EPistémologie et d'ERgologie Comparatives and especially Gabriella Crocco for her participation and for her valuable advice during the organization of the workshop.

The bare life on stage

Julia Boll, Department of Literature

Fig. 1
Hotel Medea, Arcola Theatre London, 2009.
Photo © Ludovic des Cognets.

The year 2014 saw the publication of my article about a theater production I attended in 2011. In the article, I discuss the production as part of my research project on the theatrical representation of the bare life.

Based on the Medea-myth, Zecora Ura Theater's and Para Active's Brazilian-British co-production *Hotel Medea* (2010-2012) is an overnight promenade performance which actively involves the audience. It turns them into alternately party guests, Medea's children, her closest friends, soldiers, and the focus group of her husband's political campaign. Medea herself, the archetypal refugee, represents the figure of the *homo sacer*, whom the philosopher Giorgio Agamben describes as one whose life is sacred, defined purely by her exclusion from the polis and stripped of all civil and human rights, as well as social and legal status.[1] What is left is the bare life, contact with which is taboo.

The figure presents itself as an important parallel to the function of the scapegoat in tragedy, and appears in contemporary theater as a victim of war and conflict or as a person or group of people that have been legally ostracized from or never been part of the community (such as asylum-seekers, refugees, illegal immigrants, unlawful combatants and displaced and stateless persons), by official decree turned into *homines sacri*. Agamben points out that Western politics is based on this simultaneous exclusion and inclusion of bare life into its legislation. Mostly, the bare life has remained invisible – the taboo status of the *homo sacer* demanding a shielding from the public eye. As the central political taboo on which, according to Agamben, Western society is founded, it has also remained the last taboo to be brought to the theater. Drawing from philosopher Kelly Oliver's theory of an ethics based on witnessing, on enabling the other to form a subject's identity by not only allowing for a voice, but also by witnessing the other's act of speech, the theater might be seen as the art form best suited to enable "witnessing beyond recognition".[2] This article discusses how *Hotel Medea*'s unique inclusion and physical engagement of the audience allows for both the witnessing of, and responding to, the *homo sacer*, for an experience that goes far beyond spectatorship and successfully enables the audience to establish a relationship with the politically and socially excluded that might overcome the exclusion.

Fig. 2
Hotel Medea, Trinity Buoy Wharf London, 2010.
Photo © Ludovic des Cognets.

My article appeared in the *Journal of Contemporary Drama in English* (JCDE 2014; 2(1): 26-37), published by de Gruyter in collaboration with the German Society for Contemporary Drama and Theatre in English.

[1] *Agamben, Giorgio. Homo Sacer. Sovereign Power and Bare Life. Trans. Daniel Heller-Roazen. Stanford: Stanford UP, 1998.*
[2] *Oliver, Kelly. Witnessing Beyond Recognition. Minneapolis: University of Minnesota Press, 2001.*

Facing the challenges of antibiotic resistance

Thomas Böttcher, Department of Chemistry

In my popular science article, “Antibiotic Resistance: Facing the Challenges of Bacterial Infections,” published in the G.I.T. Laboratory Journal, I addressed the problem of the evolution and rapid spread of antibiotic resistances and presented an outlook on future strategies for the treatment of infectious diseases.[1] Antibiotics have been our most important weapons against bacterial infections for almost a century. In recent years, however, the number of new antibiotics on the market has decreased dramatically while the development and spread of resistances has increased just as dramatically. The reasons for this development are multifaceted and include the limited number of cellular targets and mechanistically different antibiotic classes, the mechanisms of resistance development and the spread by horizontal gene transfer. One major reason is the over- and misuse of antibiotics in livestock, prophylaxis and household products.
Future strategies may focus on changing treatment policies to preserve the efficiency of antibiotics for life-threatening diseases by restricting access and use, while alternative concepts for treatment may be applied for the treatment of non-life-threatening infections (Fig. 1).

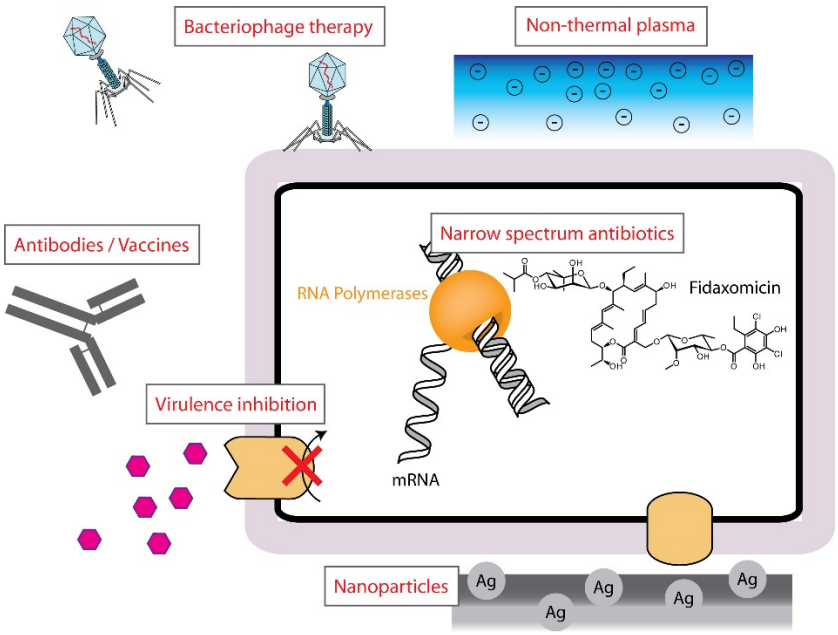


Fig. 1
Strategies and concepts for the future treatment of bacterial infections may use a combination of existing and new technologies along with changes in treatment policies that put a stop to the over- and misuse of antibiotics.

These concepts will combine fast diagnostics with narrow spectrum antibiotics to combat the causative pathogens, and use antibodies, vaccines and new physical treatment options for chronic diseases, such as nanoparticles and non-thermal plasma. Finally, new emerging treatment strategies, such as bacteriophage therapy or anti-virulence drugs that inhibit the toxin production, biofilm formation and coordinated attack of a pathogen, may help to treat bacterial infections without the risk of resistance development. Most importantly, these strategies would preserve our beneficial human microbiome, prevent secondary infections and support our defensive immune response.

[1] *T. Böttcher (2014) Antibiotic Resistance – Facing the Challenges of Bacterial Infections. G.I.T. Laboratory Journal 11-12/2014: 23-25.*

Setting up a new laboratory to study novel two-dimensional materials

Daniele Brida, Department of Physics

We recently started a new project aimed at the study of ultrafast electronic dynamics in the class of layered materials, ranging from two-dimensional systems with atomic thickness to topological insulators and nonconventional superconductors, where dimensionality and the microscopic physics of two-dimensional electron gases play a key role. This research topic will require significant advances in ultrafast spectroscopy techniques and the development of a new setup for the study of femtosecond dynamics driven by impulsive photoexcitation. Interest in the physics of layered materials is related to their peculiar characteristics, which can be technologically exploited in mono-atomically thick devices for optoelectronics and electronics, thus overcoming the miniaturization limitations of current semiconductor technologies.
A full study of the fundamental processes, such as electron-electron and electron-phonon scattering mechanisms occurring at this dimensional scale, calls for the implementation of an ultrafast spectroscopy system capable of extreme temporal resolution combined with broad spectral coverage and exceptional sensitivity.

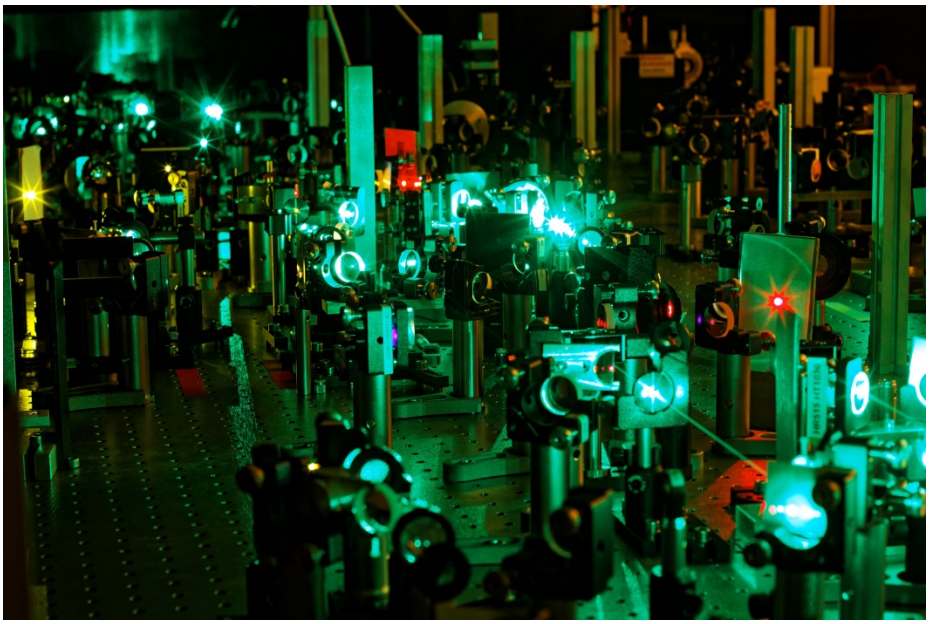


Fig. 1
Photo of the experimental system for the generation of ultrashort pulses. The ultrashort pulses at different wavelengths are generated via a cascade of nonlinear optical interactions.

In particular, we concentrate our efforts on the generation of ultrashort optical pulses in various spectral ranges to be employed in two-color pump-probe experiments, the goal being to obtain sub-10-fs temporal resolution. High repetition rate will ensure sensitive detection of the small signal arising from few/mono-layered materials. With the novel spectroscopic tools developed in the project, it will be possible to unveil the ultimate charge dynamics that are the basis of the optical and electronic properties in 2-dimensional systems.

Where hope and anger meet: Dissident Polish and Latvian LGBTQ discourses on the web

Joanna Chojnicka, Department of History and Sociology

In a project that focuses on attitudes towards specific minorities in media discourse, it is of vast importance to study not only hegemonic discourses of mainstream mass media, but also counter-discourses produced and disseminated by the minority groups in question. Since they usually do not have an opportunity to publish through traditional media channels, it is the Internet that provides a rich repository of discourses challenging hegemonic, prejudiced and biased ways of representing them.
The year 2014 was marked by an intensive focus on dissident Central- and Eastern European LGBTQ discourse, represented by a corpus of 30 blogs in Polish and 19 blogs in Latvian written by authors self-identifying as LGBTQ. The study of these blogs resulted in three journal articles, all of which will be published in 2015:

1. Chojnicka, Joanna, 2015. Contesting hegemonic gender and sexuality discourses on the web. Latvian and Polish discourses of gender dissidents. *Critical Approaches to Discourse Analysis across Disciplines* 7 (2), 240-260;
2. Chojnicka, Joanna. Contesting hegemonic gender and sexuality discourses on the web: Semiotic analysis of Latvian and Polish LGBTQ and feminist blogs. Submitted to *New Media & Society*;
3. Chojnicka, Joanna. Activist Online Journalism and the Gender Controversy. Investigating Polish LGBTQ blogs. Submitted to *Zeitschrift für Diskursforschung.*

The first two articles taken together constitute a cohesive general introduction to dissident discourse analysis, which may be seen as a form of positive discourse analysis (PDA). Dissident discourse analysis is concerned with describing strategies of dissent, either textual (as in the first article) or visual (as in the second article).
The third article in turn illustrates how dissident discourse analysis can be employed to study discourses on a specific topic, in this case the topic of gender. This article is based on a conference paper presented at the conference *Hybridity and the News. Hybrid forms of journalism in the 21st century*, which took place in Brussels on December 4-5, 2014 (see photo below).

The study of Polish and Latvian LGBTQ blogs brought many interesting results, which suggest certain differences between the condition of LGBTQ movements in Poland and Latvia in general. To illustrate, in Latvia, the LGBT blogosphere is weak; queer and feminist practically non-existent. There are no blogs on same-sex parenting, and the normalizing discourse in general focuses on describing suffering and loneliness rather than happiness or fulfillment. There is less ”angry,” provocative and sarcastic radical discourse than in the case of Poland. Here, the blogs abound in success stories and there are even a few that specialize in radical reframing, the most angry and queer of all counter-strategies (Chojnicka 2015: 257).

Fig. 1
Presenting the paper “Dissident online journalism: Investigating Polish LGBTQ blogs” at the conference Hybridity and the News. Hybrid forms of journalism in the 21st century in Brussels, 4-5 December 2014.

Beyond disciplinary boundaries: Medical cases as genre

Monika Class, Department of Literature

In 2014, I edited and wrote an introduction and article for the special series of articles on "Medical Case Histories as Genre." The publication, which is the result of a workshop I convened in 2013, appeared in *Literature and Medicine* (The Johns Hopkins University Press), the leading US journal in this burgeoning research area (Literature and Medicine). The articles examine medical case histories during different stages in Western medical history. The publication includes five contributions written by Prof. Brian Hurwitz, Prof. Meegan Kennedy, Prof. Nicolas Pethes, Prof. Gianna Pomata, and myself. The essays open up new perspectives on the distinct nature of medical case histories. For instance, medical cases circulated independently of clinical practices; indeed, full-fledged case collections have existed since the Renaissance and thus over a longer time (and a larger number of different cultures) than commonly assumed.

What's to be gained from studying medical case histories as genre? Medical case histories help us to understand the individual experience of illness, shaped by biological, social and psychological factors alike. As such, the study of medical cases is at the intersection of the humanities, medicine, social and natural sciences. Part of this research strand is a reaction against the "Two Cultures" (C. P. Snow, 1959), which assumes two incompatible spheres: science and culture. Medical case narratives are seen as a paradigmatic example of the reciprocity of literature and medicine. But scholars have not agreed yet what the "and" between literature and medicine stands for. This publication proposes that genre theory can provide possible answers. Distinct from our daily use of the term, like "genre literature" for science fiction or fantasy, "genre" pertains to critical issues about literary studies as an academic subject. The topic is as hotly debated as ever. One major objection against so-called "formalism" is the criticism that "genre" presupposes a kind of transhistorically fixed format that is then imposed on written records, regardless of the specific context in which the texts were produced. Taking this very seriously, our joint publication applies "genre" to counter this view. Textual formats are arguably a matter of social convention to begin with. From this perspective, "genre" is not only profoundly historical but it can also provide crucial information about the history of knowledge creation. This is one of the reasons why Gianna Pomata's article introduces the concept of "epistemic genres," which refers to "kinds of text that develop in tandem with scientific practices – for instance, … essay, medical recipe, the case history" and which three of the five articles apply. The concept of "epistemic genres" offers analytical tools that help to ascertain similarities and differences among specific sets of medical records; indeed, the concept can be used to develop a longue-durée perspective. Studying case histories as genre builds on the arguably intrinsically interdisciplinary nature of cases since cases form part of many disciplines, from law and theology to medicine. What this approach lays open is that the disciplinary distinction between medical case histories and literature is sometimes not only unhelpful but can be historically distorting. For instance, 19th-century British physicians, as two of the articles show, assimilated sentimental modes of fiction when contributing to the creation of the profiles of now known disease types, notably Parkinson's disease (Brian Hurwitz). My hope is that the publication strengthens the study of medical case histories as genre internationally as a means for overcoming traditional disjunctions in the history of literature and medicine and enhances future multidisciplinary research. The collaboration continues with a workshop in July 2015.

[1] http://muse.jhu.edu/journals/literature_and_medicine/toc/lm.32.1.html

An endangered language – and an endangered community

Eleanor Coghill, Department of Linguistics

As a linguist, my work focuses on North-Eastern Neo-Aramaic (NENA), a group of modern languages descended from ancient Aramaic, that have somehow survived till the modern day in Iraq, Turkey, Syria and Iran.

These languages (we usually call them dialects, but they are in fact as diverse as the Romance language family), are of enormous value to historical linguists, because they represent the latest stage in a recorded history of nearly three thousand years: the earliest texts in Aramaic date to around 900 BC. This means we can trace developments in the language over a very long span of time, in a way that is impossible for the vast majority of languages, most of which have recorded histories of a few hundred years or have until modern times never been written down.

Because the NENA dialects are so diverse, and most are not normally written, work on them involves linguistic fieldwork.

As a result, I have had a lot of contact with the communities which speak Aramaic. Fieldwork for me, which has largely been in diaspora communities, is a special experience, due to the enormous generosity of the communities. Speakers give hours of their time for free, and very often feed me afterwards. While I try to give something back, by documenting their endangered heritage and sharing my findings with interested members of the community, I am aware of how much I owe them.

Speakers of NENA belong to religious and ethnic minorities: Jews and Assyrian/Chaldean Christians. A hundred years ago this year the Assyrians in what is now Turkey were massacred or ethnically cleansed from their homeland, as part of the genocide against Christian communities in the Ottoman Empire. As a result they became scattered across the region and the world. In addition to the human tragedy, the dialects themselves became endangered as a result. The Assyrians/Chaldeans continued to suffer massacres and displacement, culminating last year in the mass ethnic cleansing, murder and kidnapping instigated by the organization ISIS (Da'esh). Villages which had somehow been spared the tribulations of the last century became empty overnight. Tens of thousands of people have now lost all hope and seek emigration, which will surely lead ultimately to their disappearance as a people and the extinction of their language.

Fig. 1
Conducting fieldwork within a diaspora community in Damascus

Fig. 2
Giving a talk at the 2014 conference on the plight of Aramaic-speaking Christians in the Middle East

When this catastrophe happened in the summer of 2014, I was on holiday, but I felt I had to do something. I wrote to my colleagues in the field and organized a joint letter to the media. Within a few weeks we had had the letter, signed by around 70 international scholars, published in major newspapers in six different countries. While we did not expect this to achieve a miracle, we achieved some more publicity for the plight of the Assyrians/Chaldeans, and showed them our solidarity and support. I continued to try to raise awareness, and when my colleagues in the Research Centre for Aramaean Studies in the Department of History organized a conference on the desperate situation of the Christian ethnic minorities, I was happy to assist and to give a talk myself (Aramaic: a priceless linguistic heritage under threat), as well as appear in the panel discussion on the world's responsibility to protect these endangered minorities.

Navigating through virtual Konstanz

Maité Crespo García, Department of Psychology

We memorize new information better if we can relate it to congruent concepts learned previously. During my doctorate at the Laboratory of Functional Neuroscience in Seville, Spain, I investigated how elderly people can also use this strategy to boost their memory abilities. By combining surface electroencephalography (EEG) with sophisticated mathematical methods, we detected age-related functional loss in frontal regions that are key to memory formation. Interestingly, processing congruent semantic information helped older participants to access additional brain regions, which compensated for some of their memory decline.

Another efficient mnemonic technique consists in associating new information with a well-learned spatial map of an environment. Spatial maps, as well as semantic knowledge, are considered abstract forms of memories (schemas) which are stored in the neocortex, the outermost cerebral tissue. However, at initial stages of both memory and map generation, a deeper brain structure called the hippocampus-entorhinal cortex system plays a crucial role.

How do neocortical schemas support learning of new information? In order to answer this question, we need to have a look at the neocortico-hippocampal dialog. This is the main focus of my current Marie Curie Zukunftskolleg project, started in March of 2014. With this project, I have broadened the scope of my doctorate question to the field of spatial navigation. People living in a city for years have incorporated spatial relationships between landmarks into a mental map. We investigate how participants from Konstanz learn new spatial or semantic information while navigating through computer models of Konstanz's town center and of a city for which they have no spatial schema.

On the way to achieving the project goals, one major challenge is the reconstruction of hippocampal activity from noninvasive measurements, which are usually performed on humans. Two years ago I had the opportunity to join the NEMO laboratory, directed by Zukunftskolleg Research Fellow Sarang Dalal. Here, I benefited from the in-house methodology for obtaining accurate head models of the participants. In collaboration with physicians at the University Hospital of Erlangen, I performed intracranial EEG recordings on patients with refractory epilepsy when they were engaged in spatial memory and navigation tasks. All this has enabled me to determine the neural correlates indicating successful encoding of direction and position within virtual environments (1).

My aim is to provide new knowledge that is not accessible by applying other neuroimaging techniques with less temporal resolution. I also believe that this project can contribute to the future understanding of spatial memory disorders, such topographical disorientation.

Fig. 1
A computer model of Konstanz's town centre is used as a virtual environment for the spatial navigation task.

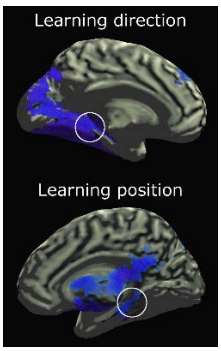


Fig. 2
Brain activity (blue areas) associated with better memory for direction and position, displayed on medial views of the left and right cerebral hemispheres, respectively. Circles indicate the approximate location of posterior hippocampi.

[1] *Crespo-García M., Rampp S., Kaiser M., Zeiller M., Kreiselmeyer G., Hamer H., Dalal S. S. (2014). Identifying the MEG sources that support the formation of spatiotemporal memories. 19th International Conference on Biomagetism (BIOMAG). Halifax, Canada.*

Good results in ongoing archaeological excavations in Hoping Dao, Keelung, Taiwan

María Cruz Berrocal, Department of History and Sociology

The 2014 field season of archaeological excavations in Hoping Dao, Keelung, Taiwan, was especially successful. I have been working there since 2011, together with my colleagues and co-PI Prof. Dr. Tsang Chenghwa, on a current project called "Taiwan in the 17th Century: Archaeology of Early Colonialism and the Beginnings of Globalization," funded by the Chiang Ching-kuo Foundation for International Scholarly Exchange of Taiwan. Through this research, I aim to unravel the implications for colonists and above all for local populations of the founding of the Spanish colony San Salvador de Kelang in the 17th century, in the context of a broader investigation of the largely unknown consequences of the earliest European presence in the Pacific for the native peoples. This research project on European colonialism in Taiwan during the 17th century is the first systematic study on this topic on the island.
San Salvador de Kelang was founded in 1624 and in Dutch possession from 1642 to 1662. At that time it was conquered by the Zheng family during their occupation of Taiwan and used as headquarters for their war against the Qing Dynasty. Our excavations in Hoping Dao showed an uninterrupted occupation from the Neolithic to the present, with a Neolithic-Iron Age period that showed clear continuation in ways of life. This was radically disrupted by Europeans: The settlement was dismantled to condition the terrain for colonial needs, associated with major changes in the use of space and environment (a large European building was uncovered in 2012). Therefore, our goals in 2014 were to:
1) Improve our knowledge of the Neolithic and Iron Age transition; 2) Understand the early Chinese presence and its role in attracting Europeans; 3) Improve the knowledge of the layout of the colony and define the nature of the European building.

I will only briefly comment here on the third goal: We were fortunate to identify two more corners of the building as well as four burials in close proximity to it. This enabled us to start outlining the building plan and reliably identify the type of building it was: A convent mentioned in historical documents. The burials seem to have been part of a cemetery and are of great interest as well: One is a child burial performed under the indigenous ritual, and the remaining three are adults, anatomically identified as European individuals, following a Christian rite. Thus, the cemetery may point to a certain tolerance shown by the Catholic fathers to indigenous rituals, or the possibility that different degrees of conversion to Christianity may have co-existed. These options are not attested in historical documents.

Fig. 1
One of the test pits and ongoing excavation in HopingDao-B.

The retina as a window to the brain

Sarang Dalal, Department of Psychology

My research group made considerable progress towards a new line of research examining how the retina interacts with the brain in humans. Many neurophysiologists consider the retina to be an extension of the brain due to its embryonic development and the sophistication of its neural circuitry, and a whole domain of research is dedicated to studying how the retina itself can, for example, distinguish objects and detect motion. Indeed, the retina must somehow intelligently filter and compress visual input, since the optic nerve does not possess enough "bandwidth" to pass the full visual scene to the brain. However, as these studies typically involve the isolated retina, the way that the retina codes information and communicates it to cerebral cortex has not been extensively studied. Additionally, to date, human vision neuroscientists have almost exclusively focused on how cortical structures are involved in processing such complex features of vision, without considering the role that the retina may have had in facilitating this processing.

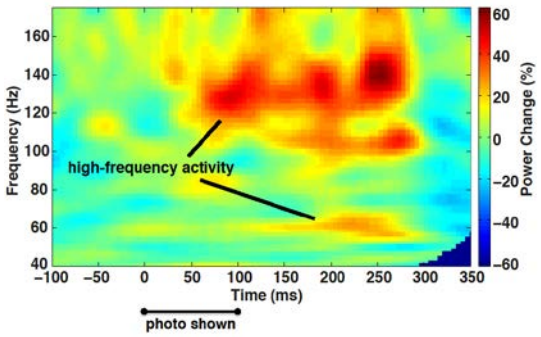


Fig. 1
High-frequency activity exhibited by the retina in response to photographs of natural scenes

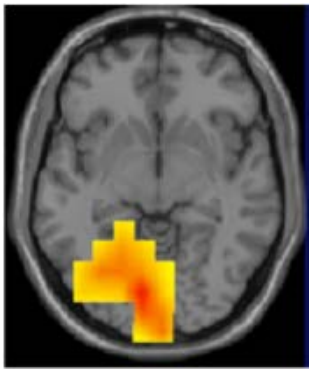


Fig. 2
A brain map of *retinocortical coherence*, showing which brain areas are driven by high-frequency activity arising from the retina of the right eye

The electrical activity of the retina, or the electroretinogram (ERG), can be measured using special electrodes placed on or near the eye. While ERG is widely used in eye clinics to diagnose the cause of deteriorating vision, it is nearly unknown in human neuroscience research. In our new experiments, we combined ERG with magnetoencephalography (MEG) in order to record both retinal and cortical activity at the same time. These first experiments were made possible by generous seed funding from the Zukunftskolleg and the Baden-Württemberg Ministry for Science, Research and the Arts.

Visual stimuli have been shown to induce rhythmic high-frequency activity measurable with MEG, in visual cortex at the back of the brain. However, they also evoke retinal "oscillatory potentials" which have a similar spectral signature. These retinal responses are well-demonstrated to occur in response to synthetic stimuli, such as light flashes and checkerboard patterns, but we also showed that they occur in response to naturalistic stimuli, such as photographs of landscapes (Figure 1).
We therefore hypothesized that a substantial portion of the visual cortical response may follow directly from retinal responses. To address this hypothesis, we developed a technique we call *retinocortical coherence* to map the information flow from the retina (measured with ERG) to the cortex (measured with MEG). Our present results show that a large proportion of high-frequency activity in visual cortex may in fact be directly driven by retinal processing (Figure 2), suggesting that the retina may in fact have performed much of the computation previously ascribed to visual cortex.

I presented a summary of these initial findings as a "hot topic" talk at the International Conference on Biomagnetism in Halifax, Canada, while my group members, Mathis Kaiser, Britta Westner, and Daniel Wong, presented posters on related pilot experiments. These experiments ultimately formed the foundation of my successful ERC Starting Grant, which will commence in 2016, supporting more in-depth investigations of the relationship between retinal and cortical oscillations.

Logic colloquium 2014

Panteleimon Eleftheriou, Department of Mathematics and Statistics

I was an invited speaker at the Model Theory session of the Logic Colloquium 2014, which took place at the Vienna University of Technology, July 14 - 19, 2014. The Logic Colloquium is the largest annual event in logic held in Europe. I had the opportunity to present my recent work, together with Dr. Hieronymi from the University of Illinois at Urbana-Champaign, which marked the completion of the first part of my project at the Zukunftskolleg entitled “Groups definable in tame expansions of o-minimal structures.” This project comes under tame geometry, an area of mathematics that studies geometric objects which satisfy certain tameness conditions imposed by logic. Consider, for example, the shaded area in Figure 1. It is defined using polynomial equations and inequalities, and the logical symbol “AND.” It is known that such objects are *tame* and they are the objects of study in semi-algebraic geometry. Their basic properties, such as volume and dimension, are easy to calculate. On the other hand, a fractal, such as the Koch snowflake (Figure 2), is known to have peculiar and abnormal properties which exhibit a rather wild and non-tame behavior. To study those properties, one has to appeal to a whole new branch of mathematics, called fractal geometry. Tame geometry strives to identify exactly those geometric objects which, although large in scope, still exhibit tame behavior.

In this first part of my project, presented in the Logic Colloquium 2014, new structure theorems for tame sets were established, opening promising paths towards an analysis of tame groups, which is the ultimate goal of my project. The topic is of innovative character in Europe, because it has previously only been studied in the American Midwest, and it attracted great attention from notable scientists who attended my presentation in Vienna.

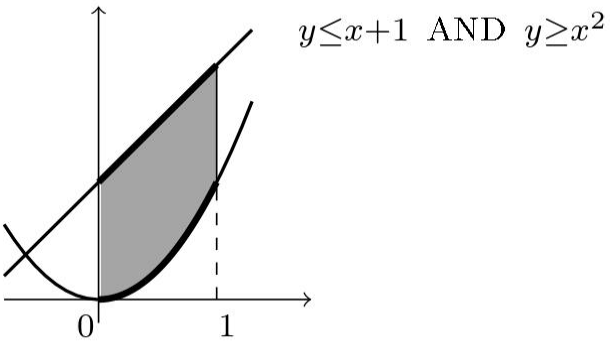


Fig. 1
Semialgebraic sets are tame.

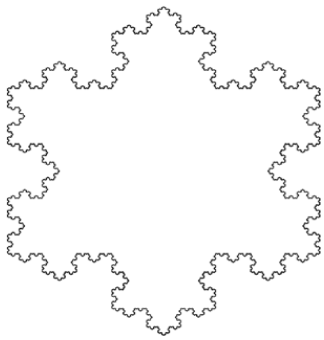


Fig. 2
The Koch snowflake is not tame.

Looted art and restitution in the twentieth century: Europe in transnational and global perspective conference University of Cambridge, September 18-20, 2014

Bianca Gaudenzi, Department of History and Sociology

Over the past decade the subject of looted art and the restitution of cultural property have captured the attention of the media and the public alike through a range of popular recollections that included novels, exhibitions, documentaries, international headlines and more recently even a blockbuster movie, *Monuments Men*. In these narratives, the historical complexities that characterized wartime looting or under duress sales and the ensuing efforts to restore cultural artefacts to their pre-war conditions have often been put aside in favor of vivid literary accounts that occasionally present a tale of heroic sacrifice and the fulfilment of justice.

The major interdisciplinary conference that I organized at the University of Cambridge in September 2014 aimed at bringing together the rich yet fragmented research on art looting in twentieth century Europe in order to develop a framework for understanding the processes of restitution in a transnational and global perspective. The event attracted more than 100 participants, including historians, art historians, legal experts, museum curators, art dealers, politicians and representatives of restitution taskforces from four different continents, to discuss advances in research, share good practices and outline areas for future cooperation. Organized in workshop format with pre-circulated papers, the conference tackled the issue of the restitution of cultural property by inquiring into the processes of denazification and decolonization that shaped the history and present policies across Europe, Algeria, Nigeria, Israel, Indonesia, Korea, the U.S. and the U.S.S.R. over the course of the 20th century.

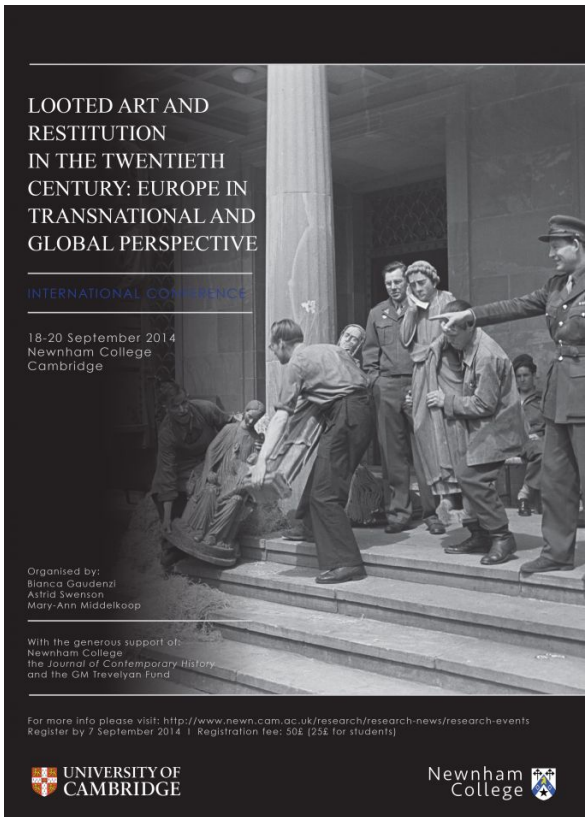


Fig. 1 Conference poster

By comparing and connecting case studies across institutional and national borders over the course of the twentieth century, speakers revealed the nexus between private individuals, national governments and international organizations in their efforts to return looted artworks and artefacts. The interdisciplinary approach provided valuable insight into the deep transnational connections that have shaped both the looting and the restitution of cultural property in the past and continues to do so up to present day. At the same time, researchers, museum curators and elected politicians pointed out that a still greater level of sharing of expertise is needed to identify looted objects. Hence, the conference concluded with the aim to create a more permanent network and an international association for provenance research.

I am now in the process of reworking the most thought-provoking contributions in an edited volume that will be published as a Special Issue with the *Journal of Contemporary History* in early 2016. The volume questions the impact of restitution practices on notions of national, international and regional identity in a number of particularly representative cases – from 1930s Portugal to Suharto's Indonesia to 21st-century Native American communities – and contributes to gaining a deeper understanding of the processes of restitution of cultural property as a political and cultural practice in transnational perspective.

A new perspective on the birth of crystals

Denis Gebauer, Department of Chemistry

Many natural phenomena, such as rock formation or biomineralization (bone or teeth), are based on crystallization. Also in industrial contexts, crystallization is widespread and employed *e.g.* for the purification of synthetic solids. This combined with its pivotal importance for various scientific fields ranging from materials chemistry to structural biology has spurred tremendous research activity that has led to the formulation of well-established theories to describe and predict the basic processes. The obvious fundamental step is the birth of the first tiny crystals in solution—nucleation. Detailed knowledge of the molecular mechanisms underlying nucleation is required to understand crystallization phenomena as a whole, and to control and direct crystallization processes in targeted ways. It is a prerequisite for the development of novel synthetic routes for the generation of advanced materials, ranging from medical implants to improved construction materials.

In recent years however, it has turned out that classical nucleation theories are challenged by experimental observations primarily made in research related to biomineralization and protein crystallization. While the literature reporting corresponding "non-classical" observations is vast —partly dating back to several decades ago— a detailed review article, compiling the respective literature and linking together different observations made in distinct chemical systems, has been lacking. An article published in the renowned journal *Chemical Society Reviews* has now filled this gap.[3] It collects evidence for "non-classical" nucleation reported in almost 200 papers and provides a consolidating discussion of calcium carbonate, calcium phosphates, iron oxides, silica, and crystals of small organic molecules forming from aqueous solution. This covers the most important biominerals, which are also of great technological importance. By contrasting the experimental evidence reported in the literature with the notions of established theories, this approach furthermore supports the proposition of a novel mechanism for nucleation, the so-called pre-nucleation cluster pathway (

Fig.). As opposed to classical theories, the alternative framework does not consider the size, but the dynamics of the precursors of crystals to be central to the event of phase separation (nucleation). It is shown that this basic idea has the potential to unify various experimental observations within a common framework, whereas the article also highlights open questions and unknown aspects. The hope is that this will contribute to advancing the understanding of nucleation phenomena, and foster lively discussions in the scientific community.

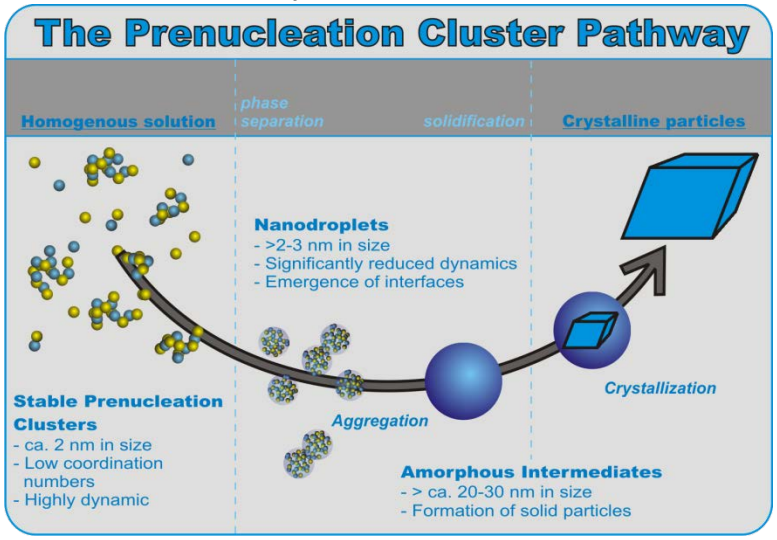


Fig. 1
Diagram summarizing the notions of the proposed nucleation mechanism. Stable pre-nucleation clusters, consisting of tens of atoms, ions or molecules (depending on the type of crystal; blue and yellow spheres) transform into nanodroplets upon a distinct decrease in dynamics. Amorphous (that is, non-crystalline) intermediates are then formed via aggregative processes and solidification, and eventually transform into crystals.

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[1] *D. Gebauer, M. Kellermeier, J. D. Gale, L. Bergström, H. Cölfen: "Pre-nucleation Clusters as Solute Precursors in Crystallisation", Chem. Soc. Rev.* ***43****(7), 2348-2371, 2014.*

Archaeology of forced labour in the Alps – The Suggadin camp in the Montafon Valley

Barbara Hausmair, Department of History and Sociology

During National Socialist rule in Austria (1938-1945), the exploitation of involuntary labour played a key role in economic development, also in today's province of Vorarlberg (part of the former Reichsgau Tirol-Vorarlberg). The Illwerke GmbH company in particular profited from forced labour when expanding their network of power plants in the Vorarlberg Alps[1]. Historians studying this system are confronted with a very scarce basis of historical sources, since forced labour outside the concentration camp system has received comparatively little attention, and comprehensive collections of former forced labourers' accounts of work in Vorarlberg do not exist. The numerous camps established in the Montafon Valley, however, have left their material traces in the modern landscape and offer a possibility for engaging with the history of exploitation and slave labour in the NS period.
The project "*NS Forced Labour in the Alps – The Suggadin Camp in the Montafon Valley*" was initiated in 2014 and is a cooperation between Barbara Hausmair and the Montafon Museums (Michael Kasper and Isabella Greußing) that explores the history of the forced labour camp Suggadin. Located 1.8 km southwest of St. Gallenkirch, the camp was opened in 1939 to accommodate forced labourers and prisoners-of-war who were exploited on behalf of the Illwerke GmbH to build a bridge over Suggadin creek. The number of imprisoned workers is estimated between 100 and 342. Our research to date has revealed very few written records and photos of the camp and only one account by a former inmate. Although the barracks were largely demolished in the post-war period, the area itself never has been developed and many archaeological remains of the camp, such as foundations and waste pits, are still visible on the modern surface.

Fig. 1
1940s photo of Suggadin camp (red arrow) and the construction site of the water bridge (foreground; image: LAV).

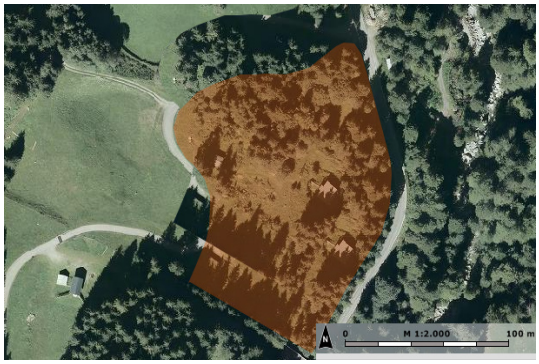


Fig. 2
Aerial photograph of the former camp, outlining the survey area (image: VoGIS 2012).

Archaeology makes it possible to broaden the little knowledge we have about the camp at present by analyzing the material remains of the camp and studying artefacts that were lost or left in the camp when it was abandoned. The as-yet unknown dimensions and structures (living areas, workshops, functional buildings) and a first insight into the range of small finds from the camp period will be established through an archaeological survey in summer 2015, which is designed as an interdisciplinary field internship for students of the University of Konstanz. In combination with the few available historical sources, the archaeological results will provide initial information into the camp's layout and size, and the living conditions of the forced labourers. In the framework of the Montafoner Museums' education initiative "Places of Memory" the project will also host an on-site workshop for local school classes in order to motivate young people to engage with the National Socialist history of their home region.
The project is funded by the state of Vorarlberg and the Research Department of Montafon Museums. The University of Konstanz's History Department (Chair Prof. Stefan Hauser) and the Zukunftskolleg are supporting the field work by supplying technical equipment.

[1] *Michael Kasper, "Zwangsarbeit auf den Baustellen der Vorarlberger Illwerke 1938-45", in: "Jahresbericht der Montafoner Museen" 2012, 67-70.*

Identifying water reward in the fly brain

Wolf-Dietmar Hütteroth, Department of Biology

In a study[1] initiated and led by Suewei Lin, in my former lab in Oxford, we examined the rewarding properties of water in naïve choice behavior and associative odor learning, characterizing its anatomical foundation in the fly brain (Fig. 1).

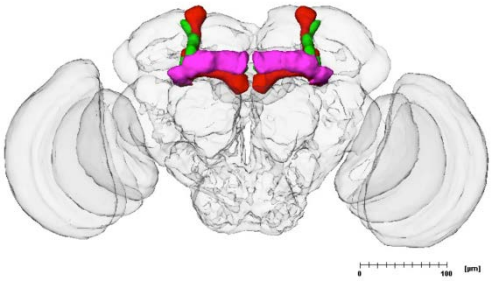


Fig. 1
3D reconstructions of the brain neuropils of *Drosophila melanogaster.*
The mushroom body (MB, in color) is regarded as being the homologous structure to the vertebrate pallium in protostomes and is crucial for associative memory processes.
Three subsets of the mushroom body are differentiated: the horizontal-only γ lobe (pink), the αβ lobes (red), and the α'β' lobes (green). About 150 dopaminergic neurons (not depicted) innervate this structure and are indispensable for memory formation. Scale: 100 µm.

Naïve flies seek a water source based on their internal state

Like most animals, the fruit fly *Drosophila melanogaster* seeks out water if it is thirsty. If the fly is water-satiated, it avoids water vapor. In our experimental setup, the flies changed their behavior from water-avoidance to water-seeking after six hours of water deprivation. We identified a cluster of about 70 dopaminergic neurons in the fly brain that proved to be crucial for this switch in behavior. If we blocked these neurons during the flies' choice between dry and humid air, even thirsty flies continued to choose the dry side. Apparently these neurons are involved in relaying the water-seeking behavior and therefore we called them "water-wanting neurons."

Learned water reward requires a unique set of dopamine neurons

In another experiment, thirsty flies were trained to associate the water stimulus with a distinct odor, so the flies learned to choose one odor over another in expectation of a water reward. Using functional Ca^{2+}-imaging, we showed that a distinct subset of dopaminergic neurons become active during water ingestion, and these neurons are responsible for mediating this learned behavior. If these neurons were blocked during the presentation of both odor and water stimulus, no association was formed. During testing, the flies showed no preference for the odor that was previously paired with the water reward. We called these neurons "water-learning neurons."

Different rewards are mediated by different neuronal circuits

Strikingly, the neurons identified in this study were distinct from the ones we previously characterized as being required for sugar learning[2]. It seems that different reward types, such as water and food, are represented by distinct neuronal circuit elements in the brain, and not by a general cellular representation that says: "this is good!" – something that was postulated but never shown with such cellular resolution.

As discussed in an article about our work in The New Yorker by Jonathan Weiner[3], these results could open the door to an understanding of the cellular differences between "wanting," "liking" and "learning," and might eventually help to interpret human reward-related disorders.

[1] "Neural correlates of water reward in thirsty Drosophila" (Suewei Lin, David Owald, Vikram Chandra, Clifford Talbot, Wolf Huetteroth, Scott Waddell); in: "Nature Neuroscience" 2014, 17, p. 1536-1542, DOI: 10.1038/nn.3827, published Sep 28, 2014: http://www.nature.com/neuro/journal/v17/n11/full/nn.3827.html

[2] "Layered reward signalling through octopamine and dopamine in Drosophila" (Christopher J. Burke, Wolf Huetteroth*, David Owald, Emmanuel Perisse, Michael J. Krashes, Gaurav Das, Daryl Gohl, Marion Silies, Sarah Certel, Scott Waddell); in: "Nature" 2012, 492 (7429), p. 433-437, DOI: 10.1038/nature11614, published Oct 28, 2012: http://www.nature.com/nature/journal/v492/n7429/full/nature11614.html, * equal contribution.*

[3] "The thirsty mind" (Jonathan Weiner); in: "The New Yorker" 2014, published Sept 29, 2014: http://www.newyorker.com/tech/elements/thirsty-mind

Multiobjective PDE-constrained optimization using the reduced-basis method

Laura Iapichino, Department of Mathematics and Statistics

Optimization problems are common in many disciplines and various applications. Optimization problems require us to find solutions - called problems controls - which are optimal or near-optimal with respect to a goal. Typical examples include the design of a bridge, where the goal is to minimize its weight or maximize its strength by controlling the material used to build it, the design of an aircraft wing with the best aerodynamics proprieties by controlling its shape, and by many other applications arising in almost every field. Multiobjective problems are specific optimization problems for finding an optimal solution according to more than one goal. The goals of the problems can be completely independent, such that one solution that is optimal for one goal can penalize the other goals.
Real phenomena are often modeled by a specific set of equations, called partial differential equations (PDEs), which define the state of the problem. Some parameters in the equations can help describe different configurations, such as specific physical quantities (like material properties) and/or geometrical variations. For this range of models, procedures based on classical numerical techniques are expensive in terms of computational time, particularly when the solutions need to capture fine details or several configurations need to be considered. Numerical simulations must be carried out very rapidly, to provide a prompt quantitative output/response on each new specific geometrical/physical configuration. Model order reduction, in particular the Reduced Basis (RB) method, was used in [1] to reduce the computational complexity of these problems, meaning that significantly less simulation time was required than that needed with classical numerical techniques, such as the well-known and widely used Finite Element (FE) method. The accuracy of the RB solution varies with the number of certain functions used in the RB numerical scheme. By increasing this number, the solution will be more accurate but the computational time increases. In Fig. 1, the optimal control and the state solution of a heat transfer problem are shown, the control in this case represents the source term and the state the temperature of the system. Fig. 2 shows the decay of the error between the RB and FE solutions as a function of the number of RB functions used. Since we want to avoid the computation of the FE solution, a rigorous error bound, capable of predicting the error between the RB and FE solutions, is computed. Its effectiveness is shown in Fig. 2. The evaluation time of the RB solution when using 15 RB basis functions and including evaluation of the error bound is 0.016 seconds, while evaluation of the FE solution requires about 1.26 seconds, by obtaining a speed-up that is 88 times faster than the old method. The proposed strategy was applied to a simple problem, and some examples that include problems with more than one goal (multiobjective optimization) are presented in [1]. It can be stated in general that for more complex problems, the speed-up can be even greater.

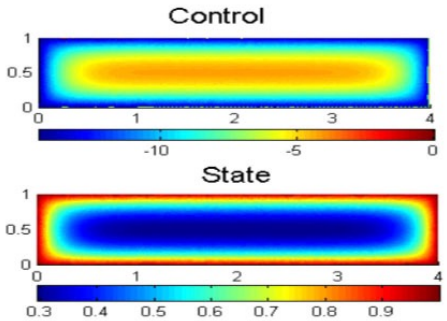


Fig. 1
Example of an optimization problem, where the state represents the temperature of a heated block and the optimal control is the optimal source term such that some goals are achieved.

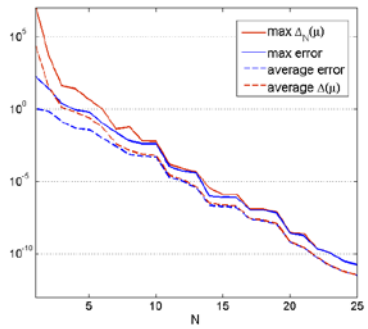


Fig. 2
Average errors, maximum errors and error bounds regarding the solution of the problem between the FE and RB approximations by varying the number of RB functions.

[1] *L.Iapichino, S. Ulbrich, S. Volkwein, "Multiobjective PDE-Constrained Optimization Using the Reduced-Basis Method"; Submitted, 2014.*

Suppression of chain transfer in catalytic acrylate polymerization via rapid and selective secondary insertion

Zhongbao Jian, Department of Chemistry

Catalytic polymerizations of ethylene or propylene are among the largest-scale synthetic chemical reactions performed today. By contrast, an insertion (co)polymerization of polar vinyl monomers continues to be a long-standing challenge. The fundamental limitations and problems associated with these reactions can be understood from their mechanisms. Thus, low molecular weights of copolymers are a significant issue. The electron-poor polar α-olefins insert in a 2,1-fashion into the growing chain preferentially. The resulting secondary electron-withdrawing-substituted alkyls insert the next olefinic monomer only sluggishly. Additionally, they are particularly prone to chain transfer by β-hydride elimination. In this work, our findings show that the concept of a second rapid intramolecular insertion can help to overcome fundamental issues of the insertion polymerization of electron-poor polar monomers. The product of polar monomer (2,1-) insertion, which is usually less reactive for chain growth but prone to β-H elimination and hereby limits molecular weights, is rapidly reacted before chain transfer occurs. At the same time, conformational constraints force this intramolecular insertion to occur in the electronically less favored 1,2-mode. This yields a primary alkyl, which is reactive for further chain growth and disfavors β-H elimination.

Under pressure-reactor conditions, the copolymerization of ethylene (E) with acrylic anhydride (AA) was studied with various catalyst precursors **1**−**2**, which showed a moderate catalytic activity. Comprehensive NMR studies indicated that the incorporation of AA into a copolymer could reach a very high 25.1 mol %. The copolymer microstructure contained four different units (five-membered cyclic structure *cis*-**III** and *trans*-**III**, six-membered cyclic structure **II**, and non- cyclic structure **I**), in which *trans*-**III** is the major unit (89%) (Fig. 1). The anhydride repeat units render these novel polyethylenes reactive for various desirable post-polymerization reactions. More importantly, GPC studies revealed that the molecular weights of these E-AA copolymers obtained could reach 38,500 g mol^{-1}, which is higher by up to an order of magnitude vs. the low molecular weight E−methyl acrylate (MA) copolymers.

The underlying insertion events were further elucidated by stoichiometric NMR studies. The first insertion of AA into the Pd−Me bond of **1** or **2** occurs in a 2,1- fashion exclusively, and then the remaining acrylic double bond rapidly inserts intramolecularly with a reversed 1,2-regioselectivity to form a five-membered cyclic repeat unit (Fig. 1). This key AA insertion product could be isolated and fully characterized by NMR and X-ray diffraction (Fig. 2), which shows a slower β-hydride elimination. This agrees qualitatively with the observed considerably higher molecular weights of E-AA copolymers.

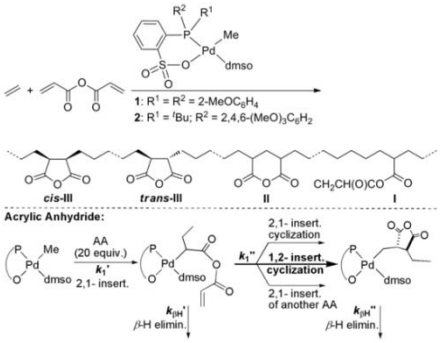


Fig. 1
Cyclo-copolymerization of ethylene with acrylic anhydride.

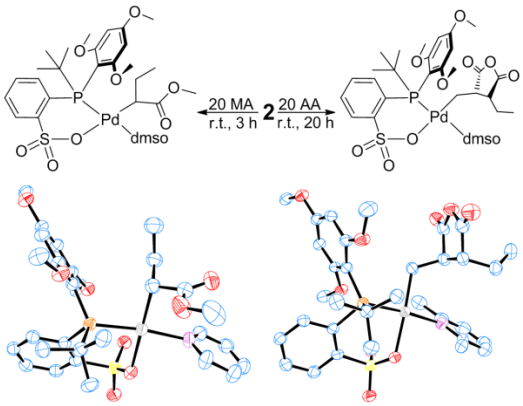


Fig. 2
Synthesis of insertion products.

[1] *Zhongbao Jian, Moritz C. Baier, Stefan Mecking, J. Am. Chem. Soc. 2015, 137, 2836–2839.*
[2] *Zhongbao Jian, Laura Falivene, Philipp Wucher, Philipp Roesle, Lucia Caporaso, Luigi Cavallo, Inigo Göttker-Schnetmann, Stefan Mecking, Chem. Eur. J. 2015, 21, 2062–2075.*
[3] *Zhongbao Jian, Philipp Wucher, Stefan Mecking, Organometallics 2014, 33, 2879–2888.*

Improving flat panel displays by discrete optimization

Andreas Karrenbauer, Department of Computer and Information Science

Our objective is to advance the state of the art in modern display technology by means of discrete optimization. Specifically, we want lower power consumption in the next generation of flat-panel displays through a reduction of their addressing time. To this end, we exploit a common feature of today's displays: the pixels are arranged in a matrix fashion with only one contact per row and per column. For the sake of simplicity, let's assume that these contacts are switches and that a pixel (i,j) shines if and only if the switches for row i and column j are off. This implies that an arbitrary pattern cannot be displayed at the same time. Hence, several subframes are necessary to display an image entirely. Traditionally, an image is displayed row-by-row at a sufficiently high frame rate such that the eye perceives the average. This method is called Single Line Addressing since each subframe consists of a single line. This is a major cause of excessive power consumption because each pixel only shines for a very short time, and therefore must shine very brightly to achieve a sufficient average brightness. However, it is possible to drive multiple rows at once, though only by solving a discrete optimization problem in real-time on a driving chip. Constrained by the strong competition on the display market, successful algorithms must be efficient with respect to arithmetic operations and memory consumption.

We have developed a fully combinatorial approximation algorithm for the practically relevant case in which pixels in consecutive rows are addressed simultaneously. Because the algorithm uses only addition, subtraction, and comparisons, it is well-suited for implementation in hardware. Nevertheless, our algorithm computes decompositions in real-time whose objective values are within one percent of the optimum solution in the majority of cases in practice. This invention was patented and commercialized by Dialog Semiconductor under the brand name SmartXtend and has made transparent and flexible displays possible. In particular, it is used in transparent OLED displays by Futaba (formerly TDK). The Lenovo S800 (see photo at right), the Explay Crystal, and the Nexian Glaze M9090 are three mobile phones available on the international market that are driven by our technology.

In a follow-up project funded by the German Research Foundation, we extend this research to further display technologies. Our framework will apply to devices like OLED displays, plasma screens and e-paper.

We develop new sophisticated driving algorithms and thereby contribute to the theory of addressing matrix displays, which still lacks a profound understanding of the underlying computational problems. Due to the relation of binary matrices to bipartite graphs, the addressing problem is captured by the problem of decomposing the edge set of a bipartite graph into a minimum number of complete bipartite subgraphs, also called bicliques. This project will close a research gap in the area of approximation algorithms for biclique decomposition problems, and the foundational research will benefit flat panel displays and in turn other applications, for example in graph drawing, computer security and genetics. In fact, we have already taken a leap forward by recently proving nearly tight lower and upper bounds for approximation factors of polynomial-time algorithms for biclique covering and partition.

[1]*P. Chalermsook, S. Heydrich, E. Holm, and A. Karrenbauer, "Nearly Tight Approximability Results for Minimum Biclique Cover and Partition," in Algorithms - ESA 2014 (A. Schulz and D. Wagner, eds.), vol. 8737 of Lecture Notes in Computer Science, pp. 235-246, Springer Berlin Heidelberg, 2014.*

The search for the genetic basis of natural diversity

Claudius Kratochwil, Department of Biology

Evolution is an often surprisingly fast process that results in new and improved adaptations, but of course also is the mechanism for the origin of novel species. Genetic variation and the resulting changes in an organism's characteristics are the raw material for selection to act on, which might allow for the evolution of adaptations in response to changing environments. The underlying genetic processes that are the basis of evolutionary mechanisms are still largely unknown. To discover these "genetic drivers" of diversification is of central interest to evolutionary biology[1].

My study organisms are cichlid fish (**Fig.1**), a famous textbook example of exuberant diversity and record-breaking rates at which new species arise, chosen as a means for understanding the molecular mechanisms that drive phenotypic diversity. Cichlid fish are one of the most diverse and species-rich families of vertebrates, and a suitable model for analyzing the genetic, epigenetic and developmental bases of evolution[1-3]. Evolutionary geneticists are in an especially favorable position since they have access to a treasure trove of spectacular phenotypes. At the moment we are entering a new and exciting era in biology in which we can expect great advances in understanding the molecular changes that drive the evolution of diversity thanks to a deluge of new experimental approaches and technologies (**Fig.2**).

Fig. 1
The family of cichlids, here the African cichlid *Abactochromis labrosus* from lake Malawi, is a textbook example for diversity and rapid evolutionary change.

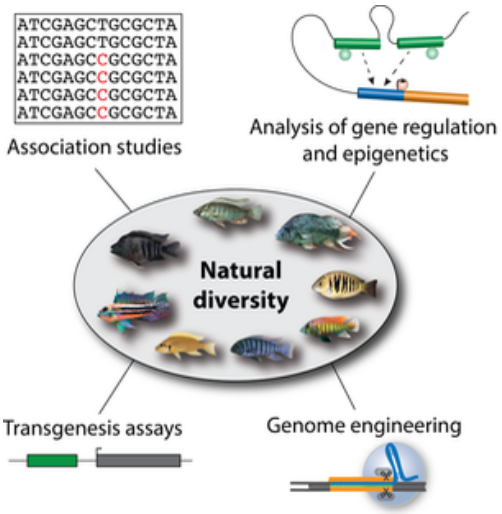


Fig. 2
Many novel technologies have been established that will facilitate the investigation of the genetic basis of organism characteristics.

In particular, I study how changes in the regulation of gene expression are used to drive the evolution of phenotypically diverse traits, such as body coloration and pigmentation[3,4]. There is accumulating evidence that especially the regulation of how, when and where genes are expressed plays a pivotal part in the process of diversification. Instead of redesigning its components, evolution "tinkers" with the existing bits[1,4]. By conducting a more comprehensive study across cichlid species, I aim to better understand how "evolutionary tinkering" within gene regulation contributes to the molecular underpinnings of the diversification that Charles Darwin already talked about in the "Origin of Species": "*From so simple a beginning, endless forms most beautiful and most wonderful have been, and are being, evolved*".

[1] *Kratochwil, C. F., & Meyer, A. (2015). Closing the genotype-phenotype gap: Emerging technologies for evolutionary genetics in ecological model vertebrate systems. BioEssays 37 (2), 213–226.*
[2] *Kratochwil, C. F., & Meyer, A. (2015). Mapping active promoters by ChIP-seq profiling of H3K4me3 in cichlid fish - a first step to uncover cis-regulatory elements in ecological model teleosts. Molecular Ecology Resources (in press)*
[3] *Kratochwil, C. F., Sefton, M. M., & Meyer, A. (2015). Embryonic and larval development in the Midas cichlid fish species flock (Amphilophus spp.): a new evo-devo model for the investigation of adaptive novelties and species differences. BMC Developmental Biology, 15(1), 277–16.*
[4] *Kratochwil, C. F., & Meyer, A. (2015). Tinkering within gene regulatory landscapes. Current Biology 25 (7), R285-R288*

A priori synthesis and imagination

Andrea Lailach-Hennrich, Department of Philosophy

The project that brought me to the Zukunftskolleg is called “The Synthetic *A priori*,” a concept that Immanuel Kant introduced into philosophy. Synthetic *a priori* judgments are of special interest to philosophers. They are on one hand supposed to tell us something about the features of the empirical world, which is what makes them synthetic. On the other, they are to be justified without reference to experience, which is what makes them a priori. By means of synthetic a priori judgments philosophers seem to be in a position to say something about the general conditions of experience and knowledge without leaving their armchair. But how are we to understand the term “synthetic”? Finding an answer to this question proved more difficult than expected. In 2014 my approach to the problem changed. I participated in a scientific retreat on the issue of imagination (organized by M. Balcerak Jackson and J. Langkau). While preparing a presentation on Kant’s notion of imagination, I realized that Kant uses the term “synthetic” in very different ways. However, for my interpretation the most interesting use of the term ‘synthetic’ is that of the ‘act of synthesizing’, if it is understood as an act of *a priori* synthesis. Imagination is one of three syntheses underlying perception and representation in general. The key to understanding the nature of synthetic *a priori* judgments is therefore a discussion of Kant’s notion of synthesis.

In September 2014 I was a visitor to the Kant Research Group at the University of Western Ontario (UWO) in London, Canada, where I worked with Prof. Corey Dyck and Prof. Robert DiSalle. I presented the initial results of my new approach to the issue of synthetic *a priori* in a talk at UWO and in an article.

To continue the cooperation between the philosophy departments in London/Ontario and Konstanz, I am in the process of initiating a more frequent exchange between the two.

Fig. 1
University of Western Ontario in Canada (UWO) – in the snow.

Forced global singularity in a geometric flow equation

Ben Lambert, Department of Mathematics

Geometric flow equations are a set of equations by which shapes (or manifolds) may be deformed over time, hopefully "improving" the geometry in some way. These equations have been fantastically useful, with applications that range from proving difficult conjectures, such as the Poincaré Conjecture, to being fundamental to the definition of the center of mass in general relativity. Some such equations are well known for forming singularities (points where the flow equation becomes infinite, or maybe even undefined), such as mean curvature flow or Ricci flow, and often a major mathematical challenge is the analysis of such singularities. Some equations usually do not form singularities, such as the inverse mean curvature flow of starlike domains -- indeed under this flow, shapes expand out towards infinity, becoming more and more spherical.

In a recent paper (to appear in *Mathematische Annalen*) with Julian Scheuer, we considered what would happen if we took inverse mean curvature flow on a disc that was not allowed to expand out to infinity due to a perpendicularity assumption on a sphere (or Neumann boundary condition). We demonstrated that the Neumann boundary condition forced the flow equation to form a singularity at every point of the flowing disc at exactly the same moment. This furnishes mathematicians with an exciting new example of how addition of a boundary condition can result in exotic behavior in a flow.
For more details see the preprint at http://arxiv.org/abs/1410.5359.

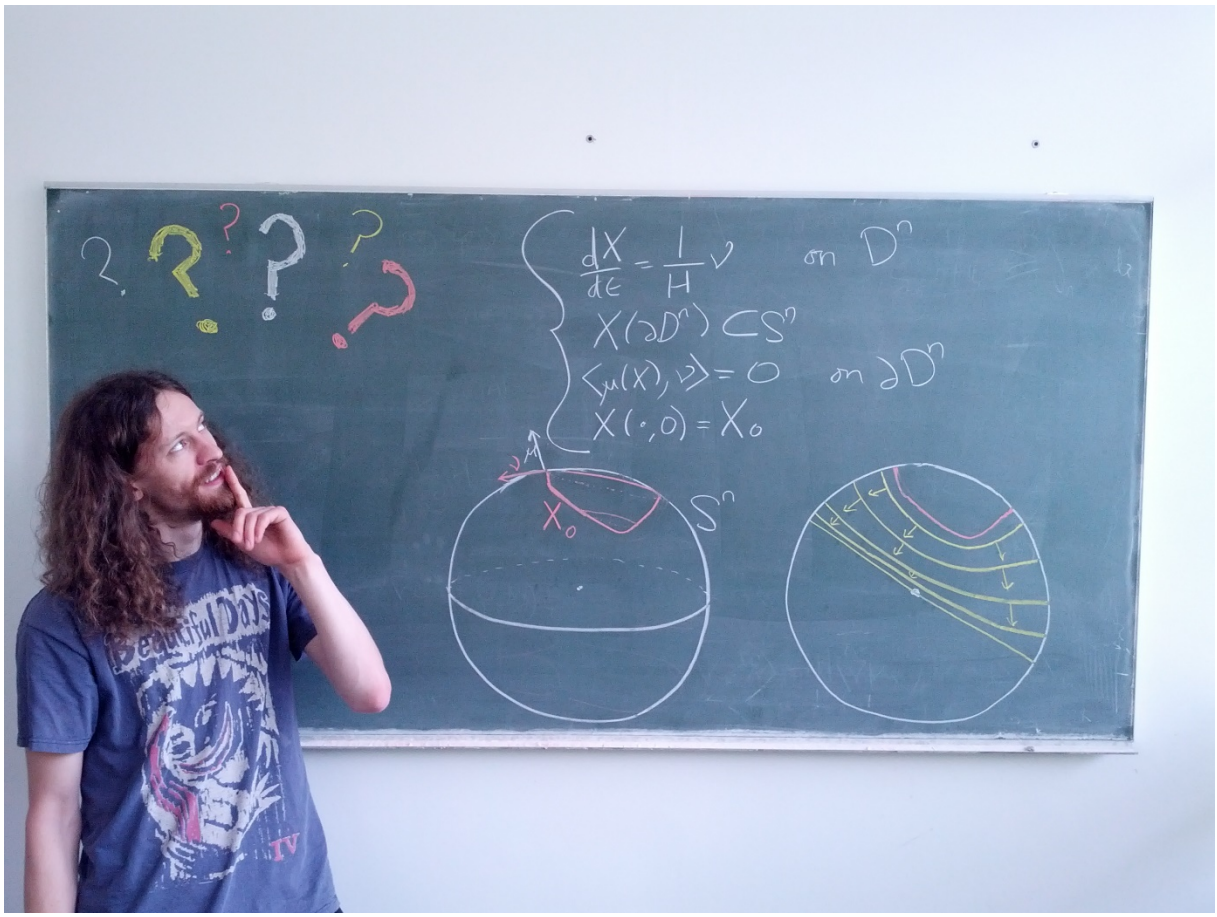


Fig. 1
An unnamed mathematician, lost in the fascinating world of geometric analysis.

[1] *B. Lambert and J. Scheuer, "The inverse mean curvature flow perpendicular to the sphere"; To appear in Mathematische Annalen. Preprint may be found at* http://arxiv.org/abs/1410.5359

Thought experiments and philosophical methodology

Julia Langkau, Department of Philosophy

Philosophers traditionally have been thought of as using intuitions as evidence. One way of gaining such evidence is to perform thought experiments. When setting up a thought experiment, the author presents a counterfactual scenario and poses a question concerning the scenario. The answer to that question is understood to be our intuition. The fact that we have an intuition or the propositional content of the intuition can then be used to refute or to establish a theory or claim.

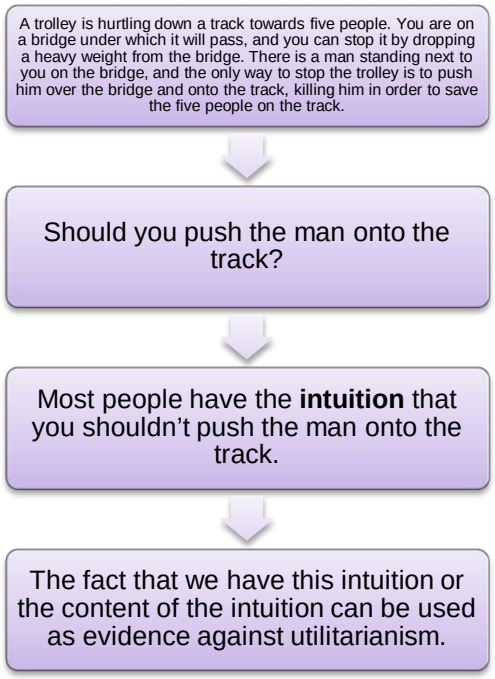


Fig. 1
See e.g. Judith Jarvis Thomson, *The Trolley Problem*, 94 Yale Law Journal 1395-1415 (1985).

Fig. 2
https://sites.google.com/site/centroricerchecirfis/workshopthoughtexperiments

I participated in a workshop on thought experiments entitled 'Philosophical Thought Experiments', June 9 – 10, 2014, in Urbino (Italy), organized by Adriano Angelucci (University of Urbino) and Margherita Arcangeli (Institut Jean-Nicod).

The traditional practice of appealing to intuitions from thought experiments as evidence has recently been criticized by so-called experimental philosophers. While some traditional philosophers defend intuitions as a trustworthy source of evidence, others try to sidestep or undermine the challenge which this criticism poses to philosophical methodology. They argue that philosophers do not need to and should not rely on intuitions, that they usually do not, that they never do, or that the term "intuition" does not refer to anything which could serve as evidence in philosophy. My Paper, "Experimental Philosophy: Against Undermining the Challenge," is a contribution to the debate about whether we in fact do appeal to intuitions. I argue that some recent attempts to undermine the challenge from experimental philosophy fail. I conclude that the question as to whether intuitions play a role in philosophy cannot be answered by analyzing our use of the word "intuition" or related terms, and what philosophers rely on may not be manifest on the surface of what they write. The role of intuitions in philosophy has to be settled within the wider framework of a theory of knowledge, justification and philosophical methodology.

The workshop contributions will be published in a special issue of *Topoi*, edited by Adriano Angelucci and Margherita Arcangeli.

Subject positions in old and middle Irish

Elliott Lash, Department of Linguistics

In the September 2014 issue of Lingua, my article entitled Subject Positions in Old and Middle Irish was published[1]. This article aims to show through a quantitative case study on word order that despite more than a century of work on Old and Middle Irish (spoken in Ireland between 600 A.D. and 1200 A.D), the syntax of these two phases of the Irish language is far from adequately understood. The subject of the case study concentrates on the position of the subject of the sentence. While the majority of previous scholars have claimed that Irish is a Verb Subject Object (VSO) language, I show that this pattern is too simplistic and in fact obscures a pervasive dichotomy between two distinct subject positions, distinguished by a series of adverbial particles. If instead one looks at the placement of subjects in relation to these particles, one makes the following observation: While all types of subjects can appear both before and after the adverbial particles, there are certain semantic and information structural constraints on both the pre- and post-adverbial position. In particular, pre-adverbial indefinites and quantified subjects have a wide-scope reading, while post-adverbial indefinites and quantified subjects have a narrow-scope reading. Additionally, pre-adverbial definite subjects are old information, while post-adverbial definite subjects are new information. These facts are comparable to similar facts in Germanic languages and thus may constitute further evidence for a possible universal underlying clause structure for Human Language.

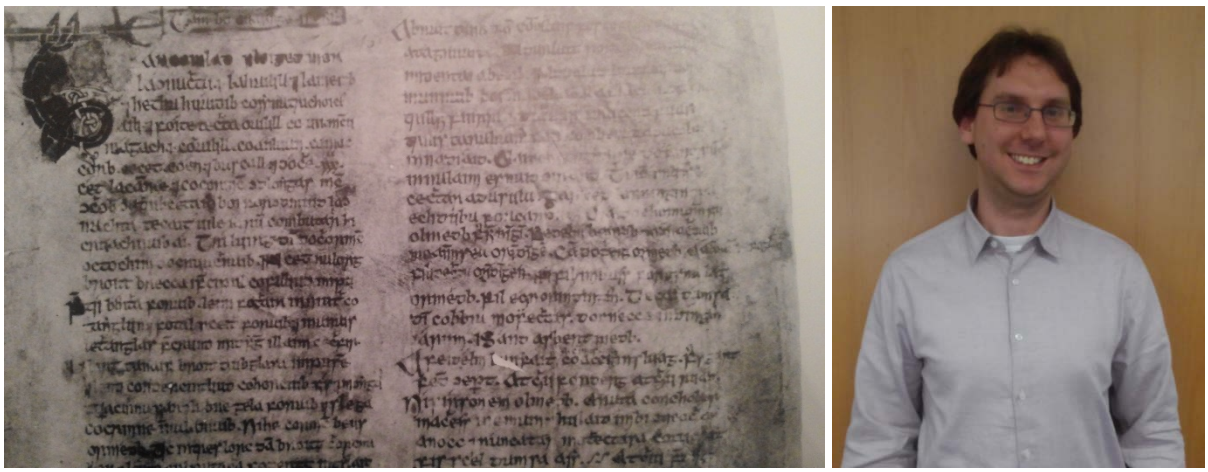


Fig. 1
11th Century Irish manuscript named Lebor na hUidre, showing the first page of the text Táin Bó Cúailnge, whose syntax was analyzed for this project.
Image obtained from Labor na hUidre: Book of the Dun Cow, R.I. Best and Osborn Bergin (eds.), Dublin: Royal Irish Academy, 1929.

[1] *"Subject positions in Old and Middle Irish" in Lingua (Sept. 2014) 148, p. 278–308.*

What you should do if you want to go to Harlem

Sven Lauer, Department of Linguistics

If I were in a joking mood, I might say that I have spent much of 2014 thinking and writing about what one should do if one wants to go to Harlem. Of course, as a linguist interested in the meaning and use of natural language sentences, I was not really poring over the subway map of New York (pictured at right) or studying any other transportation options – rather, I was investigating the interpretation and usage conditions of sentences like (1), which is a classic example of a so-called "anankastic conditional."

(1) If you want to go to Harlem, you should take the A train.

Intuitively, it is clear what this sentence says: That taking the A train is the best, or possibly the only, way of going to Harlem. But linguists such as myself are not content with making this observation. We also want to explain how this interpretation arises from the meaning of the words involved, the way they are put together in the sentence and the features of the context in which the sentence is uttered. From this perspective, innocuous-looking sentences like (1) pose surprisingly intricate problems for linguistic analysis, which have given rise to a considerable literature in the last 15 years.

Fig. 1
http://commons.wikimedia.org/wiki/File:NYC_subway-4D.svg

Together with former senior fellow Cleo Condoravdi, I had worked on the semantics and pragmatics of such sentences, and the Zukunftskolleg proved to be the perfect place to further this project: On the one hand, it turns out the kind of inferences I am studying in my project, "Pragmatic Inference based on Linguistic Preferences," play a crucial role in the interpretation of conditional sentences such as (1). On the other hand, the interpretation of conditional sentences is the focus of many linguists in Konstanz. For example, the DFG research unit "What if?" investigates conditional sentences more generally and Research Fellow Doris Penka has worked on anankastic conditionals in particular. So, early in 2014, I presented the analysis that Cleo Condoravdi and I had developed ("Anankastic conditionals are just conditionals"[1]) to a small, interdisciplinary group of linguists and philosophers.

At this meeting, my colleagues from philosophy, especially research fellow Brendan Balcerak Jackson, brought up a number of philosophical puzzles about this type of conditional. In particular, is the inference rule *modus ponens* generally valid for such conditionals? That is, if (1) is true and the hearer in fact wants to go to Harlem, does it follow, as a matter of logic, that he should take the A train? And how do such sentences figure in practical reasoning? During the discussion, it became clear that our linguistic analysis offers a novel perspective on these philosophical issues, as well. This led to the publication of another paper on the topic (*Preference-conditioned necessities: Detachment and practical reasoning*[2]), which is aimed at an audience of linguists and philosophers---it is a cross-disciplinary contribution that was enabled, in part, by the interdisciplinary environment of the Zukunftskolleg.

[1] *Cleo Condoravdi and Sven Lauer (under review). Anankastic conditionals are just conditionals.*
[2] *Sven Lauer and Cleo Condoravdi (2014). Preference-conditioned necessities: Detachment and Practical Reasoning. Pacific Philosophical Quarterly, 95(4), 584—621.*

xergm: Extensions of exponential random graph models

Philip Leifeld, Department of Politics and Public Administration

In 2014, Philip Leifeld took the lead in developing the *xergm* package[4] for the statistical computing environment R. *xergm* implements extensions of the exponential random graph model (ERGM), an inferential model for network data. In particular, the Temporal ERGM for repeated observations of networks was implemented via maximum pseudolikelihood estimation and bootstrapping of uncertainty measures. The idea behind these models is that many datasets, particularly in the social sciences, violate the assumption of conventional regression models which states that observations are independent and identically distributed (i.i.d.). For example, treating wars between nation states or legislator voting behavior as independent events is problematic in a regression context because these units are contained in larger groups and thus likely to influence each other: Legislators do not cast votes independently of their party platform, just as World Wars I and II were not comprised of 567 entirely independent militarized interstate disputes.[5] (T)ERGMs are a principled way to model endogenous processes between observations as part of the data-generating process.

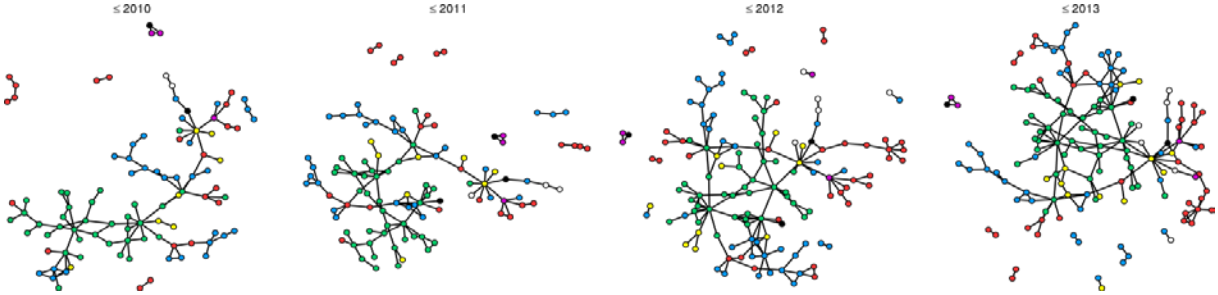


Fig. 1
A temporally changing network that can be modeled with xergm.

To accomplish this, datasets are treated as networks. For example, nation states can be interpreted as nodes, and their conflict or peace ties as edges that connect the nodes. This conceptual shift permits specification of the interdependencies between edges that may be at work, also across multiple time steps. Common examples of endogenous dependency terms include reciprocity, triadic closure and *k*-stars. Intuitively, one can see some of these patterns by looking at empirical networks like the temporally evolving coauthorship network among Swiss political scientists depicted in Figure 1. In this simple example, some researchers act as hubs that connect subfields. Once the coefficients for the dependency terms and for the standard exogenous variables have been jointly estimated, the *xergm* package permits goodness-of-fit assessment by comparing observed network statistics with characteristics of artificial networks that are simulated from the model (Figure 2).

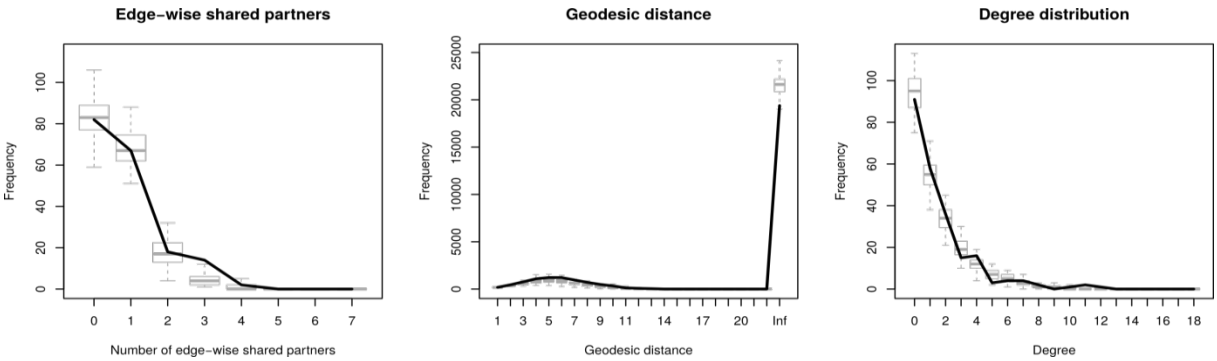


Fig. 2
Goodness-of-fit assessment. Black line = observed network; boxplots = simulated networks based on the model.

[1] *Leifeld, Philip, Skyler J. Cranmer and Bruce A. Desmarais. "xergm: Extensions of Exponential Random Graph Models." R Package Version 1.4.1. http://cran.r-project.org/package=xergm*
[2] *Cranmer, Skyler J., Bruce A. Desmarais, and Elizabeth J. Menninga (2012):. "Complex Dependencies in the Alliance Network." Conflict Management and Peace Science 29(3): 279-313.*

Light signaling and photoprotection in photosynthetic eukaryotes with ”green” and ”red” chloroplasts

Bernard Lepetit, Department of Biology

In plants and green algae (“green” plastids), as well as in red algae (“red” plastids), the chloroplasts result from an endosymbiotic incorporation of a cyanobacterium more than 1 billion years ago. The major ecologically relevant algae groups in the oceans later obtained their plastids by secondary endosymbiosis of a red alga (i.e. also containing “red” plastids). During and after the process of endosymbiosis, genes of the former cyanobacterium or the former red alga were transferred into the host cell nucleus, and only a small number of genes was retained in the plastid genome. Consequently, most of the multimeric protein complexes in a chloroplast are chimeras of proteins encoded both in the nuclear and plastidic genome. Thus, in order to adjust the photosynthetic machinery and metabolism to an optimal extent under changing light conditions, the specific amounts of these proteins have to be finely balanced, something that is performed by the plastid itself, i.e. via intra-plastidic and retrograde (plastid to nucleus) signaling pathways. In the last decades, many different light signaling triggers have been identified in plants and green algae, e.g. reactive oxygen species (ROS) and the redox state of the plastoquinone (PQ) pool (Fig.1). Another more rapid way of avoiding cellular damage by sudden increases in light intensity is the dissipation of excessively absorbed light as heat, thus avoiding over-oxidation. This so-called NPQ process involves xanthophyll cycle pigments, Lhcsr and/or PsbS proteins. For both light signaling and NPQ, much is known about “greens” compared to “reds” and comparative studies are scarce (NPQ) or completely lacking (light signaling). Therefore, we collected and compared knowledge on “greens” and “reds” in terms of NPQ (Fig. 1, with Reimund Goss, University of Leipzig) and light signaling (Fig. 2, with Lars Dietzel, University of Frankfurt) and thus pinpointed the knowledge gaps on the light responses of the ecologically very important group of algae with “red” plastids.

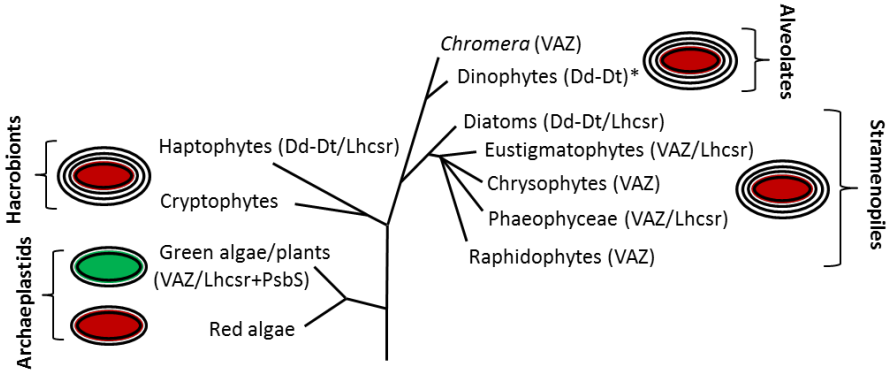


Fig. 1
Simplified phylogenetic tree of eukaryotic phototrophs and the prevailing type of xanthophyll cycle (VAZ, violaxanthin-antheraxanthin-zeaxanthin; Dd-Dt, diadinoxanthin-diatoxanthin) and the presence of Lhcsr or PsbS proteins, modified from [1]. The color of the plastids indicates their origin as green or red chloroplasts

Table 1: Light signaling triggers in eukaryotic phototrophs, modified from [2]. ‘+’, trigger is identified as gene; ’(+)’, trigger is identified as gene in some but not all investigated organisms of the respective group; ‘+/-‘,physiological evidence for the existence of this trigger is available; ‘-‘trigger is absent; ‘(-)’ the signaling trigger was not found as a gene so far, which may be due to the lack of in-depth investigation and poor data availability. ROS: O_2-, H_2O_2, $^1O_2$; ß-CC, beta-cyclocitral; MEcPP, methylerithrol cyclodiphosphate; PAP, 3'-phosphoadenosine 5'-phosphate

		Plants	Green algae	Red algae	Photosynthetic stramenopiles	Hacrobionts	Dinophytes
Primary trigger	PQ redox state/Cyt b_6f	+	+	+/-	+	(-)	+/-
	O_2-/H_2O_2	+	+	(-)	+	(-)	+
	$^1O_2$	+	+	(-)	+/-	(-)	(-)
	Downstream components after the cyt b_6f-complex in the PET	+	+	(-)	+	(-)	+/-
Secondary trigger	Tetrapyrrole	+	+	+	(-)	(-)	(-)
	Triosephosphate	+	(-)	(-)	(-)	(-)	(-)
	ß-CC	+	(-)	(-)	(-)	(-)	(-)
	MEcPP	+	(-)	(-)	(-)	(-)	(-)
	PAP	+	(-)	(-)	(-)	(-)	(-)

Protein expression profile of HT-29 human colon cancer cells after treatment with a cytotoxic daunorubicin-GnRH-III derivative bioconjugate

Marilena Manea, Department of Chemistry

Tumor targeting with peptides is based on the discovery that receptors for several regulatory peptides, such as gonadotropin-releasing hormone (GnRH), are highly expressed on the surface of cancer cells, with limited expression in healthy tissues. GnRH and its analogs therefore can be used as targeting moieties to specifically deliver chemotherapeutic agents to cancer cells. Compared to classical chemotherapy, this targeted approach may provide increased selectivity and decreased peripheral toxicity. We recently developed a promising drug delivery system, in which the anticancer drug daunorubicin (Dau) was attached *via* an oxime bond to a gonadotropin-releasing hormone-III (GnRH-III) derivative used as a targeting moiety (GnRH-III[^{4}Lys(Ac),^{8}Lys(Dau=Aoa)] bioconjugate, Fig. 1). This compound had an *in vitro* cytostatic/cytotoxic effect on human breast, prostate and colon cancer cells, as well as a significant *in vivo* tumor growth inhibitory effect on colon carcinoma-bearing mice. Using liquid chromatography-tandem mass spectrometry, we identified the H-Lys(Dau=Aoa)-OH fragment as the smallest metabolite produced in the presence of rat liver lysosomal homogenate, which was able to bind to DNA in vitro. To obtain deeper insight into the mechanism of action of this bioconjugate, the changes in the protein expression profile of HT-29 human colon cancer cells after targeted chemotherapeutic treatment were investigated by mass spectrometry-based proteomics (i.e. protein separation by 2D-gel electrophoresis, followed by proteolytic degradation of differently expressed proteins and mass spectrometric analysis). As shown in Fig. 1, we found that seven proteins (P1 - heat shock 70 kDa protein 1A/1B; P2 - calreticulin; P3 - protein disulfide-isomerase; P4 - UDP-glucose 6-dehydrogenase; P5 - fatty acid-binding protein, epidermal; P6 - Ran-specific GTPase-activating protein; P7 - guanine nucleotide-binding protein subunit beta-2-like 1) were affected by the treatment with the bioconjugate, their expression being down-regulated in the bioconjugate-treated cells compared to the untreated ones. These proteins belong to the following functional classes: molecular chaperons, metabolism-related proteins and proteins involved in signaling. Previous studies have demonstrated their implications in cancer, indicating that their down-regulation may be of therapeutic benefit.

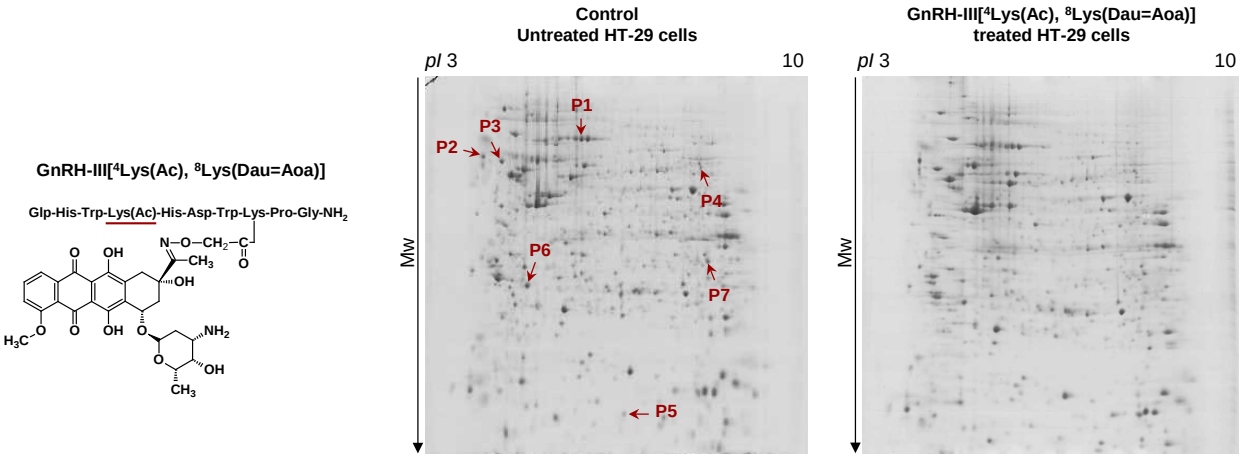


Fig. 1
Structural diagram of oxime bond-linked daunorubicin-GnRH-III derivative bioconjugate, GnRH-III[^{4}Lys(Ac), ^{8}Lys(Dau= Aoa)] and protein expression profile of untreated and bioconjugate-treated HT-29 human colon cancer cells. Significantly different protein spots are marked by arrows.

On the basis of our results, it can be concluded that the GnRH-III[^{4}Lys(Ac),^{8}Lys(Dau=Aoa)] bioconjugate exerts its cytotoxic action on HT-29 colon cancer cells by interfering with multiple intracellular processes and represents a promising targeted chemotherapeutic agent.

[1] *"Protein expression profile of HT-29 human colon cancer cells after treatment with a cytotoxic daunorubicin-GnRH-III derivative bioconjugate"; in: "PLOS ONE" 2014, 9(4):e94041. doi: 10.1371/journal.pone.0094041. eCollection 2014: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0094041*

Social solutions to energetic bottlenecks

Teague O'Mara, Department of Biology

Animals live in groups to shelter from changes in the environment, keep warm, find mates and find food. I have been investigating how such groups help tent-making bats (*Uroderma bilobatum*) in Panama to find food when it is particularly unpredictable by studying their social learning strategies. I have found that the bats can discriminate between subtle differences in information quality which may enable them to integrate multiple sources of information in their roosts in order to find their main food source: unpredictable ripe figs (Figure 1). With students from the University of Konstanz, the Netherlands, and the USA, I have also been exploring how social familiarity and species ecology impacts the use and processing of this information.

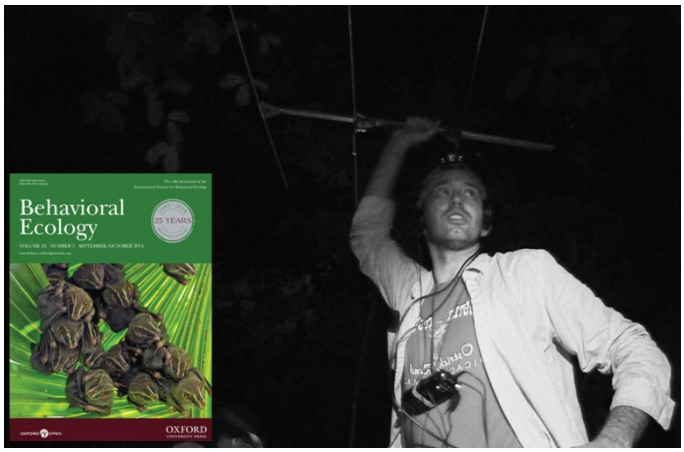


Fig. 1 Tracking energetic expenditure in tropical forests in real time. Tent-making bats use discriminatory social learning to identify the most reliable social cues, likely so that they can make the best decisions about unpredictable food resources. This was the cover article for the issue of *Behavioral Ecology*.
O'Mara MT, Dechmann DKN, Page RA. 2014 Frugivorous bats evaluate the quality of social information when choosing novel foods. *Behavioral Ecology* **25,** 1233-1239. (doi: 10.1093/beheco/aru120)

Bats live high-energy lifestyles, and these energetic constraints should encourage them to leverage their roosts as social information centers. But beyond a few estimates, we do not know what their actual energetic expenditure is. To solve this problem, I have been tracking real-time energy use in free-living bats by recording their heart rates using miniaturized radio transmitters (Figure 2). This will allow me to reconstruct how much energy they use to fly, socialize and how they economize energy use when they roost during the day. The combination of these social experiments and real-time physiological measures open up new ways for understanding how and why these animals live together and what it means to be a social mammal.

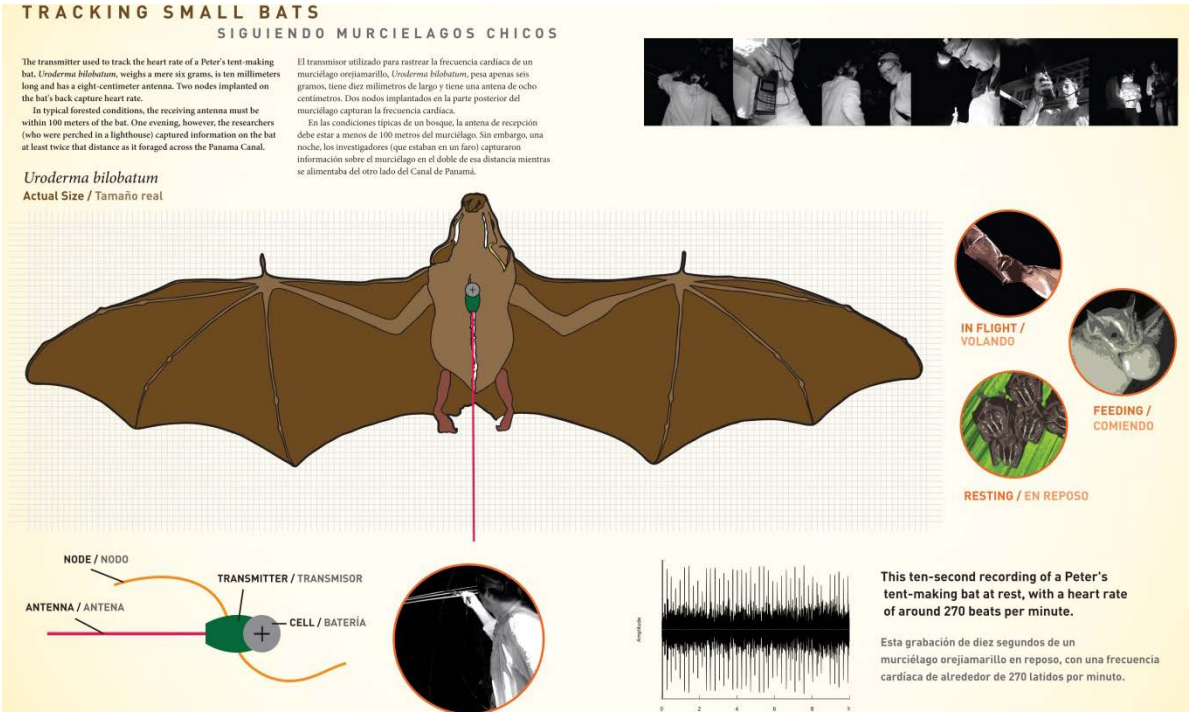


Fig. 2 Tracking the hearts of small bats. This infographic about how I track energetic expenditure in bats appeared as part of the lead article in the first issue of the Smithsonian Tropical Research Institute's *TRóPICOS* magazine. Online at: issuu.com/strinewspanama/docs/tropicos_jan_2015

The hidden sulfur cycle in rice paddy soil

Michael Pester, Department of Biology

Rice paddy fields are indispensable for human food supply but at the same time are one of the critical sources of the greenhouse gas methane. A hidden sulfur is proposed to occur in freshwater wetlands, such as rice paddy fields, that effectively cycles the various sulfur species between their oxidized and reduced states and at the same time counterbalances methane production. Dissimilatory sulfate reduction is a major process within the hidden sulfur cycle in rice paddy soil and operates at rates comparable to marine surface sediments, despite the significantly lower sulfate concentrations. As a consequence, sulfate reduction as the thermodynamically favorable process over fermentations coupled to methanogenesis diverts organic matter degradation from methane towards more carbon dioxide production. To stimulate and thus identify the responsible microorganisms, greenhouse experiments were set up where whole rice plants were grown in soil amended with gypsum ($CaSO_4$) in amounts relevant for rice agriculture (0.15% w/w). Rice plants grown in soil without gypsum served as a control. Gypsum amendment significantly reduced methane emission from rice plant mesocosms by up to 98%, showing that sulfate reducers were active and effectively competed with microorganisms involved in the methanogenic degradation pathways. 16S rRNA gene-targeted high throughput amplicon sequencing revealed a clear effect of gypsum amendment on the total microbial community in the rhizosphere and bulk soil. In particular, the abundance of members of the *Desulfobulbaceae*, *Desulfovibrionaceae* and *Synthrophobacteraceae* increased under conditions that stimulated sulfate reduction. In contrast, methanotrophic bacteria belonging to the *Methylococcaceae* decreased in abundance, most likely as an effect of the reduced methane supply. These results corroborate the importance of the hidden sulfur cycle in controlling production of the greenhouse gas methane and identified key players involved in sulfate reduction as a key process in this biogeochemical phenomenon. A publication of the presented results is in preparation.

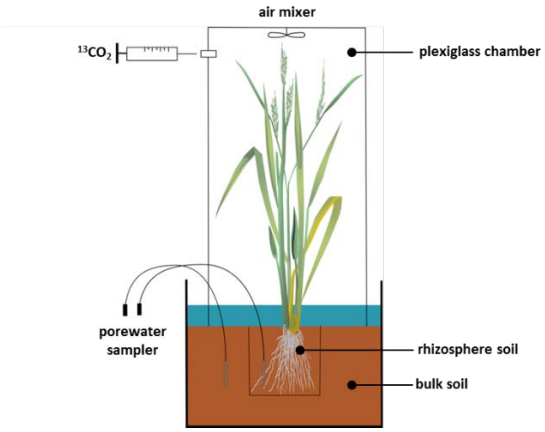


Fig. 1
Experimental setup of rice plant mesocosms.

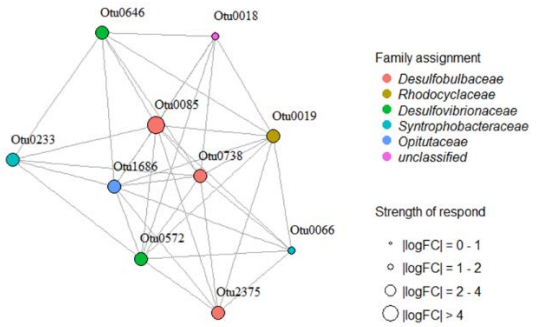


Fig. 2
Network analysis of microorganisms that respond positively to gypsum amendment.

Magnetic order on the atomic scale

Torsten Pietsch, Department of Physics

Magnetic micro- and nanostructures are important building blocks for many applications, ranging from sensing- and data storage devices to diagnostics in medicine. Therefore, intense research worldwide is aimed at the generation of new magnetic materials and functional nanostructures. Researchers at the University of Konstanz, in Torsten Pietsch's and Elke Scheer's labs, have now demonstrated experimentally that the noble metal platinum (Pt) becomes magnetic on the atomic scale.[1]

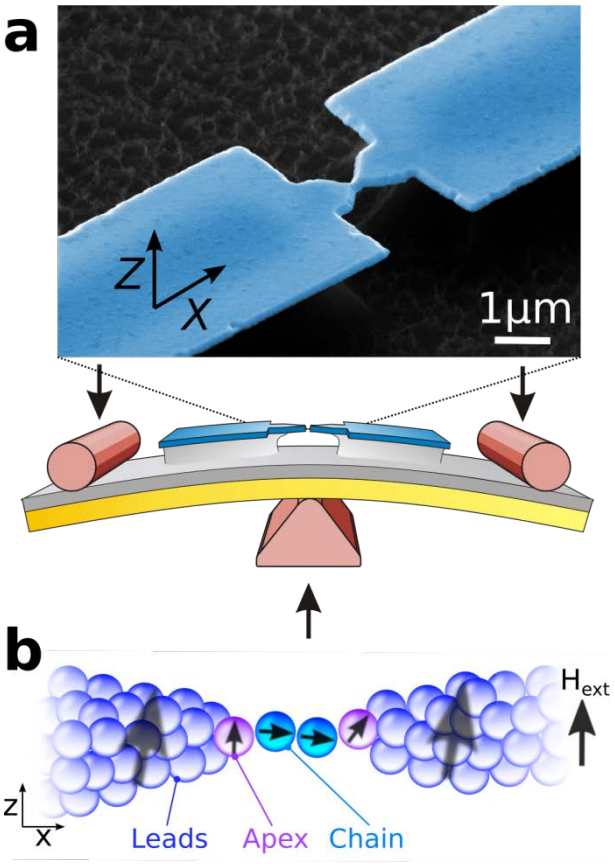


Fig. 1
a) Electron micrograph of a Pt nanowire bridge suspended over a flexible substrate and schematic illustration of the mechanically controllable break-junction technique used to prepare single-atomic contacts. b) Sketch of a single-atom platinum contact showing a possible magnetic configuration of the different atoms in the chain.

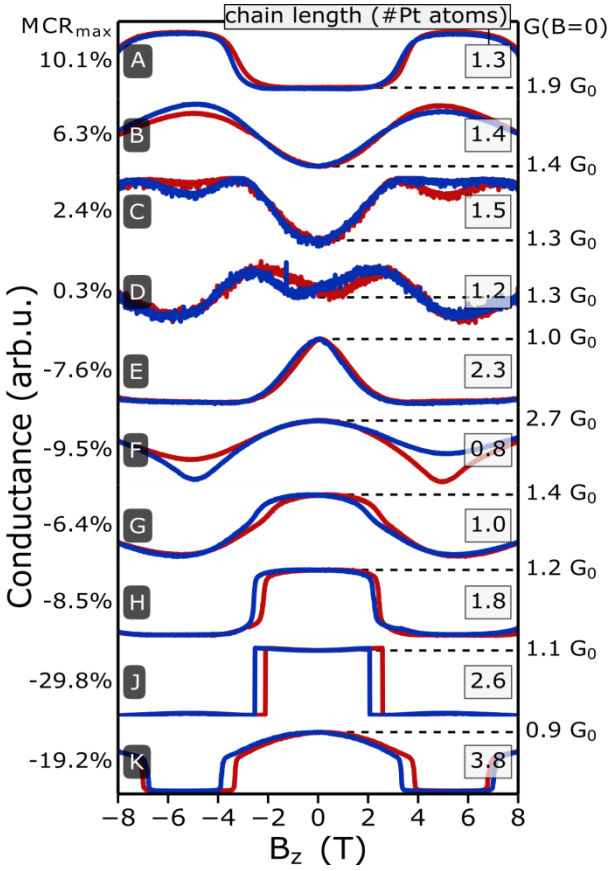


Fig. 2
Overview of possible magnetoconductance traces recorded in single-atomic Pt wires at different chain length and base conductance. The large amplitude of the magneto-conductance and the presence of a hysteresis points to a magnetically ordered state.

In bulk, i.e. at the macroscopic level, Pt is non-magnetic. However, in atomic-scale wires, a magnetically ordered state emerges. Such single atomic chains can be produced with lithographically defined break junctions (see Figure 1). In extensive experimental trials over the past three years, the researchers gathered evidence of a local magnetically ordered state in Pt atomic wires. These findings were deduced from measurements of the conductance as a function of an external field (see Figure 2) and culminated in a publication in *Nature Communications*[1]. The emergence of local magnetism on the atomic scale is not likely to be a unique property of Pt; other potential candidates, such as palladium and iridium, are currently under investigation. These studies have led to new insights into the magnetic interactions that become relevant on the atomic scale and may result in a new paradigm for nanomagnetic recording devices.

[1] *"Emerging magnetic order in platinum atomic contacts and chains"; in: "Nature Communications" 2015, (6), 6172, DOI: 10.1038/ncomms7172, accepted: Dec. 23, 2014, published: Feb 04, 2015: http://www.nature.com/ncomms/2015/150204/ncomms7172/abs/ncomms7172.html*

Where are the solutions?

Daniel Plaumann, Department of Mathematics

Complex numbers

The real numbers are typically depicted and thought of as a *line*, representing the continuum of numbers, from negative numbers through 0 to positive numbers. But there is also a *plane* of numbers: The *complex numbers,* a two-dimensional continuum. The horizontal axis corresponds to the real numbers, while the vertical axis corresponds to the *imaginary numbers*. Some equations, like

$$x^2 + 2x + 2 = 0$$

do not have solutions in the real numbers. However, this has the complex solutions

$$x = 1 + \sqrt{-1} \quad \text{and} \quad x = 1 - \sqrt{-1}.$$

The *fundamental theorem of algebra* says that any algebraic equation

(P) $$x^n + c_{n-1}x^{n-1} + \cdots + c_1 x + c_0 = 0$$

in one variable x has exactly n solutions in the complex plane.

Location of solutions

The fundamental theorem of algebra establishes the existence of solutions to algebraic equations. But in general it is not possible to write down all the solutions using expressions in roots if n>4. (A famous result of Abel and Ruffini proved in 1823.)

However, it is possible to say something about the *relative position* of solutions in the complex plane. There is a relation between the solutions of an equation like the one above and its *derivative equation*

(P') $$nx^{n-1} + (n-1)c_{n-1}x^{n-2} + \cdots + c_1 = 0$$

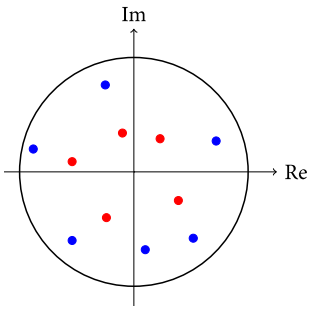


Fig. 1
Solutions of an equation of degree 6 (in blue) and solutions of the derivative equation (in red)

By the Gauss-Lucas theorem, the solutions of (P') are contained in the convex hull of the solutions of (P). In particular, if all solutions of (P) lie in the *unit disc* (the disc of radius 1 around the origin), so do all solutions of (P').

Our work

Another classical result is due to Grace (1900): If two polynomials p and q satisfy a certain bilinear relation and one of them has solutions in the unit disc, then the other has at least one solution in the unit disc. In joint work with Mihai Putinar, we prove a generalized version of Grace's theorem which holds for other domains than the unit disc. Our result applies to the image of the unit disc under a polynomial map. Figure 2 shows such a region (shaded in grey) where the unit disc was deformed by a cubic map.

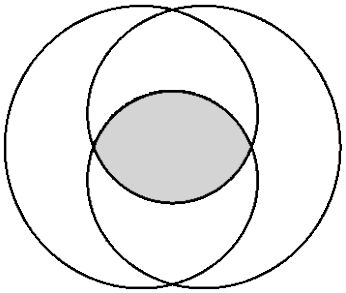


Fig. 2
A generalized circular domain from [PP]. The boundary is a curve of degree 6.

Outlook

A fascinating conjecture of Sendov (1962) says the following:

If all the solutions of the complex equation (P) lie in the unit disc, then any solution has distance at most 1 from a solution of the derivative equation (P').

In the above picture, this means that every blue dot has distance no more than 1 from the closest red dot.

The conjecture is more than 50 years old but remains open. We hope that our work on Grace's theorem may provide a piece in this puzzle and continue to work in this direction.

Personal background

Most of this work was done during my visit to the Nanyang Technological University of Singapore in the spring of 2014, where Mihai Putinar was my cordial host.

[1] *D. Plaumann and M. Putinar. A relative Grace theorem for complex polynomials. (Preprint, submitted)* http://arxiv.org/abs/1410.5935

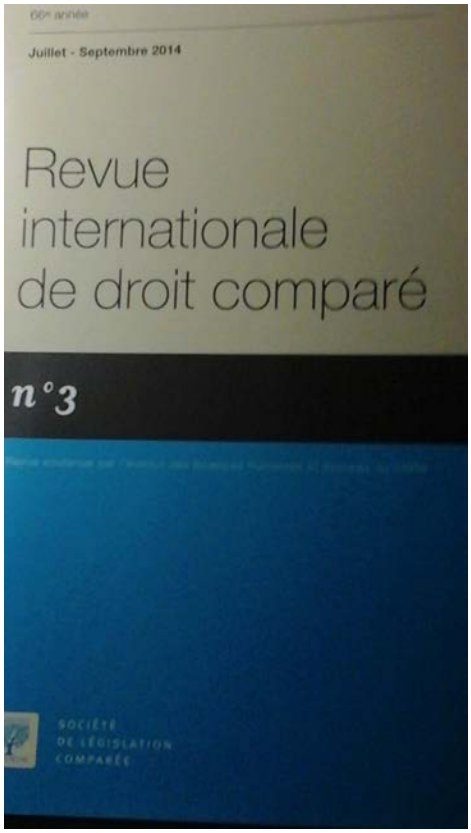
Law and society: Same-sex marriage according to the constitutional courts

Maria Daniela Poli, Department of Law

Law reflects society's development. Although it may be obvious to state, adapting law to social changes is not always simple, as demonstrated by the very current issue of the legal recognition of same-sex marriage. Starting from this presupposition and considering marriage from a constitutional point of view, the decisions of the Constitutional Courts become very important.
In a comparative law perspective, the attitude of the Constitutional Courts towards the extension of the institution of marriage to homosexual couples can be analyzed by distinguishing four models:

1) The model of constitutional obligation, according to which the prohibition of discrimination based on sexual orientation leads us to consider heterosexual and homosexual marriages as legally equivalent;
2) The model of unconstitutionality, which regards same-sex marriage as unconstitutional;
3) The intermediate or facultative model, according to which the possibility of same-sex marriage comes under legislative discretion;
4) The hybrid model, a variation of the intermediate or facultative model, according to which the Constitutional Court speaks out in favor of the recognition of same-sex marriage, even if only the legislator has the power to decide.

On the basis of this classification, my essay examines different national experiences underlying the role of the Constitutional Courts in terms of affirming the rights of homosexuals, as well as the importance of the judicial dialog and the influence of comparative law.



The essay was presented at the eighth Franco-German meeting of young researchers in comparative public law (organized jointly by the University of Paris 1 Panthéon Sorbonne, the University of Strasbourg, the University of Freiburg and the German University of Administrative Sciences Speyer) that took place in Villa Vigoni (Como) on June 13 – 15, 2013. It was published in 2014 in the *Revue internationale de droit comparé*, no. 3, pp. 843-856.

Ground-state cooling of a carbon nanomechanical resonator by spin-polarized current [1]

Gianluca Rastelli, P. Stadler and W. Belzig, Department of Physics

Synopsis: "One spin to rule a quantum mechanical oscillator"

Nano-electro-mechanics pave the way to the formidable task of observing quantum effects in large mechanical systems formed by millions of atoms. To achieve such a goal, a crucial requirement is cooling the mechanical resonator - integrated in an electrical circuit - to very low temperature ~μK. In this work, we propose a method for thermally controlling such systems by employing the intrinsic electron magnetic moment or spin. The electrons' spin behaves as a small nanomagnet, which for instance can coupled to the vibrational motion of a suspended carbon nanotube (similar to a vibrating guitar string, Fig. 1).

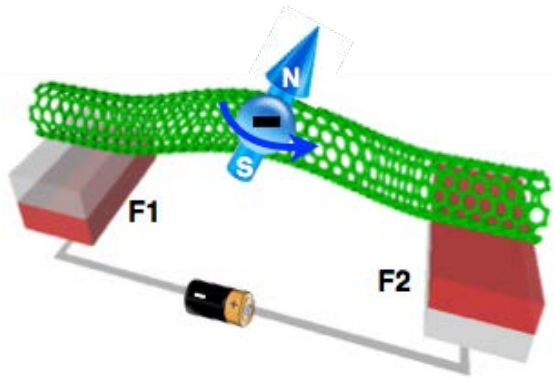


Fig. 1

In simple terms, our basic idea is that a spin-polarized current can flow from one electrical contact (ferromagnet F1) to the opposite one (ferromagnet F2) only if electrons can flip their spin (Fig. 2). By arranging the transport parameters, such a spin-flip requires an exchange of energy with the mechanical vibration. For instance, electrons can pass only by removing some energy from the vibration, as when a person jumps up on a trampoline (Fig. 2). In this way, the mechanical energy stored in the resonator decreases and the resonator is cooled. Inverting the electron current causes the opposite behavior and the resonator is heated. This method has future applications in the field of spintronics in which the spin is exploited in a manner similar to the charge in conventional electronics.

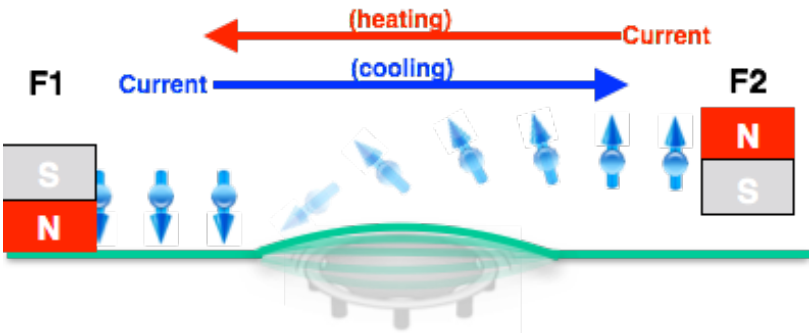


Fig. 2

[1] *Phys. Rev. Lett. 113, 047201 – Published 21 July 2014*

Bridging research and practice: The Center for Multilingualism at the University of Konstanz

Tanja Rinker, Department of Linguistics

The European project “Advancing the European Multilingual Experience” (AThEME) was initiated in 2013 and funded by a five million euro grant from the EU. Researchers from 17 countries are conducting projects on multilingualism in Europe, ranging from the maintenance of first languages (heritage languages) to clinical or neuroscientific topics. An important component to these projects is the dissemination of research results to policy makers, educators and the general public. This is intended to bring about a positive understanding of multilingualism and promote multiple language use in both home and educational settings. As part of the European project, AThEME members are connected to the Bilingualism Matters network, an information service on multilingualism. Bilingualism Matters was founded at the University of Edinburgh, GB, by Prof. Antonella Sorace, an internationally renowned researcher in bilingual language acquisition.

For years there has been a demand for information, but also for closer collaboration among researchers, education specialists and other experts in the field of multilingualism at the University of Konstanz, the city of Konstanz and beyond. The Konstanz branch of Bilingualism Matters is The Center for Multilingualism, founded by Prof. Janet Grijzenhout, my colleague from the Department of Linguistics, and myself on January 24, 2014.

Purpose and Mission of the Center for Multilingualism

The Center intends to be a hub for multilingualism issues for the University of Konstanz, the city of Konstanz and the region.

This includes:

- The establishment of an interdisciplinary research colloquium on the topic of multilingualism at the University of Konstanz,
- The initiation of common academic activities and research proposals,
- A lecture series on multilingualism in the winter term 2014/15 for students, faculty and staff of the University of Konstanz as well as the general public,
- An exchange with other Bilingualism Matters centers in Europe and related centers for multilingualism in Germany,
- Events for families, educators, etc.,
- The establishment of a weekly telephone consultation hour,
- Consultation for institutions, agencies and multilingual families,
- Collaboration and joint projects with institutions at the university and in the field of education.

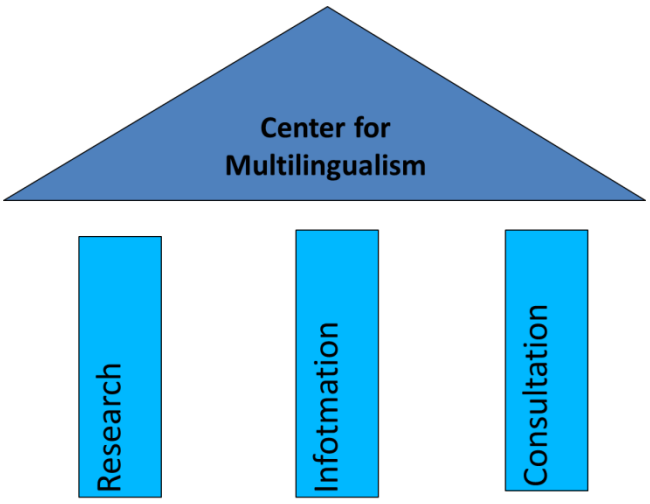


Fig. 1
The three aims of the Center for Multilingualism at the University of Konstanz.

Mesocrystals: Building up “crystals” from nanoparticles

Elena Rosseeva, Department of Chemistry

Bottom-up generation of novel nanostructured materials with controlled structure and complex functionality continues to be a conceptual challenge in the field of materials science and nanotechnology. In contrast to spherical nanoparticles, which usually self-assemble into a close-packed superlattice with random crystallographic orientation of the building blocks, anisotropic nanocrystals can generate much more complex superlattices combined with mutual crystallographic orientation (mesocrystals)[1]. In cooperation with the labs of Prof. A. Eychmüller (TU Dresden), Prof. H. Lichte (TU Dresden) and Prof. R. Kniep (MPI CPfS, Dresden), we are working on the detailed characterization of nanoparicle self-assemblies. Close cooperation between these labs opens up the opportunity to gain deeper insight into the fundamental principles of the formation and structural organization of these fascinating nanostructured materials.

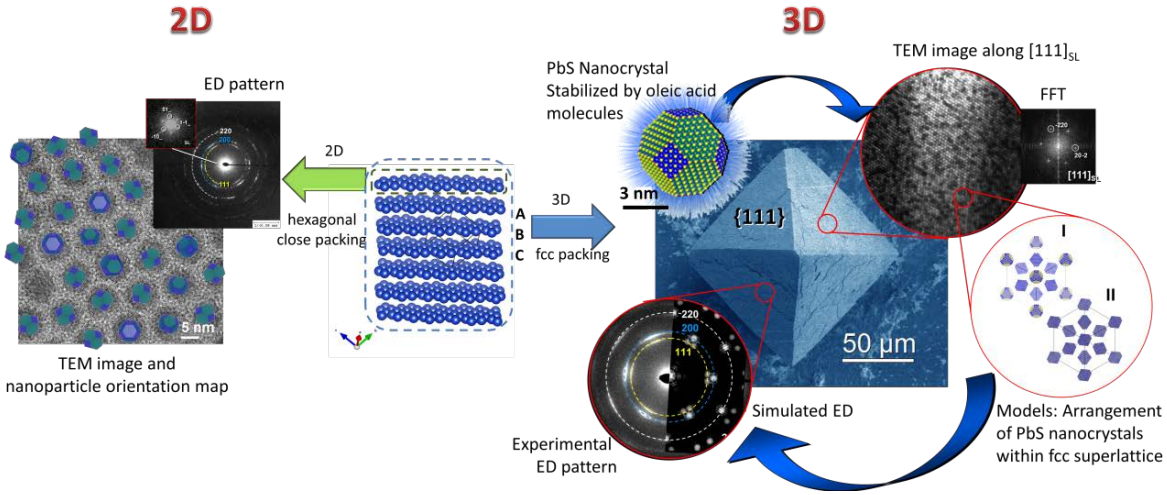


Fig. 1
Short summary of experimental observations and results of simulations on 2D and 3D PbS-organic mesocrystals:

One of our recent examples is the detailed structural characterization of facetted 3D PbS-mesocrystals and 2D PbS nanoparticle self-assemblies [2, 3]. Several steps of structural characterization of the PbS nanoparticle self-assemblies were performed on different length scales using XRD, a complex of electron microscopy techniques and atomistic simulations. The results of our investigations are summarized in Fig. 1. The 3D mesocrystals (Fig. 1 right) are characterized by the long-range translational order of the nanoparticles within an *fcc* superlattice combined with preferred crystallographic orientation of the truncated octahedrally shaped PbS-cores of the nanoparticles (stabilized by oleic acid) leading to short range ordering[2]. Systematic analyses of the orientational relationships between the PbS nanocrystals within the *fcc* supperlattice array indicate that the nanoparticles have a tendency towards face-to-face interactions within each closed-packed layer (resulting in a $[111]_{SL}$ || $[110]_{PbS}$ crystallographic orientational relation), while allowing for a certain degree of orientational mismatch. Furthermore, it recently was shown that these structural features are already prearranged in the 2D state (hexagonal close packed layer) of nanoparticle self-assemblies (Fig.1, left)[3]. Interestingly, it was observed that within a 2D array, some of the PbS nanocrystals are interconnected by nanobridges, which are partially mineralized by PbS. This finding opens up the opportunity to create 2D and 3D self-assemblies of interconnected nanoparticles (e.g. using careful annealing, plasma treatment, etc). This type of isolated but still interconnected structure formed by the inorganic bridges, represents an ideal “isolated but connected” structure that preserves the effects of quantum confinement present within the individual nanoparticles, while at the same time having the potential to provide high electron mobility throughout the extended structure.

[1] *L. Bergström, E. V. Sturm (née Rosseeva), G. Salazar Alvarez, H. Cölfen. Mesocrystals in biominerals and colloidal arrays. Accounts of Chemical Research 2015, accepted*
[2] *P. Simon, E. Rosseeva, I. A.Baburin, L. Liebscher, S.G.Hickey, R. Cardoso-Gil, A Eychmuller, R. Kniep, W. Carrillo-Cabrera, PbS-Organic Mesocrystals: The Relationship between Nanocrystal Orientation and Superlattice Array. Angew. Chem. Int. Ed. 2012, 51(43), 10776*
[3] *P. Simon*, L. Bahrig , I. A. Baburin, P. Formanek, F. Röder, J. Sickmann, S. G. Hickey, A. Eychmüller, H. Lichte, R. Kniep, E. Rosseeva*, Interconnection of Nanoparticles within 2D Superlattices of PbS/ Oleic Acid Thin Films. Adv. Mater. 2014, 26(19), 3042*

All along the watchtower

Antonio Rotolo, Department of History and Sociology

2014 was a year of fundamental change in my career and research: I concluded my former research project on medieval Sicily and began a fresh, new project: *The Fortress Island. Archaeology of Watchtowers in Sicily (13th-19th centuries)*. I am still working at the publication of a book and three papers on medieval archaeology in Sicily, but am thrilled about the new project.
Sicilian history can be largely contained in the study of its dichotomic relationship with the sea, which is sometimes a means of prosperity, and at other times a source of threat. A relationship of this kind between the island and the sea becomes tangible along its coastlines, which are a multilayered landscape of cities, harbors, villages, watchtowers, landscape and history along 1,000 km of coastline.
The defense of the coastlines is a recurring theme connecting the prehistoric fortified villages from the Aeolian Islands, the Greek colonization, the Eurialo Castle of Syracuse, the watchtowers of Camilliani, the Second World War coastal bunkers and Operation Mare Nostrum.

Fig. 1
The *garitta* (watchtower) of Santa Tecla (Catania) built between 1600 and 1650.

The increasing number of coastal raids (mainly by Barbary pirates) from the 14th to 17th centuries created a climate of constant threat for the population all along Mediterranean shores. Such hazards were mainly prevented by protecting the coastlines with watchtowers. In Sicily, building activity became feverish during the second half of the 16th century. Under the reign of King Philip II of Spain, an extensive architectural program radically transformed the coastal landscape of the Island with the construction of some 120 new towers and the restoration of old ones.
These towers are a unique heritage of the period — the total number amounts to more than 250 — and they are virtually almost unexplored archaeologically.
The project aims to understand the watchtower system from a diachronic perspective in order to draw conclusions about the development and transformation of the network, its functions and its relationship to the landscape with which it interacted. Each tower served as a node in the network, which was created for the purpose of guarding and defending the landscape, allowing a flow of information, supplies and forces within the network, but also to and from inland areas.
The tremendous volume of archival, historical, archaeological and geographical data involved requires rigorous management with a database management system, and the data processing requires the broad use of quantitative and qualitative methods as well as GIS-based spatial analyses of visibility, mobility, networks and ballistics.
Thanks to this study, a renewed appreciation of the Modern period coastal military defense system will shed new light on several aspects of Sicilian history, particularly landscape organization, material culture and social processes, within the framework of the Modern period in the Mediterranean, and the relationships that Sicily established with other Mediterranean regions.
The project also aims to create a webGIS that will enable users to visit the shores of the island and access comprehensive information on each tower. Stay tuned for updates!

Economic policy uncertainty and real economic activity

Paraskevi Salamaliki, Department of Economics

Economic policy uncertainty and its role in macroeconomic performance has been intensely discussed in recent years, taking off after the work of Bloom (2009), especially after the Great Recession, and throughout the subsequent "not-so-great" or slow recovery. Policy-related economic uncertainty was considered to be at historically high levels during these years, both in the US and in Europe, while evidence arises that correlates increased policy uncertainty with the observed slow recovery of the US economy (Baker, Bloom and Davis 2012; Baker, Bloom and Davis 2013).

One of my research projects during the year 2014 focuses on the effects of economic policy uncertainty (EPU) on US real economic aggregates, such as output (proxied by industrial production) and employment. The EPU index we employ is presented in Figure 1 and was recently constructed by Baker, Bloom and Davis (2013). This index is considered to be a measure (proxy) of movements in policy-related economic uncertainty over time, while the EPU index, by nature, might be related to uncertainty about fiscal, monetary or regulatory conditions.

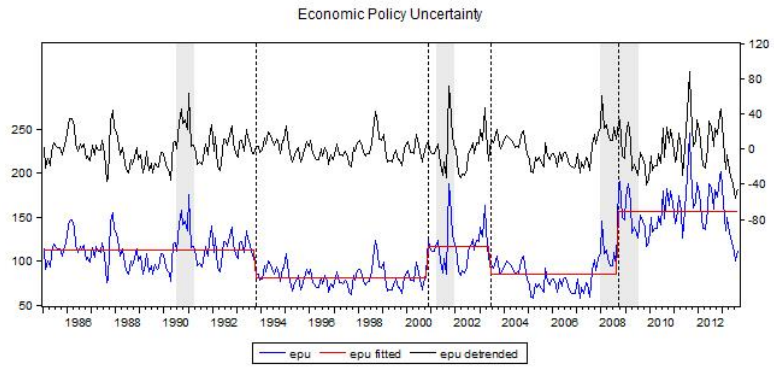


Fig. 1
Economic policy uncertainty index 1985m1 – 2013m8 (Baker, Bloom, Davis 2013). Estimated structural shifts (break points) are shown as vertical dashed lines. U.S. NBER recession periods are marked by shaded areas. The fitted trend function is obtained by regressing the series on a constant and intercept shift dummies.

In our analysis, we employ a vector autoregressive (VAR) model and a multiple-horizon Granger causality testing procedure, and we focus on the (in-sample) predictive ability of EPU for macroeconomic aggregates. The multiple-horizon causality concept can reveal additional information on multiple causal channels or the presence of causal chains and causation delays among the system variables. We further focus on the role of structural shifts – which represent infrequent changes in economic fundamentals or changes to the general economic environment (e.g. changes in fiscal or monetary conditions, labor market conditions etc.) – when estimating reduced-form VAR models. The relevant literature has shown that the non-modeling of "rare" events that still affect the long-run part of the time series might lead to inconsistent VAR estimates, and it can cause Granger causality tests to over-reject the null hypothesis of non-causality. Our analysis is further enriched by the estimation of dynamic responses of key macro variables to innovations in EPU.

Does economic policy uncertainty help to predict output and employment? Do industrial production, employment or economic policy uncertainty present infrequent structural changes that should be modeled as part of the deterministic component? Does non-modeling of such shifts affect the predictive ability of the system variables? These are some of the research questions we examine in this research project.

[1] *Bloom N. 2009. The impact of uncertainty shocks. Econometrica 77(3): 623--685.*
[2] *Baker SR, Bloom N and Davis SJ. 2012. Has Economic Policy Uncertainty Hampered the Recovery?. Chapter 3, in L.E. Ohanian, J.B. Taylor, and I.J. Wright (Eds.), "Government Policies and the Delayed Economic Recovery". Hoover Press, Hoover Institution, Stanford University.*
[3] *Baker SR, Bloom N, Davis SJ. 2013. Measuring Economic Policy Uncertainty. Stanford and Chicago, Unpublished manuscript, Stanford University*

Brazilian propaganda: Legitimizing an authoritarian regime

Nina Schneider, Department of History and Sociology

My most important publication in 2014 was my first book: *Brazilian Propaganda: Legitimizing an Authoritarian Regime* (Gainesville: University Press of Florida, 2014). Based on my PhD thesis and supported by the Arts and Humanities Research Council (AHRC), the University of Essex, and the Zukunftskolleg, *Brazilian Propaganda* examines the various channels of official and unofficial propaganda during the authoritarian regime in Brazil. While numerous studies have examined censorship and cultural resistance in authoritarian Latin America, the official propaganda of the Cold War period remains understudied. With regard to Brazil in particular, the book is the first study in the English language and the only comprehensive study, ranging from the intentions of the propagandists to the reception of the regime's campaigns.

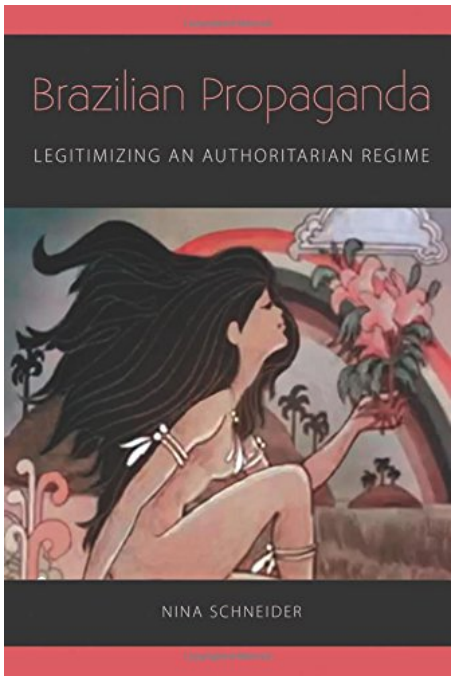


Fig. 1
Brazilian Propaganda is the result of nine years of research.

The lack of secondary literature was a major challenge, as I had to enter entirely new territory. I spent approximately two years of my PhD just locating sources: films and documents from the National Archives in Rio, intelligence files from the National Archives in Brasilia (at the time recently disclosed documents), and documents from private archives. I conducted a dozen oral history interviews with the five key propaganda officials. Some of them have meanwhile passed away, while others are in their nineties.

Dictatorial propaganda is commonly believed to be political, praising military figures and openly legitimizing state repression. However, I found that Brazil's military dictatorship (1964–1985) launched seemingly apolitical, official campaigns that were aesthetically appealing and ostensibly aimed to "enlighten" and "civilize." Some were produced as civilian-military collaborations and others conducted by privately owned media, but underlying them all was the theme of a country aspiring to become a developed nation. Focusing primarily on visual media, I demonstrate how many short films of the period perpetuated the so-called economic miracle, while hiding class and race frictions. These films espoused "civic-mindedness" while attempting to distract from atrocities perpetrated by the regime.

My book challenges the notion of a homogeneous military regime in Brazil, highlighting its factions and competing forces. It also discusses the polemic question of varying degrees of responsibility and collaboration. Dovetailing with the values of the Zukunftskolleg, the book is highly interdisciplinary, based on a novel research approach (sources, methods), and it is "risky," in the sense that it tries to strengthen a field of study that is under-researched in Germany (Brazil). My next step will be to find a Brazilian publisher and to publish the book in the Portuguese language in order to enter into a dialog with Brazilian scholars.

From 2012 to 2014, Nina Schneider was a Marie Curie Postdoctoral Fellow and she maintains her ties to the Zukunftskolleg as an Associate Fellow. Currently she is a Visiting Scholar at the National University of Brasília (UNB) pursuing a research project funded by the German Research Foundation (DFG).

Explaining and predicting large-scale violence in civil conflicts

Sebastian Schutte, Department of Politics and Public Administration

The different fates of the "Arab Spring" uprisings remind us that episodes of political violence are difficult to predict or extrapolate from. Initially peaceful protests can evolve into violent insurgencies or ethnic civil conflicts, and government repression can escalate into all-out civil war. Such escalations often lead to civilian casualties in the tens or even hundreds of thousands. Therefore, it is important to better understand and ultimately be able to predict escalations of ongoing conflicts, but also to identify countries ahead of time that could be affected by large-scale civil wars.

We are currently getting closer to understanding the escalatory dynamics in civil conflicts and protest movements through event data. Such data code the exact timing and geographic location of conflict events as well as additional information regarding the type and severity of the incident. Last year, I published an article in collaboration with Karsten Donnay in *Political Geography* in which we described a novel geo-statistical technique for analyzing how certain types of events cause reactive events in their vicinity. In empirical applications drawing on the WikiLeaks data from Iraq, we found that violence against civilians leads to increased collaboration with the enemy of the perpetrator.

While this result does not fully explain why certain civil conflicts escalate while others do not, we believe that the statistical technique and our freely available software will help researchers to get a better understanding of how conflicts escalate when and where they do.

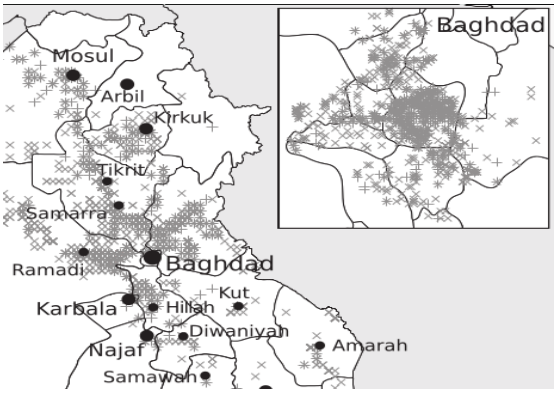


Fig. 1
Conflict even data for northern and central Iraq 2004-2010. Such data give unprecedented insights into the micro-dynamics of conflicts.

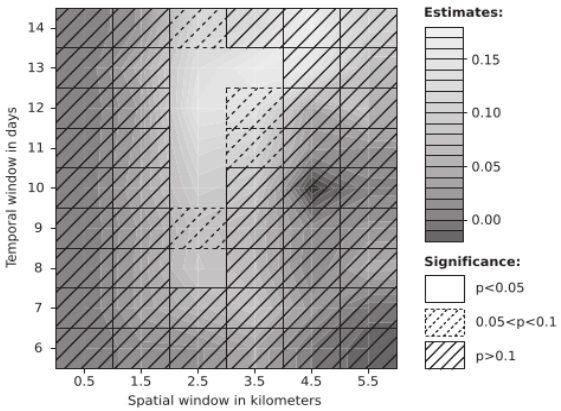


Fig. 2
Quantitative results from the Iraq analysis. The figure shows that collaboration with US forces increases at certain spatial and temporal distances from indiscriminate insurgent attacks

For my current research at the Zukunftskolleg, I am developing an electronic survey system that can be used for public option research in unstable environments. I hope to be able to interview thousands of respondents in low-level conflict environments to get a better understanding of how hostilities emerge that can lead to identity-based conflicts, such as ethnic and religious civil wars. A prototype of the system is currently being tested in India.

[1] *For details see "Matched wake analysis: Finding causal relationships in spatiotemporal event data"; in: Political Geography (41) pages 1-10, 2014: http://www.sciencedirect.com/science/article/pii/S0962629814000262t*

Quantum interference: Symmetry breaking

Denis Seletskiy, Department of Physics

Classical wave mechanics, used for example to describe surface waves on a pond, is governed by the principle of interference, where positive and negative crests of different waves can either add together to produce constructive interference or cancel each other destructively. One of the central pillars of quantum mechanics is the realization that all matter in fact possesses wave-like properties and therefore can interfere, even with itself. This was famously used by Richard Feynman to construct the celebrated theory of quantum electrodynamics [1]. Feynman's main principle is based on the recognition that quantum trajectories are defined by the constructive interference of all possible pathways which a quantum "wave-like" object can take (Figure 1a). In connection with these ideas, the experiment we pursued here is based on utilizing quantum interference to inject electrical current into a semiconductor without any electrical contacts. In short, we can produce mobile electrons in a semiconductor by irradiating it with light of either frequency ω (one photon absorption, 1PA) or $\omega/2$ (2PA), provided ω is higher than the characteristic band-gap frequency of that semiconductor. The electrons generated by either of these processes will not produce current, unless we apply a voltage to a semiconductor. In other words, to induce charge current, we have to break the spatial symmetry by introducing a preferential direction in space for electrons to move. What happens when we irradiate the semiconductor with both frequencies at once? As per Feynman, electrons now are generated via two independent pathways (1PA and 2PA) and therefore quantum interference (QI) is induced. Surprisingly, with proper timing of ω and $\omega/2$, QI is manifested in the production of current *without any external bias*! The required symmetry break is now accomplished by the light-field itself. The asymmetry can be visualized by comparing the amplitude maxima and minima of the combined electric field of (ω + $\omega/2$), as shown in Fig 1b. The asymmetry can be nullified or reversed simply by changing the timing between the pulses at two different frequencies.

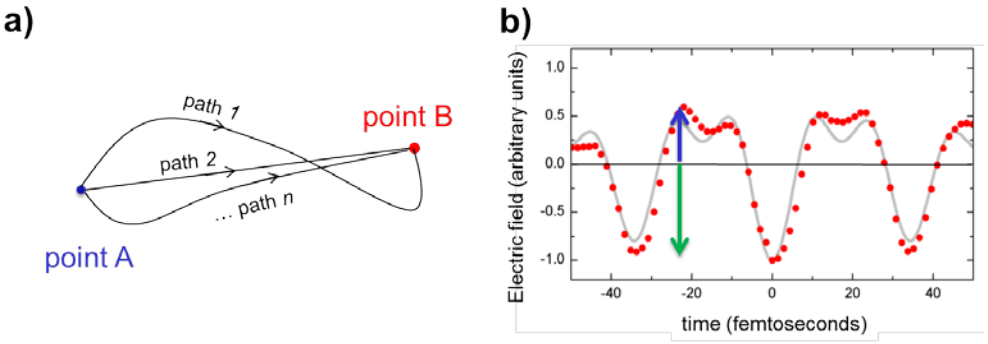


Fig. 1
a) Quantum interference of all possible paths (labeled path 1, 2.. n) dictates trajectory of a microscopic particle taken between points A and B. **b)** Measured (dots) and calculated (line) electric field profile of a symmetry-broken composite light pulse, derived a combination of ω and ω/2 spectral components at an appropriate temporal delay between the two. The asymmetry in the polarity of the total electric field is indicated by the blue and green arrows. The difference in polarity can be nullified or reversed by changes in the aforementioned temporal delay (not shown).

Together with two PhD students from the Department of Physics and the University of Konstanz, we have measured and controlled injected current via quantum interference in an indium antimonide (InSb) semiconductor for the first time. The work was conducted in the ELBE facility (Center for High-Power Radiation Sources) at the Helmoltz Center in Dresden-Rossendorf. We verified earlier predictions of high efficiency in the production of QI current in InSb, which could be used in the future for efficient all-optical (contactless) injection and fast control of electrical currents in nano-devices. In addition, there appear to be fundamental connections between quantum interference and symmetry. With funding from the Zukunftskolleg, the Baden-Württemberg Ministry of Science, Research and the Arts ("RiSC" project: "Quantum Analysis and Control of Vacuum Field on Sub-Cycle Timescales") and the Baden Württemberg Foundation ("Elite program" project: "Ultrafast Spectroscopy of Laser Cooling Cycle in Bulk and Nanoscale Solids"), my junior research group aims to address questions like these, in the general investigation of quantum aspects of ultrafast light-matter interaction with practical applications.

[1] *Richard P. Feynman, "QED: The Strange Theory of Light and Matter", Princeton Univ. Press (1988), ISBN-10: 0691024170*

An interactive framework for insect tracking

Minmin Shen, Department of Computer and Information Science

Extracting insect motion trajectories is an important prerequisite in many behavioral studies. Despite great efforts to design efficient automatic tracking algorithms, tracking errors are unavoidable. In this paper, we propose general principles that help to minimize human effort for accurate multi-target tracking, with applications in tracking the antennae and mouthparts of a honey bee from a set of low-frame-rate videos. This interactive framework estimates key frames for user correction, which are used for 1) incrementally learning an object classifier and 2) data association based tracking (DAT). We apply this framework with a standard classification algorithm (i.e. naive Bayesian classification) and an association optimization algorithm (i.e. Hungarian algorithm). Our choice of base tracker is the DAT algorithm proposed in [2]. In theory, any DAT approach is applicable in our framework. The precision of tracking results by our framework on real-world video data is above 98% [1].

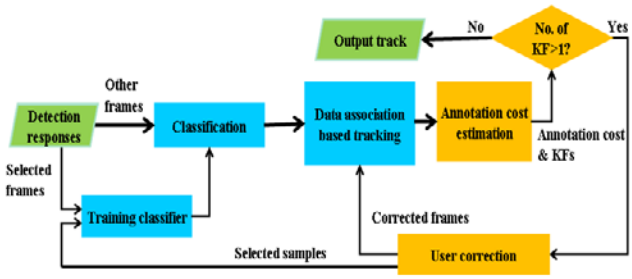


Fig. 1
Flowchart of the proposed tracking framework

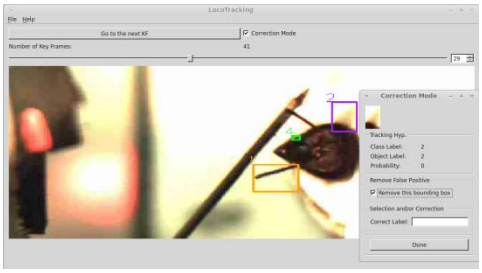


Fig. 2
Graphical User Interface for user interaction

We highlight our contribution in this work as follows:

1. We suggest interactive tracking instead of a “track-and-then-rectification” approach for acquiring accurate video annotations for further analysis. We show how this framework works with data association techniques to fulfill multi-target tracking, which can be extended by exploiting more advanced techniques. The principle of interactive tracking and user annotation presented in this paper is applicable for other DAT algorithms.

2. We construct an approach for measuring annotation cost and estimate the key frames which require user annotation for correcting the tracking hypothesis. It defines the annotation cost as a function of uncertainty, enabling users to achieve a trade-off between performance and human effort.

3. Specifically, we apply this framework with standard classification and data association techniques to track individual bee antennae and mouthparts. This is an appropriate example application, because it required us to manage the problems of long tracking gaps, similar appearance of the targets and identity switching of targets.

[1] *"Interactive Framework for Insect Tracking with Active Learning", in: “IEEE International Conference on Pattern Recognition”, 2013, p. 2733-2738, DOI:10.1109/ICPR.2014.471, published: Aug. 24-28, 2014.*
[2] *“Automated Tracking and Analysis of Behavior in Restrained Insects”; in "Journal of Neuroscience Methods", 2015, 15 (239), p. 194-205, doi: 10.1016/j.jneumeth.2014.10.021. Jan. 2015.*
Invited Talks about the work:
[3] *IEEE International Conference on Pattern Recognition, “Interactive Framework for Insect Tracking with Active Learning", Aug. 24-28, 2014, Stockholm, Sweden.*
[4] *Shenzhen Institute of Advanced Technology, Visual Computing Research Center, An interactive framework for insect tracking, July 24-31, 2014, Shenzhen, China.*

The politics of portfolio design in Germany

Ulrich Sieberer, Department of Politics and Public Administration

Government ministries play a crucial role in policy-making from the early stages of formulating draft bills to the final implementation of new laws. Thus it is not surprising that the distribution of ministries is one of the most disputed and also most-analyzed aspects of government formation, especially in coalition cabinets consisting of multiple parties with at least partly diverging policy goals. Most research on the distribution of ministries treats ministries or "portfolios" as fixed entities. However, the number, size and responsibilities of ministries are not exogenously given; rather they can be changed during the process of cabinet formation. The formation of the current German cabinet in 2013 provides a good example since competencies for energy, consumer protection and public infrastructure were massively rearranged between several ministries. Given the centrality of ministries, such changes in portfolio design are likely to influence policy-making processes and ultimately public policy: Energy policy should look different if designed by a ministry with primary responsibility for economic affairs, instead of a ministry of the environment.

My new research project, "The Politics of Portfolio Design" (currently funded by the Young Scholar Fund at the University of Konstanz), pursues the first systematic analysis of the politics of portfolio design in the Federal Republic of Germany since 1949. The project maps the development of cabinet portfolios, i.e. the creation, merger and abolition of ministries as well as all shifts in jurisdictions between them; develops a rational choice theoretical explanation for such reforms and assesses the effects of portfolio design on policy processes and outcomes. Here, I present core findings of an initial article that analyzes all changes in ministerial jurisdictions since 1957. The article conceptualizes reforms of portfolio design as the outcome of a distributive conflict between coalition partners during coalition formation and investigates which ministries profit from such reforms.

Fig. 1
Names and main jurisdictions of the German and Federal Ministry for Economics, 1949-2015.

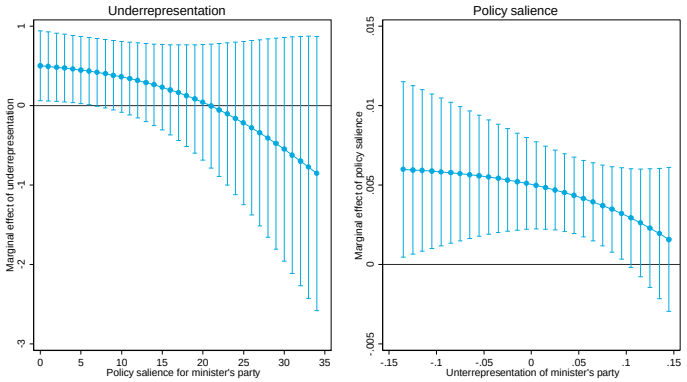


Fig. 2
Marginal effects of the underrepresentation of the minister's party salience of the ministry's policy to the minister's party on the likelihood that a portfolio is strengthened.

The analysis shows that changes in portfolio design are much more frequent than usually assumed: Since 1957, there have been 39 reforms that affected on average three and up to nine ministries each. Some ministries, such as the Ministry for Economics (**Fig. 1**) and the Ministry of Family Affairs, repeatedly gained and lost responsibilities for large policy fields, whereas others, like the Foreign Office, were more stable. Statistical analysis shows that ministries held by parties that are quantitatively underrepresented in the cabinet (compared to their parliamentary seat shares) and that are central for the policy agenda of the minister's party, i.e. enjoy high policy salience, are significantly more likely to profit from such reforms. Furthermore, underrepresented parties are compensated by strengthening low-salience portfolios (**Fig. 2**). Party leaders are not systematically more successful in strengthening their portfolios than other ministers, notwithstanding the prominent examples of Oskar Lafontaine and Sigmar Gabriel taking over massively strengthened ministries. Overall, the findings support the idea that parties bargain about and strategically design cabinet portfolios during coalition formation based on their policy priorities and their aim to maximize office benefits for their party.

[1] *Original Publication: Ulrich Sieberer, 2015, Die Politik des Ressortzuschnitts zwischen Koalitionsarithmetik und thematischer Profilierung. Eine koalitionspolitische Erklärung für Kompetenzänderungen der Bundesministerien, 1957-2013, Politische Vierteljahresschrift 56 (1).*

More than human history

Aline Steinbrecher, Department of History and Sociology

My research seeks to expand our understanding of history by refusing to limit it to the human species. It questions further our understanding of history, and its separation from natural history. Considering animals as beings with an influence on historical development leads us to (re)write a new history of animals and of people. This (re)writing arises from a thorough (re)-interpretation of sources as well as a theoretical and methodological (re)organization of the role of animals. Empirically my research focuses on the dog-human relationship in the early modern period.
One of my aims is to establish international animal studies, and particularly animal history, in the German-speaking region. In 2014, together with Clemens Wischermann (Konstanz, Department of History) and Gesine Krüger (Zürich, Department of History), I therefore edited the volume: "Tiere und Geschichte." For a discussion of the articles, we invited the authors to a workshop at the Zukunftskolleg.

Fig. 1
Edited volume: "Tiere und Geschichte."
Konturen einer Animate History."

Fig. 2
"Wildlife Selfies" for National Geographic.
Silvio Medeiros and Diomedia Brasil
http://cargocollective.com/silviomedeiros/Diomedia-NatGeo (01.10.2014)

My own article in this volume is on "animal and space" (Tiere und Raum. Verortung von Hunden im städtischen Raum der Vormoderne). I argue that viewing animal history as spatial history makes possible a stronger "placing" of animals, enabling an analysis of their visibility and invisibility as well as contributing to the agency debate. Through the "spatial mapping of human-animal relationships," the diminished physical presence of animals in the social world can be considered. The concept of space as the "instant of the social" addresses the methodological problem of the difference in language and communication from human to animal from a new angle. Through their physical presence in a room alone, animals can thus be understood as social actors.

Fig. 3
A city full of animals. "Prospect von dem Schottenplatz", Vienna 1838

NeoHelp – A new tool for investigating the development of help-related content perception and processing

Margarita Stolarova and research group, Department of Psychology

In the past year we have developed and tested an innovative research tool: the NeoHelp picture set. It is available to researchers across the world through open-access publishing. NeoHelp creates possibilities for the investigation of help-related content perception and processing across the life span with both clinical and normative populations. The NeoHelp visual stimuli (see Fig. 1 for examples of each picture variation) can be employed both in behavioral and psychophysiological studies to further our understanding of prosocial development and action in the face of trivial need-of-help.

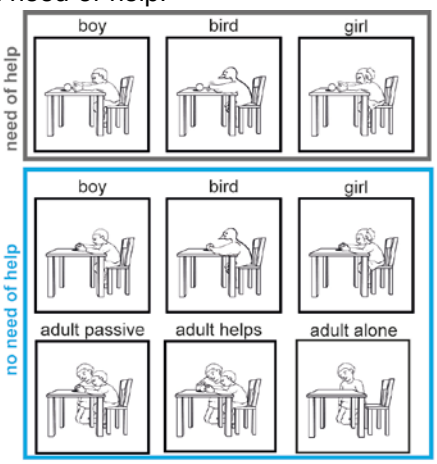


Fig. 1
Examples of the NeoHelp-pictures for all currently available variations.

So far we have used the NeoHelp picture set for data collection in seven studies with children and adults, investigating different aspects of social perception, such as need-of-help recognition and categorization in children with and without autism spectrum disorder, affective evaluation of need and the influence of help-related-content and social context on gender perception.

Completed data analyses provide evidence that children reliably identify need-of-help in our abstract black-and-white drawings[1]. This ability is modulated by the age and the gender of the participants: Younger girls identified need-of-help content more accurately than boys of the same age and performed at a level comparable to that exhibited by older girls[2].

The results of additional data analyses suggest that one important and early developing aspect of the perception of trivial need-of-help is the subjective emotional experience elicited by the relevant stimuli. In two large studies (*N*=242 and *N*=77), we found that undergraduate students[3] as well as children[4] experience greater unhappiness and higher arousal when looking at pictures of someone needing help compared to almost identical picture variations in which the need is resolved (Fig. 2). This affective response to perceptually highly similar, somewhat abstract depictions of need and resolved need likely play an important role in developing and motivating prosocial action from an early age on.

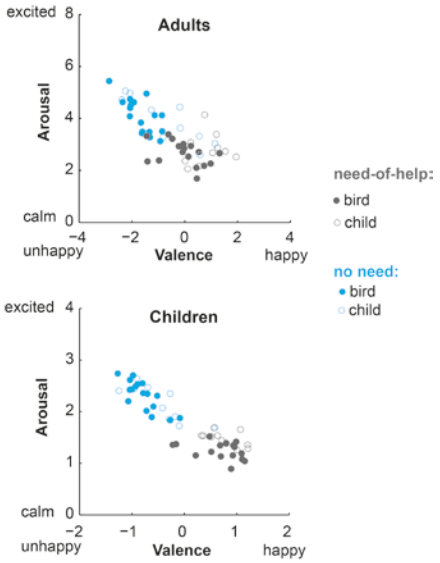


Fig. 2
Relation between valence and arousal ratings provided by adults (top) and children (bottom) in response to depictions of need (gray) and resolved need (blue).

Future studies employing the NeoHelp stimulus set and its extensions will help clarify the relation between need-of-help recognition, affective response, prosocial motivation and action by investigating perceptual, cognitive, emotional, social and motivational aspects of need-of-help processing across the life span.

[1] *Stolarova, M. & Brielmann, A. A. "Does anyone need help? Age and gender effects on children's ability to recognize need-of-help", in: "Frontiers in psychology – Developmental Psychology", 2014, 5.*
[2] *Brielmann, A. A.& Stolarova, M. "A New Standardized Stimulus Set for Studying Need-of-Help Recognition (NeoHelp)", in: "PloS one", 2014, 9(1), e84373."*
[3] *Brielmann, A. A.& Stolarova, M. "Does it matter how you ask? Self-reported emotions to need-of-help and social context depictions", in: "BMC Psychology", in press.*
[4] *Stolarova, M. & Brielmann, A. A. "Feeling the need of others – children's subjective emotional ratings of pictures showing everyday need-of-help.", in: "Child Development", under review*

Chemical epigenetics

Daniel Summerer, Department of Chemistry

Expanding the Programmability of DNA Recognition

An adult human consists of more than 200 different cell types. All these cells essentially contain the same genomes. Their different characteristics are determined by the regulation of gene expression. How the transcription of genes is controlled by epigenetic mechanisms, and how this process can be explored and influenced, is Daniel Summerer's field of research. The Summerer Group develops chemical-biological tools which make it possible to study epigenetic mechanisms, but which also hold potential to be directly applicable in diagnostics and treatments.

Through the molecular modification of so-called TALEs (transcription-activator-like effectors), Daniel Summerer succeeded in constructing receptors with an expanded programmability of DNA recognition. Not only are these capable of identifying the canonical DNA bases A, T, G and C, but they can also identify epigenetically modified DNA bases. In other words, these TALEs can be "programmed" to selectively identify random DNA sequences, as well as to detect the content of 5-methylcytosine (mC) or 5-hydroxymethylcytosine (hmC) within each sequence. This opens the door to a completely new and extremely simple analysis technique for epigenetic DNA modifications. Summerer's method is particularly relevant when it comes to cancer research, as mC and hmC are important biomarkers for cancer tissue. The research carried out by the Summerer Group thus has great potential, not only for basic epigenetic research, but also for developing simplified analysis techniques for cancer tissue.

"We combine approaches of chemical biology and genomics to gain new insights into epigenetic mechanisms of transcriptional regulation – and to open up new doors in the diagnosis and treatment of cancer."

[1] *G. Kubik, S. Batke and D. Summerer*, Programmable sensors of 5-hydroxymethylcytosine, J. Am. Chem. Soc., 2015, 137, 2-5*

[2] *G. Kubik and D. Summerer*, Achieving single nucleotide resolution of 5-methylcytosine detection with TALEs, ChemBioChem, 2015, 16, 228-31*

[3] *G. Kubik, M. J. Schmidt, J. E. Penner and D. Summerer*, Programmable and highly resolved in vitro detection of genomic 5-methylcytosine by TALEs, Angew. Chem. Int. Ed., 2014, 53, 6002-6*

Scientific retreat: Electoral competition in the democratizing multinational Habsburg Empire (July 21-22, 2014)

Edina Szöcsik, Department of Politics and Public Administration

Together with Philip J. Howe (Adrian College, MI) and Christina Zuber (University of Bremen), I organized a scientific retreat at the Zukunftskolleg to kick-off a new research project on the mobilization of ethnonational identity categories through electoral competition in the Habsburg Empire. The retreat enabled us to discuss the theoretical concepts and empirical approach of our project, for which we aim to submit a research grant application to the German Research Foundation.

The main goal of the project is to analyze how ethnonational identity interacts with other social identity categories and influences the patterns of electoral competition. The objective of our study is to explain the success and the positioning of parties that sought to represent ethnonational groups in the "Austrian" half of the Austro-Hungarian Monarchy ("Cisleithania"), which today corresponds to parts of Eastern, Central, and Southeastern Europe. This case provides an excellent opportunity to examine the effects of ethnonational divisions on political behavior in a variety of institutional and demographic contexts, since it gradually implemented universal manhood suffrage between 1885 –1911, and was characterized by extreme ethno-national heterogeneity. In addition, ethnonational identity categories were only a few among other politicized social identity categories, such as class and religion, that influenced the outcomes of electoral competition.

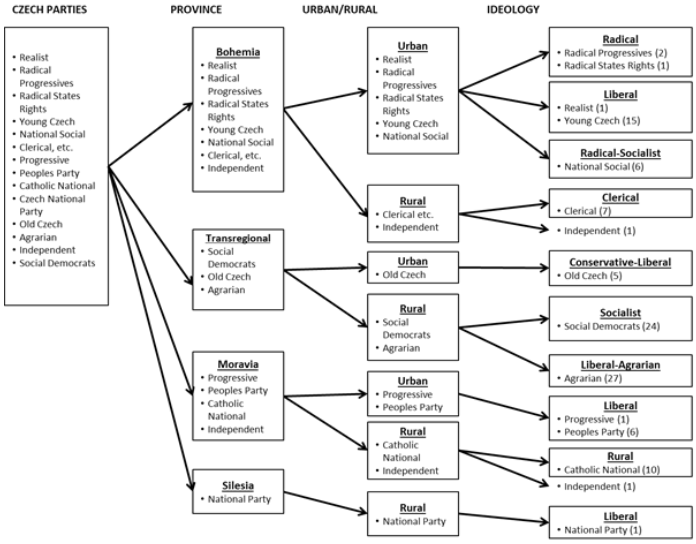


Fig. 1
Classification of Czech Party Cleavages (1907) as presented in the study of Howe (2010: 187)[1]
Notes: All parties received mandates in "Czech" districts. Province = province(s) in which party was elected. Urban/Rural = whether a greater number of mandates was from urban or rural districts. Ideology = party's ideological camp; (#) indicates total number of seats won by that party.

The quantitative analysis of electoral politics during democratization using historical cases represents a new research field in political science. Analyzing historical cases from a social science perspective enhances our understanding of current democratization processes and also emphasizes the historical constraints that current democratization processes face. While ethnic identity categories played a central role in electoral politics in the Habsburg Empire, they were politically irrelevant during the communist regimes. After the break-down of the communist regimes, ethnicity again became an important electoral cleavage in the Habsburg successor states. Our project therefore helps to shed light on the questions of whether and how pre-communist legacies, such as ethnicity, shape today´s electoral politics in eastern Central Europe.

[1] *Philip J. Howe (2010) Electoral Institutions and Ethnic Group Politics in Austria, 1867–1914, Nationalism and Ethnic Politics, 16:2, 164-191, DOI: 10.1080/13537113.2010.490749*

Mathematical exchange by the bay

Margaret Thomas, Department of Mathematics

During the Spring Semester (January – May) 2014, I held a Postdoctoral Fellowship of the Mathematical Sciences Research Institute in Berkeley, California, USA and, while there, participated in the MSRI Scientific Programme on 'Model Theory, Arithmetic Geometry and Number Theory'. As one of only seven postdoctoral researchers worldwide selected to participate in the programme, this gave me an excellent opportunity to interact extensively with senior experts and junior researchers in my research field of o-minimality and its applications to diophantine geometry.

The research semester primarily explored the various interactions between model theory and other mathematical disciplines through workshops, several weekly seminar series and regular informal discussions between groups of participants. I was fortunate enough to be able both to contribute to and to benefit from them in numerous ways. For example, during the Introductory Workshop held at the outset of the programme, I was invited to give a tutorial for all participants on the seminal counting theorem of Pila and Wilkie[1], an extremely important result in the field that has led in recent years to a productive new type of interaction between the areas brought together by this programme. This result made a breakthrough connection between o-minimality (an area of mathematics at the junction of model theory and real geometry) and diophantine geometry (a part of number theory centred on finding whole-number or fractional solutions to equations). The Pila—Wilkie Theorem provides an upper bound on the number of points with fractional coordinates lying on certain 'o-minimal' sets (which can be thought of as a collection of geometric objects with simple descriptions and highly advantageous properties). This bound has already been applied to prove several significant open conjectures in number theory, and one of the programme's aims was to explore this interaction further.

My own research lies at the heart of this interaction, and I had many opportunities to discuss my results and current work in progress while at the MSRI. I presented one recent paper[2] – which was finalized for publication during the semester and gives good bounds on the number of fractional points on graphs of Weierstrass zeta functions (complex functions which play an important role in number theory) – during a special 'Connections for Women' workshop. This event gave female researchers a chance to network and hear panel discussions on issues particularly affecting young women in mathematics. In addition, I gave an overview of my research as part of the MSRI Postdoc Seminar. This cross-disciplinary series, for which I was also a co-organizer, gave all postdocs in both concurrent MSRI Scientific Programmes a rare forum to present their work to a general mathematical audience. Other ongoing work of mine, in particular that related to my DFG project 'Parameterization and Algebraic Points in O-Minimal Structures', and the subproject of my PhD student Derya Çıray (who participated as a Programme Associate), also profited greatly from numerous informal discussions during the semester. Moreover, the seeds of several potential new collaborations were sown at the MSRI. The benefits of participating in this programme will undoubtedly last long into the future.

Fig. 1
The dramatic and inspiring setting of the Mathematical Sciences Research Institute in Berkeley, California, USA.

[1] *"The rational points of a definable set" (J. Pila and A. J. Wilkie); in "Duke Math. J." 133 (2006) 591–616.*
[2] *"Rational values of Weierstrass zeta functions" (with G. O. Jones); in "Proc. Edinburgh Math. Soc." (to appear)*

Bringing brains in line

Andreas Thum, Department of Biology

How is behavior output organized within the brain based on external sensory inputs, internal motivational states or even knowledge gained through prior experience? Understanding these processes is the most essential issue in the field of neuroscience. For centuries, researchers in the functional brain sciences have been mapping properties of behavior to areas of the brain. However a mechanistic understanding of the brain requires more than limited insights. It requires a firm idea of how the brain works as a whole. Unfortunately, the step from simple maps to a generally accepted model has proven exceedingly difficult. Due to its neuroanatomical complexity, its behavioral inaccessibility and technical limitations, a simple, generally accepted model for the brain still is unavailable even today.

In the last decade, the classical genetic model organism *Drosophila* has acquired an important intermediate position between simple, extremely reduced model organisms (e.g. *C.elegans* or *Aplysia*) that only allow for meaningful comparisons with humans on a constricted level, and more complex vertebrate systems (e.g. mouse, zebra fish) that have ethical and technical constraints and brains comprising millions of neurons. *Drosophila* originally was used as a model organism to provide easy and unbiased access to the genes. Over the last decade, however, there has been a surprising emphasis on the development of genetic tools. Because of these advances, the role of *Drosophila* has evolved from one suited for gene discovery to one offering the opportunity to integrate molecular genetics with systems neuroscience. Today's research thus puts emphasis on the pathways of information flow, information processing and information storage. Accordingly, it was recently possible to map the properties of certain behaviors to small sets of neurons within the brain.

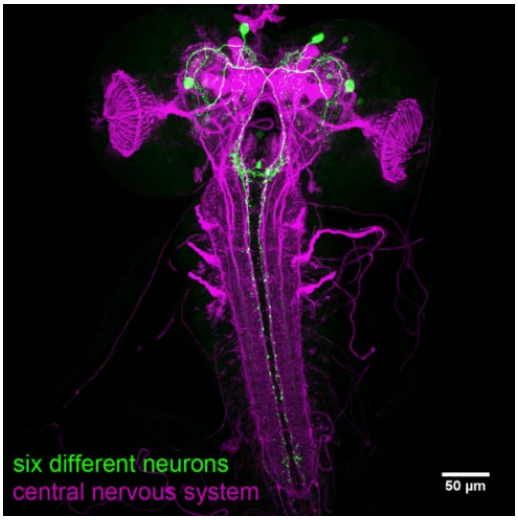


Fig. 1
The illustration shows a frontal view of a larval brain (central nervous system). In magenta is the entire neuropil. Genetically marked and visualized in green are six neurons of the entire set of about 10,000. Thus, by analyzing an extensive set of individually marked neurons in thousands of larval brains, it is possible in principle to reconstruct the entire larval brain at the single-cell level.

Following this logic, I have successfully applied for a Lead Agency grant of the "Deutsche Forschungsgemeinschaft" to establish a 4D reconstruction of the wiring networks of the larval *Drosophila* brain based on the highly specific expression patterns of the recently available, new generation of genetic tools. The larval brain consists of only 10,000 neurons; it develops during embryogenesis within 24 hours, and thus offers a minimalistic, elementary model system that still allows for meaningful comparisons even with humans. Key benefits of the larval system besides its neuronal simplicity, are its considerable behavioral repertoire, the availability of neurogenetic tools and its experimental accessibility.
Accordingly, the project described will support a scientific community that establishes the *Drosophila* larva as a model organism for studying the neuronal basis of naïve behavioral responses, including olfaction, gustation, vision and perception of temperature, but also for analyzing cognitive brain functions like learning and memory. The approach will also offer a complete set of neurogenetic tools to investigate the function of neurons in an entire brain with respect to particular behavioral functions.
Our international and interdisciplinary approach is a joint endeavor of three groups working on different fields in biology and informatics and based in Konstanz, Germany (Thum lab), Aachen, Germany (Merhof lab), and Vienna, Austria (Bühler lab). In addition, the project is supported by the Janelia Farm Research Campus, USA (Dickson lab and Truman lab), which is providing access to thousands of genetic tools and raw data from related larval confocal brain scans.

[1] *Related Links: 1) https://braingazer.org/ 2) http://gepris.dfg.de/gepris/projekt/266382180*

Turning a dissertation into a book

Borbala Zsuzsanna Török, Department of History and Sociology

My PhD dissertation, completed in the field of modern comparative history at Central European University in Budapest several years ago and titled "The Informal Politics of Culture: Transylvanian Learned Societies, Civic Networks and the Formation of the Nation-State, 1790-1914," analyzed the civic and scholarly roots of intertwined German, Hungarian and Romanian nationalisms in my home province of Transylvania. Several years and novel research were required before turning the manuscript into a book, which was made possible by the support of the Zukunftskolleg.

Fig. 1
Titular nations and nationalities in Hungary, 1867-1918.

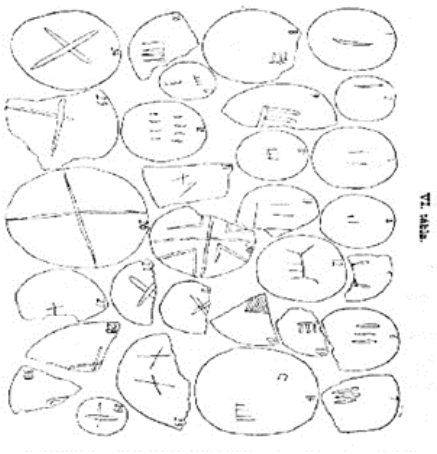


Fig. 2
Sumerian traces in prehistoric Transylvania? Conjectures of the amateur Transylvanian archaeologist Zsófia Torma (1832-1899).

The year of completion was 2014. While virtually rewriting the entire text, a new world opened up to me, whose rules and laws had been hidden before. I discovered a new 'province' in the European Republic of Letters!

In its final format, the book casts its focus on scientific practices, shaped in the framework of Transylvanian learned societies. It demonstrates how an enduring politics of social difference fostered national hierarchies, endemic tensions and centrifugal dynamics within local scholarship. My scrutiny of the scholarly explorations of the Transylvanian 'fatherland,' taking place predominantly in the disciplines of history, ethnography, geography and archaeology, triggered exciting shop talk on the Y building floor with my colleagues in Zukunftskolleg, María Cruz Berrocal (archeologist) and Nina Schneider (historian and political scientist), which ultimately led me to conferences in Lisbon, Konstanz and Cambridge. The national(ist) and imperial(ist) manifestations of scholarship in Transylvania - a Habsburg-Hungarian province prior to World War and attached to the Romanian state in the aftermath of the Trianon Peace Treaty - had to be urgently discussed after office hours first with Anda Lohan, then at the Colloquium of Eastern European Studies led by Professor Bianka Pietrow-Ennker here in Konstanz. In the end, I am proud to announce that the resulting monograph, titled "Exploring Transylvania. Geographies of Knowledge and Entangled Histories of a Multiethnic Province, 1790 – 1914," has been most warmly endorsed by Brill Publishers in Leiden and will be published very soon.

[1] *„Musealization and State-Building in the Eastern Habsburg Realms. The Transylvanian Museum Society, late 19th century – Second World War," Paper presented at the 9th STEP (Science and Technology in the European Periphery) Meeting, Lisbon, 1-3 September 2014.*

[2] *„Siebenbürgen entdecken. Geographien des Wissens und verflochtene Geschichten einer multiethnischen Provinz um 1900," talk at the workshop Laboratorien der Moderne. Orte und Räume des Wissens in Zentraleuropa, Center of Excellence "Cultural Foundations of Integration," University of Konstanz, 5-6. 12*

[3] *Cultural consumption, social identification and urban development in Hugary, late 19th century. Paper presented at the Annual Conference of the British Association for Slavonic and East European Studies, Fitzwilliam College, Cambridge, UK, 28-30 March 2015.*

Asymmetric genitalia in livebearer fish

Julián Torres Dowdall, Department of Biology

Most animals belong to the group "Bilateria," so called because all organisms in this group at some point of their life have a bilaterally symmetric body plan. In some cases however, this body arrangement changes, resulting in the whole organism or parts of it becoming asymmetric. Well-known examples include the flatfish, whose entire body becomes asymmetric, and vertebrate internal organs, which are asymmetric within an otherwise symmetric body plan. One particularly curious structure that often becomes asymmetric is the male copulatory organ. Asymmetry in genitalia evolved independently in so many different animal groups, that one can't help but to wonder what are its causes and consequences? If we compare closely related species, what is the pattern that emerges from this comparison? Do closely related species show similar patterns of asymmetry? What other asymmetric structures are associated with genital asymmetry? In the last year, I have been working on answering some of these questions. This work resulted in one bachelor thesis that will be a scientific paper, one conference talk and a DFG proposal that recently was granted.

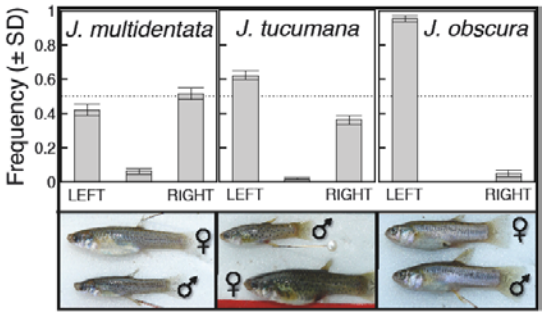


Fig. 1
Variation on the direction of asymmetry on three species of *Jenynsia*. Notice the difference in the abundance of left-handed and right-handed males.

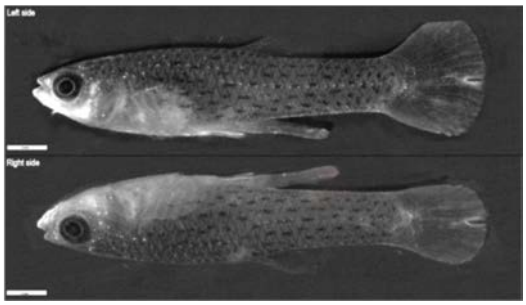


Fig. 2
Asymmetry on the sensors on the lateral line (white dots). These left-handed fish present more sensors in the left (upper photo) than in the right (lower photo).

My work focuses on a particular group of fish that includes 17 species in three different genera: *Oxygozygonectes* (1 sp), *Anableps* (3 spp.) and *Jenynsia* (13 spp.). All *Anableps* and *Jenynsia* species are livebearer fish with internal fertilization. The anal fin of males is modified into an intromittent organ, the gonopodium, which in some species is asymmetric (Fig.1). Using molecular markers I determined the common ancestry of different *Jenynsia* species, and showed that there is significant variation in the patterns of asymmetry among species, but more closely related species show similar patterns of asymmetry (Fig. 1). This result, which was presented at a conference[1], shows that asymmetry is somehow conserved within closely related species, which differ significantly from what is seen for other morphological characteristics of genitalia.

In collaboration with Sina Rometsch, a bachelor's student, I investigated the correlation between genital asymmetry and other anatomical and behavioral asymmetries. We found that direction of asymmetry in genitalia is not correlated to asymmetry on structures or behaviors not directly related to reproduction. Nonetheless, we found a strong relationship between genital asymmetry and lateralization in mating behavior. More interestingly, a sensory organ in fish that can sense vibrations in the water, the lateral line, has more sensors on the right side on right males, but more on the left side of left males (Fig. 2). These results, in Sina's bachelor's thesis[2] and now being incorporated in a scientific article, are the baseline for testing different developmental hypotheses about how asymmetry is determined in these fish.

These and other results were used as a baseline for writing a grant proposal that recently was approved for funding by the Deutsche Forchungsgemeinschaft[2]. The funding will be used over the next three years to further our understanding of the causes and consequences of genital asymmetry in livebearer fish.

[1] *Torres-Dowdall et al. (2014). Evolution of asymmetric genitalia in livebearer fish. In Symmetry and Asymmetry in Biology Conference. Paris, April 3th & 4th, 2014 (ihttps://www.mnhn.fr/fr/symmetry-and-asymmetry-biology-april-3rd-and-4th-2014)*
[2] *Rometsch (2014). Asymmetric syndromes in fishes: are morphological asymmetry and behavior laterality integrated? Bachelor Thesis. Department of Biology. University of Konstanz.*
[3] *TO 914/2 DFG grant to Torres-Dowdall. 324.000 euro for 36 months.*

Facts & Figures 2014

Zukunftskolleg Events 2014

January 9: “Advances in Discourse Network Analysis”, Jour Fixe talk by Postdoctoral Fellow Philipp Leifeld, Department of Politics and Public Administration

January 16: “Animal Culture”, Jour Fixe talk by Postdoctoral Fellow Aline Steinbrecher, Department of History and Sociology

January 17: CERN visit and workshop in cooperation with Dr. Arianna Borelli, and Dr. Dr. Koray Karaca, IZWT Bergische Universität W uppertal, organized by Senior Fellow Giora Hon and the Zukunftskolleg

January 24: Launch of the Center for Multilingualism, headed by Research Fellow Tanja Rinker and located at the Zukunftskolleg

January 30: “Topology, Curvature and Flows”, Jour Fixe talk by Postdoctoral Fellow Ben Lambert, Department of Mathematics and Statistics

January 31: “Himmelweit entfernt – Wozu noch Ökumene?”, 9. Konstanzer Konzilgespräch at the Konstanzer Konzil, Speaker: Senior Fellow Heike Schmoll et al.

February 6: “Evolution of Transcriptional Regulation during Diversification and Speciation in Cichlid Fishes“, Jour Fixe talk by Postdoctoral Fellow Claudius Kratochwil, Department of Biology

February 11: “Zeit zum Umdenken? Research Domain Criteria der Klinischen Psychologie”, Inaugural Lecture at the Zentrum für Psychiatrie Reichenau, Speaker: Associated Fellow Roland Weierstall, Department of Psychology

February 13: “The making of spin-labeled molecules and what they teach us”, Zukunftskolleg Lecture by Senior Fellow Adelheid Godt, Department of Organic Chemistry, University of Bielefeld

February 17-18: “Quantum Optics and Spin Dynamics in Few-Fermion Systems”, workshop organized by Research Fellow Denis Seletskiy, Department of Physics

April 5-6: “The Diachronic Typology of Differential Argument Marking”; workshop organized by Postdoctoral Fellow Ilja Serzant, Department of Linguistics

April 8: “Transitional Justice in Brazil 50 Years after the Military Coup”, Guest Lecture, Speaker: Marcelo D. Torelly, CNP Visiting Researcher, University of Oxford

April 24: Jour Fixe Opening Event Summer Term 2014, Speaker: Zukunftskolleg Director Giovanni Galizia

May 6: “Italien in der frühen Neuzeit”, Universitätstag, Hegau Bodensee Seminar, Workshops for pupils with Julia Boll: „Commedia dell’arte: das Comeback der europäischen Komödie“, and Viktor Konitzer: „Perspektive und Bilderzählung in der Frührenaissance: Wie italienische Künstler Räume gestalten und darin Geschichten malen“, Lecture by Michael Schwarze: „Pluralisierung in der italienischen Renaissance“

May 8: “Formal Semantics, Formal Pragmatics, and the Meaning of Desire Predicates”, Jour Fixe talk by Postdoctoral Fellow Sven Lauer, Department of Linguistics

May 8: “An African Peace”, Public Lecture by Mentor Adekeye Adebajo, Executive Director, Centre for Conflict Resolution, Cape Town, South Africa
May 17: “It‘s all too Human, even the Machines”, Lange Nacht der Wissenschaft, 11 Zukunftskolleg Fellows presented an array of topics from science and the humanities

May 20: “Describing Ergativity”, Public Lecture, Speaker: Jan-Wouter Zwart, Department of Linguistics, University of Groningen, Netherlands

May 22: “Attitudes to Confessional and Sexual Minorities in the Changing Lativan, Lithuanian and Polish Media Discourse”, Jour Fixe talk by Postdoctoral Fellow Joanna Chojnicka, Department of History and Sociology

May 30-31: “Indirect Estimation Methods in Finance and Economics”, Conference organized by Research Fellow Roxana Halbleib, Department of Economics

June 2: “Varieties of Compositionality”, Public Lecture within Zukunftskolleg Working Group on “Foundations of Semantics”, Speaker: Thomas Ede Zimmermann, Department of Linguistics, Goethe University Frankfurt

June 5: “An Interactive Framework for Insect Tracking”, Jour Fixe talk by Postdoctoral Fellow Minmin Shen, Department of Computer and Information Science

June 10: “Pen-Perceptions: Reading Dickens before Sigmund Freud”, Colloquium Talk, Speaker: Postdoctoral Fellow Monika Class, Department of Literature

June 12: “Wurzeln der Optimierung”, Inaugural Lecture, Speaker: Research Fellow Daniel Plaumann, Department of Mathematics and Statistics

June 21-26: Magdalena Delucis represented the Zukunftskolleg at the „Research in Germany” stand during the Euroscience Open Forum 2014 in Copenhagen/Norway

June 26: “The Cognitive Value of Imagination”, Jour Fixe talk by Research Fellow Magdalena Balcerak Jackson, Department of Philosophy

June 29-July 4: Marilena Manea participated in the exhibition „Medicine in Baden-Württemberg: Scientific Excellence made in Germany”, organized within the 64th Lindau Nobel Laureate Meeting dedicated to Physiology or Medicine. She presented her research project: „Peptide-based anticancer drug delivery systems”

July 3: “The History of Photosynthesis Evolution and its Consequences on Cellular Communication”, Jour Fixe talk by Postdoctoral Fellow Bernard Lepetit, Department of Biology

July 4-5: “Development and Analysis of Neural Systems Supporting Language (DANSSL)”, CUNY-KUNI Workshop organized by Research Fellow Tanja Rinker, Department of Linguistics, and Senior Fellow Valerie Shafer, Department of Linguistics

July 9: “Perception-driven Multimedia Signal Modeling”, Public Lecture by Mentor Weisi Lin, Associate Professor, School of Computer Engineering, Nanyang Technological University, Singapore

July 10: “Ecce Homo: Medicine and Empire in China under the Rule of the Manchu Kangxi Emperor (r. 1662-1722)”, Jour Fixe talk by Postdoctoral Fellow Beatriz Puente Ballesteros, Department of History and Sociology

July 13: Opening of Zukunftskolleg Alumni Club

July 14: “Multidisciplinarity: A Neuro-, Psycho-, Linguistic Perspective”, Zukunftskolleg Lecture by Senior Fellow Valerie L. Shafer, Professor in the Ph.D. Program in Speech-Language-Hearing Siences, City University of New York, USA
July 17: “Cognitive Architecture of a Mini-Brain: Develeopmental, Neuronal and Physiological Fundamentals of Learning and Memory”, Jour Fixe talk by Research Fellow Andreas Thum, Department of Biology

July 17: “Knowing that I am in Pain”, Public Lecture, Speaker: Senior Fellow Alex Byrne, Department of Philosophy

July 17: “The Historical Memory Project (HMP): Legacies of State Violence, War and Genocide in Latin America”, Public Lecture by Senior Fellow Marcia Esparza, Founder and Director, Historical Memory Project, Associate Professor, Department of Criminal Justice, John Jay College of Criminal Justice, The City University of New York, USA

July 21: “Benefits for Climate, Air and Health”, Public Lecture by Guest Speaker Brian Cairns, APS Instrument Scientist, Goddard Institute for Space Studies (GISS), New York City, USA

July 24: “The Psychology of Human Food Selection”, Public Lecture, Speaker: Paul Rozin, Department of Psychology, University of Pennsylvania, USA

July 24: “Archaeology of a Spanish Colony in Taiwan, 17th Century”, Jour Fixe talk by Research Fellow Maria Cruz Berrocal, Department of History and Sociology

July 24-27: Konstanz Reasoning Conference, organized by Research Fellows Brendan Balcerak Jackson and Magdalena Balcerak Jackson, Department of Philosophy

September 4: “Looking at Island Taiwan from an Historiographical Perspective”, Public Lecture by Mentor Ann Heylen, Associate Professor, Department of Taiwan Culture, Languages and Literature, National Taiwan Normal University

September 22: “Topological Superconducting Phase in a Helical Shiba Chain, Public Talk, Speaker: Senior Fellow Leonid Glazman, Department of Physics, Yale University, USA

October 9-10: “On the Move”, Akademie am See 2014, Julia Langkau participated in the discussion „Warum in die Ferne reisen, wenn das Gute liegt so nah? Globale WissenschaftlerInnen, internationale Forschung und regionale Kontexte“

October 13-17: “Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False”, Seminar organized by Giovanni Galizia, Department of Biology, and Eva-Maria Engelen, Department of Philosophy

October 14: “State of the Art 2014: Nach dem Projekt ist vor dem Projekt? Karrierewege von NachwuchswissenschaftlerInnen zwischen Ruf und akademischem Prekariat”, annual meeting of the ZWM, Vice Rector Winfried Pohlmeier presented the concept for support of young researchers at the University of Konstanz and the Zukunftskolleg as best practice model

October 16: “Targeted Cancer Chemotherapy: Peptide-based Anticancer Drug Delivery Systems”, Jour Fixe talk by Research Fellow Marilena Manea, Department of Chemistry, held at the 20th Anniversary of the Partnership between Al.I.Cuza University Iasi, Romania and University of Konstanz

October 23: Jour Fixe Opening Event Winter Term 2014 – 7 Years Zukunftskolleg. Taking Stock, Speaker: Zukunftskolleg Director Giovanni Galizia

October 28: “Mehrsprachigkeit: Organisatorisches und Einführung in das Thema Mehrsprachigkeit“, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit“, Speaker: Tanja Rinker and Janet Grijzenhout, , Department of Linguistics

October 30: “Chemical Strategies Toward Bacterial Communication and Coordinated Population Behaviour“, Jour Fixe talk by Research Fellow Thomas Böttcher, Department of Chemistry

November 4: “Frühe Sprachförderung: Möglichkeiten und Grenzen“, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit”, Speaker: Sonja Perren, , Department of Linguistics

November 6: “History and Archaeology of Landscape in Medieval Sicily“, Jour Fixe talk by Postdoctoral Fellow Antonio Rotolo, Department of History and Sociology

November 11: “Simultaneous and Sequential Bilingualism vs. Second Language Auqisition”, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit”, Speaker: Janet Grijzenhout, Department of Linguistics

November 12: “Gesellschaft macht Geschlecht: Heterosexism in Latvian, Lithuanian and Polish Media Discourse”, Public Lecture, Speaker: Joanna Chojnicka, Department of History and Sociology

November 13: “Semantic Framing: The Meaning of ‚Most‘“, Jour Fixe talk by guest speaker Prof. Paul M. Pietroski, Department of Linguistics, University of Maryland (MIT), USA

November 14-16: Scientific Retreat of the Zukunftskolleg, Kloster Hegne

November 18: “Wortschatzerwerb in Erst- und Zweitsprache“, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit”, Speaker: Tanja Rinker, Department of Linguistics

November 20: “Information Flows, Expectation Formation, and Tactical Voting in the General Election to the House of Commons in 2010”, Jour Fixe talk by Postdoctoral Fellow Martin Elff, Department of Politics and Public Administration

November 21-23: “The Plight of the Aramaic-speaking Communities in Irak and Syria (Hearing zur dramatischen Lage der aramäischsprachigen Minderheit (syrische Christen) im Irak und in Syrien)”, Conference

November 25: “Cognitive, Illocutionary, and Modal Products”, Public Lecture within Zukunftskolleg Working Group on “Foundations of Semantics”, Speaker: Friederike Moltmann, Department of Philosophy, French National Centre for Scientific Research, New York University, USA

November 25: “Language Contact and Aramaic / Sprachkontakt und Aramäisch”, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit”, Speaker: Eleanor Coghill, Department of Linguistics

November 27: “Cause, Causatives and Theories of Causation”, Jour Fixe talk by guest speaker Prof. Julian Reiss, Department of Philosophy, Durham University, UK

December 1: “The Retinoic Acid Pathway Contributes to Accelerate Jaw Groth in Halfbeak Fish”, Public Lecture, Speaker: Alumna Helen Gunter, Department of Biology

December 2: “Erstspracherhalt im Migrationskontext“, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit”, Speaker: Claudia Diehl and Anne Gresser, Department of History and Sociology

December 4: “How Old Memories Support Learning of New Information”, Jour fixe talk by Postdoctoral Fellow Maité Crespo García, Department of Psychology

December 9: “Icelandic Language Policy in a Changing World: Combining Linguistic Pursim and Globalization”, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit”, Speaker: Sigriour Sigurjonsdottir, Faculty of Icelandic and Comparative Cultural Studies, University of Iceland

December 11: “Macroscopic Quantum Phenomena in Condensed Matter Systems”, Jour Fixe talk by Research Fellow Gianluca Rastelli, Department of Physics

December 15: “Definiteness and Determinacy”, Public Lecture within Zukunftskolleg Working Group on “Foundations of Semantics”, Speaker: David Beaver, Department of Linguistics, University of Texas, Austin, USA

December 16: “Scots Wha Hae / Scot Who Have / Brosnachadh Bhruis: Mehrsprachigkeit in Schottland aus kulturwissenschaftlicher Perspektive“, Interdisziplinäre Ringvorlesung “Mehrsprachigkeit”, Speaker: Silvia Mergenthal, Department of Literature

December 17: “It-Clefts are IT (Inquiry Terminating) Constructions”, Public Lecture within Zukunftskolleg Working Group on “Foundations of Semantics”, Speaker: David Beaver, Department of Linguistics, University of Texas, Austin, USA

Grants 2014

Brendan Balcerak Jackson:
Heisenberg Stipendium, Deutsche Forschungsgemeinschaft, approx. 273,000 euros total, 36 months, with possible 24-month extension

Francesca Biagioli:
Postdoctoral international fellowship at the New Europe College – Institute for Advanced Study in Bucharest, Romania, from October 2013 to February 2014

Stipendiary visiting fellowship at the Mediterranean Institute for Advanced Studies of the University of Aix-Marseille (IMéRA), France, from February to July 2014

Thomas Böttcher:
Young Scholar Fund, University of Konstanz, 10,000 euros

Liebig Fellowship of the FCI (Fonds der Chemischen Industrie), 5,000 euros

Emmy Noether Fellowship of the Deutsche Forschungsgemeinschaft (DFG), project: "Chemical Strategies toward bacterial communication and coordinated population behavior", 1,68 million euros

Young Scholar Fund, University of Konstanz**,** collaborative project with Denis Gebauer on "Biofilm-Mineralisation"

Klaus Boldt:
Liebig Fellowship of the VCI (Verband der Chemischen Industrie), 111,600 euros for own position + 50,000 euros for material expenses + 1 doctoral position

Julia Boll:
Grant within Zukunftskolleg Transdepartmental Teaching Program, project: "Recognition in Theatre, Literature and Philosophy", in cooperation with Andrea Lailach-Hennrich (Dept. of Philosophy), 2,565 euros

Grant within Zukunftskolleg Transdepartmental Teaching Program, project: "Science/Stage: an Experiment", in cooperation with Thomas Böttcher (Dept. of Chemistry), Giovanni Galizia (Dept. of Biology), Gianluca Rastelli (Dept. of Physics), Andreas Thum (Dept. of Biology), 1,952 euros

Daniele Brida:
Emmy Noether grant, project "Femtosecond dynamics in layered materials", 1,65 million euros

María Cruz Berrocal:
Grant within Zukunftskolleg Transdepartmental Teaching Program, project: "Philosophy of Archaeology", in cooperation with Magdalena Balcerak Jackson (Dept. of Philosophy), 7,507 euros

Sarang Dalal:
ERC Starting grant to the amount of 1,5 million euros for his project "The Retinae as Windows to the Brain: An Oscillatory Vision."

Pantelis E. Eleftheriou:
DFG Research grant, 161,900 euros, project: "Groups Definable in Tame Expansions of O-Minimal Structures and Related Problems", University of Konstanz, Germany

Bianca Gaudenzi:
Newnham College Research Fellows conference grant

Journal of Contemporary History conference grant to subsidize a conference on “Looted Art and Restitution in the Twentieth Century: Europe in Transnational and Global Perspective”

G. M. Trevelyan Fund grant by the Faculty of History, University of Cambridge

Katherine Fama:
Volkswagen Foundation Postdoctoral Research Fellowship (awarded 2013, taken 2013- 2014)

Everett Helm Visiting Fellowship, Lilly Library, Indiana University (awarded 2013, taken 2014)

Caroline D. Bain Scholar-in-Residence Fellowship, Sophia Smith Collection, Smith College (awarded 2013, taken 2014)

National Endowment for the Humanities FPIRI Research Fellowship, Winterthur Museum, Library and Garden (awarded 2014, taken 2014-2015)

Cultural Foundations of Social Integration Research Fellowship, Institute for Advanced Study, University of Konstanz (awarded 2014, taken 2015-2016)

Denis Gebauer:
Baden-Württemberg Stiftung gGmbH grant, Research Consortium „Bio-inspired chemical materials synthesis”, project: “Advanced Nanohybrids of Calcium Carbonate and Cellulose (ANOCCC)”, collaborative project with L. Bergström (Stockholm University, Sweden); project duration 36 months (start April1, 2014), funding in Konstanz (PI DG): 185,020 euros

Roxana Halbleib:
Grant from the WIN-Kolleg of the Heidelberg Academy of Sciences and Humanities, project: “Analyzing, Measuring and Forecasting Financial Risks by Means of High-Frequency Data”, ca. 160,000 euros

Barbara Hausmair:
Grete-Mostny Dissertation Award for her dissertation at the University of Vienna

Erwin Wenzl Prize of the state of Upper Austria for her dissertation “Am Rande des Grabs. Todeskonzepte und Bestattungsritual in der frühmittelalterlichen Alamannia”, 2,500 euros

Grant of the Austrian state of Vorarlberg and the Wissenschaftsabteilung/Montafon Stand to the amount of 10,600 euros for her project: “Archäologie der Zwangsarbeit - das Lager Suggadin im Montafon” (together with Michael Kasper and Isabella Greußing, both Montafoner Museen)

Wolf Hütteroth:
Grant within Zukunftskolleg Transdepartmental Teaching Program, project: “Nature and Culture as False Dichotomy”, in cooperation with Raúl Acosta-García (Dept. of History and Sociology)

Oleksandra Kukharenko:
Bridging grant (stipend for female postdoctoral researchers) from the Equal Opportunity Office of the University of Konstanz to bridge the gap before her Zukunftskolleg Fellowship has started

Andrea Lailach-Hennrich:
Ontario Baden-Württemberg Faculty Research Exchange Program, 09/2014 until 03/2015

Philip Leifeld:
International Short Visit Grant, project: “Self-Reinforcing Recruitment Processes in the Millennium Ecosystem Assessment”, Swiss National Science Foundation (SNF), CHF 4,700

Grant within Zukunftskolleg Interdisciplinary Collaborative Project Program, project: “Feature-based extraction of contentious actor – statements from news narratives”, in cooperation with Jürgen Lerner (Dept. of Computer and Information Science)

Award for the Best Paper of an Early Career Scholar, paper: “National Parliamentary Coordination after Lisbon: A Network Approach” (joint work with Thomas Malang), 1st European Conference on Social Networks (EUSN), Barcelona, Spain, 500 euros

Teague O´Mara:
Grant from the National Geographic Society, project: “Tropical solutions to temperate problems: heart-rate and torpor use in free-ranging tropical birds” (with D.K.N. Dechmann, R.M. Brigham, and M. Wikelski), 19,000 euros

Michael Pester:
Marie Curie Actions - Career Integration Grant, project title: “Wetland-EcoSysBiol”, 100,000 euros

Torsten Pietsch:
Young Scholar Fund, University of Konstanz, project: “Fabrication of mesoscopic superconductor-ferromagnet heterostructures”, ca. 48,000 euros

Maria Daniela Poli:
Scholarship from the École de droit de la Sorbonne, Paris, in order to attend the Université d’été en droits français et allemand “Actualité du droit allemand. Droit électoral et démocratie”

Italian national scientific habilitation as Associate Professor in Comparative Law, Italian Ministry of Education, Universities and Research

Gianluca Rastelli:
Grant within the Research Seed Capital (RiSC) program funded by the Ministry of Science, Research and the Arts (MWK) Baden-Württemberg, for his project “Many-body interaction and decoherence in superconducting Josephson lattice qubits”, 94,990 euros (co-funded by the YSF of the University of Konstanz), 2 years

Tanja Rinker:
Funding from the Excellence Initiative for a transfer platform “Multilingualism in Kindergartens and Schools“ to the amount of 162,680 euros

Elena Rosseeva:
Grant for conducting the study „Machbarkeitsstudie zur Entwicklung eines biomimetischen Füllungsmaterials für kariöse Zähne (BIOFIL)“, funded by Gebr. Brasseler GmbH & Co. KG, 1 year

Ulrich Sieberer:
Grant of the Young Scholar Fund at the University of Konstanz, project “The politics of ministerial jurisdictions”, approx. 11,500 euros, 1 year

Margarita Stolarova:
Grant within Zukunftskolleg Interdisciplinary Collaborative Project Program, project: „Helping and cooperation in a normative and in a clinical population of children: a multidisciplinary approach“, in cooperation with Nora Hangel (Dept. Philosophy) and Roman Rädle (Dept. of Computer and Information Science), 8,773 euros

Andreas Thum:
Janelia Farm Visitor Grant by the HHMI, position: co-applicant (together with Marta Zlatic and James Truman, HHMI Janelia Farm; Bertram Gerber, LIN Magdeburg; Aravi Samuel, Harvard University), project: “Generating a comprehensive toolkit for functional studies of associative conditioning circuitry in larval Drosophila”, budget: 40,000 USD, from 2015 until 2016

Lead Agency Grant from the German Research Foundation and the Austrian Science Fund, position: principal investigator (in collaboration with Dorit Merhof, University of Aachen; Katja Bühler, Centre for Virtual Reality and Visualization, Vienna), project: “Das larvale 4D Standardgehirn von Drosophila melanogaster analysiert auf Einzelzell-Ebene”, budget: 1,100,000 euros, from 2015 until 2018

Margaret Thomas:
Postdoctoral Fellowship funding to spend one semester at the Mathematical Sciences Research Institute, Berkeley, USA, in the spring semester 2014 for the Scientific Program on “Model Theory, Arithmetic Geometry and Number Theory”, 25,000 US$

Julián Torres Dowdall:
DFG grant for his project “Does Side Matter? The Evolution of Asymmetric Genitalia in Livebearing Fish”, 324,400 euros, 36 months

Grey Violet:
Grant from the Russian Fundamental Research Fund, project: “Modern methods of big data processing and their applications in optimization and control”, 2 years

Publications 2014

Unai Atxitia Macizo:
"Ultrafast demagnetization rates in two-component magnetic materials" (with O. Chubykalo-Fesenko, J. Barker, and R. W. Chantrell); in: "Ultrafast Magnetism I, Springer Proceedings in Physics" 2015, 159, p. 251-254, DOI: 10.1007/978-3-319-07743-7_78, published: October 15, 2014: http://link.springer.com/chapter/10.1007/978-3-319-07743-7_78

"Multiscale modeling of ultrafast magnetization dynamics" (with T. A. Ostler, R. F. L. Evans, O. Hovorka, O. Chubykalo-Fesenko, J. Barker, and R. W. Chantrell); in: "Ultrafast Magnetism I, Springer Proceedings in Physics" 2015, 159, p. 146-149, DOI: 10.1007/978-3-319-07743-7_47, published: October 15, 2014: http://link.springer.com/chapter/10.1007/978-3-319-07743-7_47

"Atomistic modelling of magnetization reversal modes in L10 FePt nanodots with magnetically soft edges" (with J.-W Liao, R. F. L. Evans, R. W. Chantrell, and C.-H Lai); in: "Physical Review B" 2014, 90 p. 174415, DOI: 10.1103/PhysRevB.90.174415, published: November 13, 2014: http://link.aps.org/doi/10.1103/PhysRevB.90.174415

Brendan Balcerak Jackson:
"What Does Displacement Explain, and What Do Congruence Effects Show? A Response to Hofweber"; in "Linguistics and Philosophy", 37(3), p. 269-274, DOI 10.1007/s10988-014-9152-x

"Verbal Disputes and Substantiveness"; in "Erkenntnis", 79(1), p. 31-54, DOI 10.1007/s10670-013-9444-5

Tuhin Basu:
"Charge Transfer Induced Encapsulation of Si Quantum Dots by Atomically Larger and Highly Lattice-Mismatched Au Nanoparticles"; in: "J Phys. Chem. C", 2014, 118 (9), pp. 5041–5050, DOI: 10.1021/jp500576k, published February 17, 2014: http://pubs.acs.org/doi/abs/10.1021/jp500576k

"Extraordinary electron and phonon transport through metal-semiconductor hybrid nanocomposite: decoupling electrical and thermal conductivities for thermoelectric application"; in: "Int. J. Nanotechnol.", 2014, 11(9/10/11), pp. 897-909, DOI: 10.1504/IJNT.2014.063797, published July 22, 2014: http://www.inderscienceonline.com/doi/abs/10.1504/IJNT.2014.063797

Francesca Biagioli:
"Hermann Cohen and Alois Riehl on Geometrical Empiricism," in: "HOPOS: The Journal of the International Society for the History of Philosophy of Science" 4, p. 83-105

"What Does It Mean That 'Space Can Be Transcendental Without the Axioms Being So'? Helmholtz's Claim in Context," in: "Journal for General Philosophy of Science" 45, p. 1-21

Thomas Böttcher:
"A Chimeric Siderophore Halts Swarming Vibrio" (with J. Clardy); in: "Angewandte Chemie Int. Ed." 2014, 53(13): p. 3510-3513

"A β-Lactone-Based Antivirulence Drug Ameliorates Staphylococcus aureus Skin Infections in Mice" (with F. Weinandy, K. Lorenz-Baath, V.S. Korotkov, S. Sethi, T. Chakraborty, S.A. Sieber); in: "ChemMedChem" 2014, 9(4): p. 710-713

"Facing the challenge of antibiotic resistance"; in: "G.I.T. Laboratory Journal" 2014, 11-12/2014: p. 23-25

Klaus Boldt:
"Electronic Structure Engineering in ZnSe/CdS Type-II Nanoparticles by Interface Alloying" (with Kyra N. Schwarz, Nicholas Kirkwood, Trevor A. Smith and Paul Mulvaney); in: "J. Phys. Chem. C" 2014, 118 (24), 13276–13284, DOI: 10.1021/jp503609f, published: May 27, 2014: http://pubs.acs.org/doi/abs/10.1021/jp503609f

"Energy Transfer Between Quantum Dots and Conjugated Dye Molecules" (with Gary A. Beane, Nicholas Kirkwood and Paul Mulvaney); in: "J. Phys. Chem. C" 2014, 118 (31), 18079–18086, DOI: 10.1021/jp502033d, published: July 8, 2014: http://pubs.acs.org/doi/abs/10.1021/jp502033d

"Core/Shell Interface Alloying as a Means to Engineer the Electronic Structure of Semiconductor Nanocrystals"; in: "Bunsen-Magazin" 2014, 16 (4), 182-186

Julia Boll:
"Between Homeland and Exile: Witnessing the homo sacer at the Heart of Hotel Medea"; in: "Journal of Contemporary Theatre and Drama in English" 2.1 (2014), p. 26-37, Print

Daniele Brida:
"Coherent ultrafast charge transfer in an organic photovoltaic blend" (with S.M. Falke, C.A. Rozzi, M. Maiurio, M. Amato, E. Sommer, A. De Sio, A. Rubio, G. Cerullo, E. Molinari, and C. Lienau); in: "Science" 344, 1001-1005 (2014)

"Sub-cycle slicing of phase-locked and intense mid-infrared transients" (with B. Mayer, C. Schmidt, J. Bühler, D.V. Seletskiy, A. Pashkin und A. Leitenstorfer); in: "New, J. Phys." 16, 063033 (2014)

"2D IR spectroscopy with phase-locked pulse pairs from a birefringent delay line" (with J. Réhault, M. Maiuri, C. Manzoni, J. Helbing, and G. Cerullo); in: "Opt. Express" 22, 9063-9072 (2014)

"Ultrabroadband Er:Fiber Lasers" (with G. Krauss, A. Sell, and A. Leitenstorfer); in: „Laser Photon. Rev." 8, 409-428 (2014)

„Wavepacket Splitting and Two-pathway Deactivation in the Photoexcited Visual Pigment Isorhodopsin" (with D. Polli, O. Weingart, E. Poli, M. Maiuri, K. M. Spillane, A. Bottoni, P. Kukura, R. A. Mathies, G. Cerullo, and M. Garavelli); in: "Angew. Chem. Int. Ed." 53, 2504-2507 (2014)

Joanna Chojnicka:
„Ja es būtu smuks, es gribētu būt meitene! (If I were pretty, I would like to be a girl!) Debating transsexualism in the Latvian Parliament", in: "Gender Studies" 2014, 13 (1), p. 179-200

Monika Class:
"Literature and Medicine: Medical Case Histories as Genre", 32 (2014), 1: http://muse.jhu.edu/journals/literature_and_medicine/toc/lm.32.1.html

"K. P. Moritz' Case Poetics: Aesthetic Autonomy Reconsidered", in: "Literature and Medicine" 32 (2014), 1, p. 46-73

"Introduction: Medical Case Histories as Genre – New Approaches", in: "Literature and Medicine" 32 (2014), 1, p. VII-XVI

"Coleridge and Kantian Ideas in England, 1796-1817: Coleridge's Responses to German Philosophy"; London: Bloomsbury Academic

Eleanor Coghill:
"Differential Object Marking in Neo-Aramaic", in: "Linguistics" 52:2, special issue 2014, p. 335-364

"Borrowing of verbal derivational morphology between Semitic languages: the case of Arabic verb derivations in Neo-Aramaic", in: "Borrowed Morphology" (edited by N. Amiridze, P. Arkadiev, F. Gardani, De Gruyter Mouton), Language Contact and Bilingualism 8, p. 83-107

Maité Crespo Garcia:
"Does illusory flickering result from rhythmic sampling of visual stimuli?" (with Thomas Hartmann); in: "Journal of Neuroscience" 2014, 34 (2), p. 343–345. DOI: 10.1523/JNEUROSCI.4486-13.2014, published: May 8, 2014: http://www.ncbi.nlm.nih.gov/pubmed/24403135

María Cruz Berrocal:
"Archaeological history of a Fijian island: Moturiki, Lomaiviti Group" (with A. Uriarte, S. Millerstrom, S. Consuegra, J. Pérez, S. Ormeño); in: "Asian Perspectives" Fall 2014, 53 (2), p. 162-194

"Landscape construction and long-term economic practices: an example from the Spanish Mediterranean Uplands through rock art archaeology" (with M. Sebastián López, A. Uriarte González, J. López Sáez); in: "Journal of Archaeological Method and Theory" 2014, 21 (3), p. 589-615

"Summary of excavations in Hoping Dao, Keelung, Taiwan" (with E. Serrano, M. Torra, S. Walid, S. Consuegra, M. Gener, Ch. Tsang); in: "Monumenta Taiwanica" 2014, 10, p. 129-144, DOI: 10.6242/twnica.10.6

Sarang Dalal:
"Consequences of EEG electrode position error on ultimate beamformer source reconstruction performance" (with Stefan Rampp, Florian Willomitzer, and Svenja Ettl); in: "Frontiers in Neuroscience" 2014, 8(42). doi:10.3389/fnins.2014.00042, published: March 11, 2014

Martin Dege:
"Polyamory Gel(i)ebte Mehrfachbeziehungen aus kulturwissenschaftlicher Perspektive" (with P. Mattes); in: „Special Issue of Journal für Psychologie", volume 22, issue 1

"Identity Politics", in: "Encyclopedia of Critical Psychology" (2014)

"The Master-Slave Dialectic", in: "Encyclopedia of Critical Psychology" (2014)

Panteleimon Eleftheriou:
"Interpretable groups are definable" (with Y. Peterzil and J. Ramakrishnan); in: "Journal of Mathematical Logic", published online, vol. 14, no. 1 (2014), 47 pages

"Coverings by open cells" (with M. Edmundo and L. Prelli); in: "Archive for Mathematical Logic" 53 (2014), p. 307-325

Katherine Fama:
"Melancholic Remedies: Djuna Barnes's *Nightwood* as Narrative Theory"; in: "Journal of Modern Literature", 37.2, 2014, pp. 39-58, Indiana University Press; available online as well:
(Issue) http://www.jstor.org/stable/10.2979/jmodelite.37.issue-2
(Article) http://www.jstor.org/stable/10.2979/jmodelite.37.2.39

Bianca Gaudenzi:
"Press advertising and fascist dictates: Showcasing the female consumer in Fascist Italy and Nazi Germany", in: "The Press and Popular Culture in Europe, 1918-1939", edited by S. Newman and M. Houlbrook, pp. 663-680, Journalism Studies: Theory and Practice series, Routledge April 2014

Denis Gebauer:
"New Insights into the Early Stages of Silica-Controlled Barium Carbonate Crystallisation" (with Joseph Eiblmeier, Ulrich Schürmann, Lorenz Kienle, Werner Kunz and Matthias Kellermeier); in: "Nanoscale" 2014, 6 (24), p. 14939-14949, DOI: 10.1039/C4NR05436A, published: October 9, 2014:

http://dx.doi.org/10.1039/C4NR05436A

"Pre-Nucleation Clusters as Solute Precursors in Crystallisation" (with Matthias Kellermeier, Julian D. Gale, Lennart Bergström and Helmut Cölfen); in: "Chemical Society Reviews" 2014, 43 (7), p. 2348-2371, DOI: 10.1039/C3CS60451A, published: January 23, 2014:
http://dx.doi.org/10.1039/C3CS60451A

"Sweet on Biomineralization: Effects of Carbohydrates on the Early Stages of Calcium Carbonate Crystallization" (with Ashit Rao, John K. Berg and Matthias Kellermeier); in "European Journal of Mineralogy" 2014, 26 (4), p. 537-552, DOI: 10.1127/0935-1221/2014/0026-2379, published: August 1, 2014: http://dx.doi.org/10.1127/0935-1221/2014/0026-2379

"A Straightforward Treatment of Activity in Aqueous CaCO3 Solutions and the Consequences for Nucleation Theory" (with Matthias Kellermeier, Andreas Picker, Andreas Kempter and Helmut Cölfen); in: "Advanced Materials" 2014, 26 (5), p. 752-757, DOI: 10.1002/adma.201303643, published: December 5, 2013: http://dx.doi.org/10.1002/adma.201303643

Roxana Halbleib:
"Forecasting Covariance Matrices: A Mixed Approach" (with Valeri Voev); in: "Journal of Financial Econometrics", doi: 10.1093/jjfinec/nbu031, published December 18, 2014

"Estimating GARCH-type Models with Symmetric Stable Innovations: Indirect Inference versus Maximum Likelihood" (with Giorgio Calzolari and Alessandro Parrini); in: "Computational Statistics and Data Analysis", 2014, volume 76, p. 158–171

Wolf Hütteroth:
"Neural correlates of water reward in thirsty Drosophila Nature Neuroscience" (with Suewei Lin, David Owald, Vikram Chandra, Clifford Talbot and Scott Waddell); in: "Nature Neuroscience" 2014, 17(11), p. 1536-1542, DOI: 10.1038/nn.3827, published: September 28, 2014:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4213141/

"Hemichannel composition and electrical synaptic transmission: molecular diversity and its implications for electrical rectification" (with Nicolàs Palacios-Prado and Alberto E. Pereda); in: "Frontiers in Cellular Neuroscience" 2014, 8:324, DOI: 10.3389/fncel.2014.00324, published: October 15, 2014: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4197764/

Laura Iapichino:
"An improvement on geometrical parameterizations by transfinite maps," (with Christoph Jäggli and Gianluigi Rozza); in: "Comptes Rendus Mathematique", volume 352, Issue 3, March 2014, p. 263–268

„Reduced basis method for the Stokes equations in decomposable parametrized domains using greedy optimization" (with A. Quarteroni, G. Rozza, S. Volkwein); 2014:
https://infoscience.epfl.ch/record/200494, http://nbn-resolving.de/urn:nbn:de:bsz:352-279961

Zhongbao Jian:
"Insights into Functional-Group-Tolerant Polymerization Catalysis with Phosphine-Sulfonamide Palladium(II) Complexes" (with Laura Falivene, Philipp Wucher, Philipp Roesle, Lucia Caporaso, Luigi Cavallo, Inigo Göttker-Schnetmann, Stefan Mecking); in: "Chemistry - A European Journal 2015, 21(5), p. 2062–2075, DOI: 10.1002/chem.201404856, published: December 8, 2014:
http://onlinelibrary.wiley.com/doi/10.1002/chem.201404856/abstract

„Heterocycle-Substituted Phosphinesulfonato Palladium(II) Complexes for Insertion Copolymerization of Methyl Acrylate" (with P. Wucher, S. Mecking); in: "Organometallics" 33 (2014), 11, p. 2879-2888

Andreas Karrenbauer:
“Nearly Tight Approximability Results for Minimum Biclique Cover and Partition” (with P. Chalermsook, S. Heydrich, E. Holm); in: “Algorithms – ESA” 2014 (edited by A. Schulz and D. Wagner), vol. 8737 of Lecture Notes in Computer Science, pp. 235–246, Springer Berlin Heidelberg, 2014

“Improvements to Keyboard Optimization with Integer Programming” (with A. Oulasvirta); in: “Proceedings of the 27th Annual ACM Symposium on User Interface Software and Technology”, UIST ’14, New York, USA, pp. 621–626, ACM, 2014

“A Simple Efficient Interior Point Method for Min-Cost Flow”, conference paper (with R. Becker), ISAAC 2014, 12/2014

Claudius Kratochwil:
“The Cre/lox system to assess the development of the mouse brain” (with Rijli F.M.); in: “Brain development: Methods and Protocols, Methods in Molecular Biology” (edited by Simon G. Sprecher), Springer, New York. 1082, p. 295–313

Oleksandra Kukharenko:
“Control in Systems of Delay Hyperbolic Equations”, in: “Advances in Dynamical Systems and Applications”, 2014, 9 (2), p. 199-211

Elliott Lash:
“Subject Positions in Old and Middle Irish”, in: “Lingua”, 148, pp. 278-308

Benjamin Lambert:
“The constant angle problem for mean curvature flow inside rotational tori by Ben Lambert”, in: “Mathematical Research Letters”, volume 21 (2014), number 3, p. 537–551

Sven Lauer:
“Preference-conditioned Necessities: Detachment and Practical Reasoning" (with Cleo Condoravdi); in: “Pacific Philosophical Quarterly”, 95(4), p. 584–621, DOI: 10.1111/papq.12049, published: December 23, 2014

“Mandatory implicatures in Gricean pragmatics”, in” “Proceedings of the Formal & Experimental Pragmatics Workshop” (edited by J. Degen, M. Franke, and N. Goodman), p. 21–28, Tübingen, 2014

Phillip Leifeld:
“Polarization of Coalitions in an Agent-Based Model of Political Discourse”; in: “Computational Social Networks” 2014, 1(1), 7, DOI: 10.1186/s40649-014-0007-y, published: December 10, 2014: http://dx.doi.org/10.1186/s40649-014-0007-y

“Structural and Institutional Determinants of Influence Reputation: A Comparison of Collaborative and Adversarial Policy Networks in Decision Making and Implementation” (with Karin M. Ingold); in: “Journal of Public Administration Research and Theory” forthcoming, DOI: 10.1093/jopart/muu043, published online: October 21, 2014: http://dx.doi.org/10.1093/jopart/muu043

Bernard Lepetit:
“Growth form defines physiological photoprotective capacity in intertidal benthic diatoms“ (with Alexandre Barnett, Vona Méléder, Lander Blommaert, Pierre Gaudin, Wim Vyverman, Koen Sabbe, Christine Dupuy, Johann Lavaud); in: “ISME Journal“, 9, 32–45, doi:10.1038/ismej.2014.105, published online 8 July 2014: http://www.nature.com/ismej/journal/v9/n1/full/ismej2014105a.html

“Synthetic polyester from algae oil“ (with Philipp Roesle, Florian Stempfle, Sandra K Hess, Julia Zimmerer, Carolina Río Bártulos, Angelika Eckert, Peter G Kroth, Stefan Mecking); in: “Angewandte Chemie International Edition“, 53 (26), 6800–6804, DOI: 10.1002/anie.201403991, published online: May 20, 2014:

http://onlinelibrary.wiley.com/doi/10.1002/anie.201403991/abstract;jsessionid=E7DD2439908E04C25CC161A1C66DD55B.f01t03?deniedAccessCustomisedMessage=&userIsAuthenticated=false

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Prof. Dr. Rainer Maria Kiesow	Directeur études	École des hautes études en sciences sociales (EHESS)	Law
Prof. Dr. Joybrato Mukherjee	President of the Justus-Liebig University Gießen	Justus-Liebig University Gießen	Department of English
Prof. Dr. em. Helga Nowotny	President of the European Research Council	WWTF Vienna Science and Technology Fund	Social Studies of Science
Prof. Dr. em. René Schwarzenbach	Associate Vice President for Sustainability, Head and Delegate of the Steering Board of the CCES	ETH Zürich	Competence Centre of Environment and Sustainability (CCES)
Prof. em. Dr. Dr. h.c. Gerhart von Graevenitz	Emeritus, former rector of the University of Konstanz	University of Konstanz	Department of Literature
Prof. Dr. Dorothea Wagner	Head of the Institute	Karlsruhe Institute of Technology (KIT)	Institute of Theoretical Informatics
Prof. Bernard Frischer	Professor of Classics and Art History	University of Virginia, Charlottesville, Virginia, USA	Department of Classics / Frischer Consulting Inc .

Alumni (Former Fellows)

Name	Current Department	Current Institution	Fellowship
PD Dr. Christof Aegerter	Physics Institute – Physical systems biology and non-equilibrium soft matter	University of Zürich	2006 - 2009
PD Dr. Sonja von Aulock	Editor-in-Chief	ALTEX - Alternatives to Animal Experimentation	2006 - 2010
Prof. Dr. Michael W. Bauer	Dep. of Public Administration	German University of Administrative Sciences Speyer	2005 - 2009
Dr. Karim J. Becher	Dept. Of Mathematics and Computer Sciences	University of Antwerp	2008 - 2013
Dr. Gunhild Berg	Institute of German Literature	University of Innsbruck	2009 - 2013
PD Dr. Steffen Bogen	Dept. of Literature	University of Konstanz	2006 - 2010
Prof. Dr. Thomas Bräuninger	Dept. of Political Economy	University of Mannheim	2001 - 2008
Prof. Dr. Rudolf Bratschitsch	Institute of Physics	University of Muenster	2007 - 2010
Dr. Martin Bruder	Dept. of Evaluation and Statistics	DAAD	2010 - 2013

Prof. Dr. Jure Demsar	Dept. of Physics	Johannes Gutenberg University, Mainz	2007 - 2012
Prof. Dr. Martin Elff	Dept. of Politics	Zeppelin University, Friedrichshafen	2013 - 2015
Dr. Artur Erbe	Institute of Ion Beam Physics and Material Research	Research Centre Dresden-Rossendorf	2006 - 2009
PD Dr. Thomas Exner	Institute of Pharmacy	Eberhard Karls University Tübingen	2006 - 2011
PD Dr. Wolfgang Freitag	Dep. of Philosophy	University of Konstanz	2006 - 2011
Prof. Dr. David Ganz	Dept. of Art History	University of Zurich	2007 - 2012
Dr. Chiara Gianollo	Department of Linguistics	University of Cologne	2008 - 2011
PD Dr. Thomas Gisler	Dept. of Physics	University of Konstanz	2004 - 2009
Dr. Helen Gunter	Dept. of Biology	University of Edinburgh	2008 - 2014
Dr. Simon Hanslmayr	School of Psychology	University of Birmingham	2010 - 2013
Prof. Dr. Jörg S. Hartig	Dept. of Chemistry	University of Konstanz	2007 - 2011
Dr. Tamir Hassan	Automated Publishing	Hewlett-Packard Laboratories, Vienna	2013 - 2014
Dr. Anne Hauswald	Center for Mind/Brain Sciences (CIMeC)	University of Trento	2008 - 2012
PD Dr. Corinna Hermann	Dept. of Immunology/Global Preclinical R&D	Baxter Innovations, Vienna	2002 - 2008
Dr. Franz Huber	Dept. of Philosophy	University of Toronto	2008 - 2012
Prof. Dr. Georg Jochum	Chair for Public Law, Philosophy of Law & Media Law	Zeppelin University, Friedrichshafen	2003 - 2008
Dr. Julia Jones	Dept. of Biology	University of Sussex, Brighton	2008 - 2013
Prof. Dr. Johanna Kißler	Dept. of Psychology and Sport Sciences	University of Bielefeld	2003 - 2010
Prof. Dr. Mathias Kläui	Institute of Physics	Johannes Gutenberg University, Mainz	2006 - 2010
Prof. Dr. Iris-Tatjana Kolassa	Institute of Psychology and Education	University of Ulm	2006 - 2010
Prof. Dr. Albert Kümmel-Schnur	Literature, Arts and Media	University of Konstanz	2006 - 2011
Prof. Dr. Karsten Lambers	Dept. of Computer and Information Science	University of Bamberg	2008 - 2013
Prof. Dr. Daniel Legler	Biotechnology Institute Thurgau at the University of Konstanz	University of Konstanz	2004 - 2009
Dr. Shujun Li	Dept. of Computing	University of Surrey	2008 - 2011
JProf. Dr. Anna Lipphardt	Institute of Cultural Anthropology and Folkloristic	Albert-Ludwigs-University of Freiburg	2008 - 2012
Prof. Dr. Kirsten Mahlke	Dept. of Literature	University of Konstanz	2002 - 2008
Prof. Dr. Elisa May	Dept. of Biology	University of Konstanz	2004 - 2007
Dr. Matteo Morganti	Dept. of Philosophy	University of Rome	2008 - 2010
Prof. Dr. Frank Neuner	Dept. of Clinical Psychology and Psychotherapy	University of Bielefeld	2007 - 2008
Prof. Dr. Peter Öhlschläger	Dept. of Chemistry and Biotechnology	Aachen University of Applied Sciences	2007 - 2011
Prof. Dr. Niels P. Petersson	Faculty of Development and Society	Sheffield Hallam University	2003 - 2008
Dr. Anton Plech	Institute for Synchroton Radiation (ISS)	KIT - Karlsruhe Institute of Technology	2002 - 2008
Prof. Dr. Sven Reichardt	Dept. of History and Sociology	University of Konstanz	2007 - 2011
Dr. Karsten Rinke	Dept. of Lake Research	Helmholtz-Centre for Environmental Research – UFZ	2008 - 2013
Prof. Dr. Samuel Schindler	Centre for Science Studies	Aarhus University	2009 - 2011
Dr. Nina Schneider	Dept. of History	University of Brasilia	2013 - 2015
PD Dr. Matthias Schöning	Dept. of Literature	University of Konstanz	2003 - 2008
Dr. Ilja Serzants	Dept. of Linguistics	University of Mainz	2013 - 2015
Dr. Attila Tanyi	Dept. of Philosophy	University of Liverpool	2010 - 2013
Dr. Alexander Titz	Dept. of Chemistry	Helmholtz Institute for Pharmaceutical Research, Saarbrücken	2010 - 2013
Prof. Dr. Thomas Voigtmann	Institute of Materials Physics in Space	German Aerospace Center	2009 - 2014
Prof. Dr. Nils B. Weidmann	Dept. of Politics and Public Administration	University of Konstanz	2013 - 2015
Dr. Nathan Weisz	Center for Mind/Brain Sciences CIMeC)	University of Trento	2008 - 2012
Dr. Filip Wojciechowski	Research Position	GL CHEMTEC INTERNATIONAL LTD., Oakville, Ontario	2013 - 2014
Jprof. Dr. Dominik Wöll	Dept. of Chemistry	RWTH Aachen University	2008 - 2014

Associate Fellows in 2014

Name	Department	Institution
Dr. Raul Acosta Garcia	Dept. of History and Sociology	University of Konstanz
Dr. Federica Basaglia	Dept. of Philosophy	University of Konstanz
Federico Benninghoff Prados	Dept. of History and Sociology	University of Konstanz
Anette Brockmann	Dept. of Biology	University of Konstanz
Ariel Gutman	Dept. of Linguistics	University of Konstanz
Dr. Nora Hangel	Dept. of Philosophy	University of Konstanz
Tobias Henschen	Dept. of Philosophy	University of Konstanz
Dr. Jeff Kochan	Dept. of Philosophy	University of Konstanz
Dr. Christina Niermann	Dept. of History and Sociology	University of Konstanz
Michael Pokojovy	Dept. of Mathematics and Statistics	University of Konstanz
Gudrun Rath	Dept. of Literature	University of Konstanz
Marie Revellio	Dept. of Literature	University of Konstanz
Dr. Jennifer Sparr	Dept. of Politics and Public Administration	University of Konstanz
Dr. Gudrun Sprösser	Dept. of Psychology	University of Konstanz
Dr. J. Lukas Thürmer	Dept. of Psychology	University of Konstanz
Dr. Andreas Trotzke	Dept. of Linguistics	University of Konstanz
Lisa Töbel	Dept. of Psychology	University of Konstanz
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