

MAGAZINE

OF HEINRICH HEINE UNIVERSITY DÜSSELDORF



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Interview with
Professor Tobias Kalenscher

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Editorial team:

Rolf Willhardt (head), Dr. Victoria Meinschäfer, Susanne Dopheide

Editorial assistance:

Susanne Blödgen, Dr. Arne Claussen, Carolin Grape, Jun.-Prof. Dr. Jens Wrona

Translation:

Sharon Oranski, www.oranski.de

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Editorial



Dear Reader

I am very pleased to be able to present to you what is meanwhile the seventh issue of our HHU Magazine with its interesting reports on current projects and developments at Heinrich Heine University.

As you perhaps already know, ERASMUS is celebrating its 30th anniversary this year. In honour of this occasion, the programme's worldwide success is being celebrated at several German universities. Being part of these anniversary celebrations from 27 to 30 November 2017 makes us very proud and we have put together a broad programme of events and activities.

For 30 years now, ERASMUS has been instrumental in shaping a lively exchange amongst Europeans and across national borders. Especially for students, it is one of the most important exchange programmes, allowing them to travel and study abroad at a partner university. In future, internationality at Heinrich Heine University will target an even more extensive exchange and greater student mobility worldwide as well as amongst teaching personnel and technical and administrative staff. Spending a period abroad is invaluable for our personal development! We learn to adopt different perspectives and experience things in ways normally unfamiliar to us. This makes us more open and our society needs

more of that, especially nowadays. International experience enables us to empathize and together open up new horizons within which the groundwork for a more peaceful co-existence can be created. The exchange of ideas from different perspectives, cultures and backgrounds is crucial to the challenges of our times – for scientific discoveries but also for solutions to the global and social problems our society is facing.

Dear Reader, I hope you enjoy reading the latest issue of our HHU Magazine. Learn more about amusia, the latest findings in stem cell research, Japan's domestic market and decision processes in the brain!

I wish all of us continued productive cooperation at international level and perhaps some of you might even be able to join us for our ERASMUS celebrations here at Heinrich Heine University in November! You are very welcome!

Yours sincerely

Professor Andrea von Hülsen-Esch
Vice-President for International Relations

Email: Prorektorin.Internationales@hhu.de

CHE ranking: A top place to study Law, Business Administration and Economics

In the current 2017/2018 CHE University Ranking, students have re-assessed after three years their study situation in the subjects of Law, Business Administration and Economics, amongst others.

HHU's Faculty of Law was once more awarded top scores and landed high up on the list again: Students were very satisfied with overall study conditions and supervision by teaching staff. The Faculty also achieved top marks in the category "Third-party Funds per Researcher". In the summary evaluation of

all 41 law faculties rated, the Faculty of Law at Heinrich Heine University Düsseldorf occupies second place. HHU's Faculty of Business Administration and

A top place to study

Economics also scores well in the current ranking: Economics students feel that they are given extensive support and rate their study programmes – as

do Business Administration students – as excellent in the polled categories of "Completion of Studies within a Reasonable Timeframe" and "Academic Publications".

Overall, Economics occupies fourth place amongst a total of 34 universities ranked in this subject and Business Administration is in twelfth place from a total of 52 universities. C. G.

► All ranking results can be found under: www.zeit.de/studienfuehrer

FACULTY OF BUSINESS ADMINISTRATION AND ECONOMICS

NEW AREA OF SPECIALIZATION IN BUSINESS ADMINISTRATION MASTERS PROGRAMME

„Accounting, Taxation & Digital Science“

The challenges of digital transformation are also radically changing tasks in the financial functions of business administration as well as in auditing and tax consulting. As a consequence, the Faculty of Business Administration and Economics is introducing a new area of specialization that will start in the 2017/18 winter semester and concentrates in particular on "Accounting, Taxation & Digital Science".

As an integral part of HHU's prestigious Business Administration Masters degree programme, the new focus combines in-depth study of accounting, auditing and taxation with innovative courses on digital technologies and data science. In this way, "Accounting, Taxation & Digital Science" prepares graduates for the challenges of modern corpo-

rate management: In auditing and tax consulting professions but also specialist and management roles in large enterprises and high-end SMEs.

Unique selling point

A unique selling point is that "Accounting, Taxation & Digital Science" counts towards the later examination leading to the qualification as certified public accountant (§ 13b WPO). Students who successfully complete this area of specialization thus save themselves the respective exams in business administration and economics. First graduates will be able to benefit from this possibility from the 2017/18 win-

ter semester onwards. There is considerable demand in the economic sector for graduates with precisely this specialist expertise. Courses run in cooperation with the Department of Computer Science of the Faculty of Mathematics and Natural Sciences have already started.

Another important feature is partnerships with enterprises undertaken in the framework of a mentoring scheme. The intention is for each student to be coached by a mentor during the four-semester programme. Then nothing can stand in the way of a solid career in finance and accounting, auditing or tax consulting. C. G.



Further information: www.wp-studienschwerpunkt.hhu.de

Trade without borders?

The example of Japan: A mapping of territorial trade patterns beyond international borders

BY JENS WRONA

The impact of international borders on reducing trade is considered to be one of the best documented findings in empirical literature on foreign trade. However, recent studies that examine trade along now defunct borders, such as the former inner-German border, suggest that the partly very dramatic downturns in cross-border trade cannot be attributed solely to the mere existence of the actual border itself (e.g. in the shape of border controls) but far more to a trade structure (e.g. in the shape of multi-polar trade networks) which overlaps that border.

A discrete drop in trade volume, as has repeatedly been substantiated along international borders, ought consequently also to be found away from these borders. Following this logic, I identified for the first time a 20 to 50 percent decline in interregional trade between the east and the west of Japan that cannot be explained either by a historical east-west divide or by obvious institutional or cultural differences between the two areas of the country.

GRAVITATION, FLOW OF GOODS AND BORDERS

The scale of bilateral trade between two regions is determined by the product of their market sizes divided by the spatial distance between the two said regions – an economic context which, analogous to Newton’s law of gravitation, is commonly referred to as the gravity equation. The continuing triumph of the gravity equation in economics as a reliable tool in empirical trade

research can be explained not least by the fact that the trade-reducing effect of international borders can be quantified, alongside many other bilateral trade barriers. Said border effects as a rule imply dramatic downturns in cross-border trade. For example, inner-state trade on both sides of the American-Canadian border is over five times higher than cross-border trade between two regions of these countries. Similar findings for the European Single Market suggest that the surprisingly drastic downturns in cross-border trade cannot be explained solely by the trading costs associated with the physical existence of an international border.

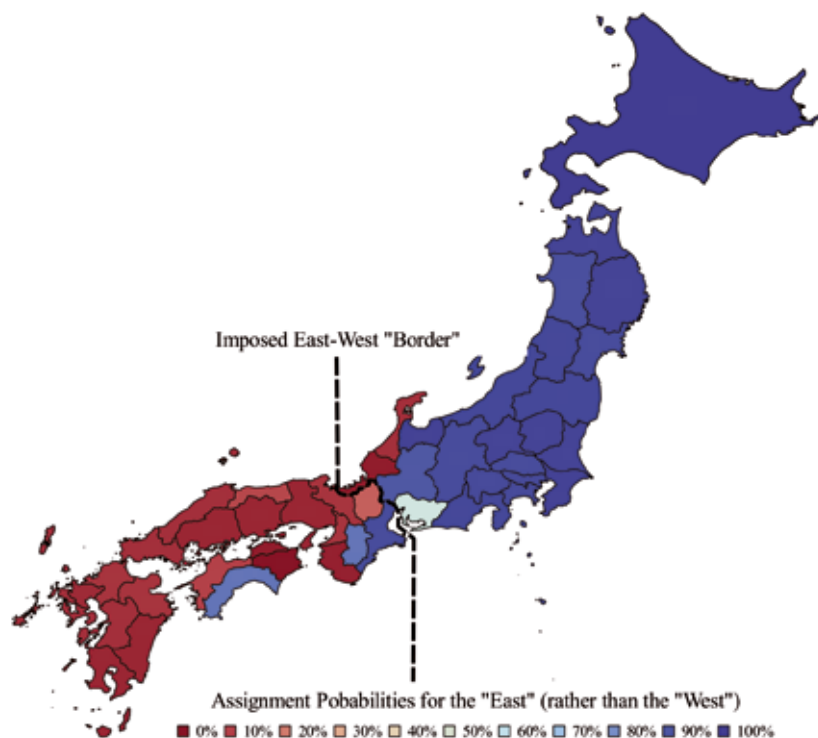
Political borders and taste frontiers

For example, a border runs between Germany and France which is not simply a political border but also a “taste” border (beer v. wine, brown bread v. white bread, etc.). In addition, there are different distribution networks and asymmetric information about possible trade partners that make it comparatively easy for firms and households to purchase within their own borders. Since differences in preferences, networks and information can, however, manifest themselves not only along international borders (a good example is the different culinary tastes and the “Veal Sausage Equator” between Bavaria and the rest of Germany), it ought to

Economist **Professor Jens Wrona** has been assistant professor for International Economics at the Düsseldorf Institute for Competition Economics (DICE) since 2015.



Photo: Press and Communications Unit



The Japanese prefectures divided into east (blue) and west (red). Professor Jens Wrona has proved in his study that trade between east and west Japan is far lower than within the two parts of the country, although there are neither political nor historical reasons for this. The characteristic east-west border is due to the bipolar structure of Japan's national economy, which is arranged in two large clusters: Tokyo in the east and Osaka in the west. Business within these two areas is particularly brisk. By reverse: the flow of trade between the two clusters is far smaller than would normally be expected. (C.G.)

be possible to identify discrete trade downturns along clearly defined geographical demarcation lines, which do not necessarily overlap with the current or historical course of international borders.

WEAK EAST-WEST TRADE IN JAPAN

Using a newly developed search algorithm to identify clearly defined demarcation lines within national trading regions, from an analysis of the trade links between 47 Japanese prefectures a clear east-west pattern emerges: Trade between prefectures in the east or in the west is 20 to 50 percent higher with other prefectures which are also in the east or the west than trade with prefectures in the other part of the country. The relatively uneven distribution of inner-Japanese trade can be attributed here to a bipolar network structure inside the country. Whilst closer networking of firms and private households fundamentally leads to more trade, the network effects which create trade do, however, sometimes differ greatly from region to region.

Accordingly, closer networking in the east and in the west leads to more trade within both regions and at the same time to a "watershed" for trade at that point where the regionally inte-

grated networks in the east and the west meet. In the case of Japan – a country in which over half the population is amassed in the conurba-

Two centres: Tokyo and Osaka

tion areas of two large natural flood plains – the formation of a bipolar network structure arises almost inevitably from the advancing urbanization established by the mega centres of Tokyo in the east and Osaka in the west as natural fixed points.

CONCLUSION

The illustrative example of an east-west divide in inner-Japanese trade beyond present or historical borders questions to what extent rigid administrative borders are a suitable way to demarcate continuously evolving sub-national and supra-national economic areas. Whilst discrete reductions in trade along international borders are clearly documented and increasingly understood, the systematic mapping of territorial trade patterns within individual trade areas is still in its early days.

Three times “summa cum laude”

Faculty of Law awards doctoral dissertation prizes

BY CAROLIN GRAPE

On 16 May, the Faculty of Law awarded doctoral dissertation prizes, sponsored by specialist publishers Schweitzer Fachinformationen, to no less than three young researchers. Commended for their dissertations, which were all awarded the distinction of “summa cum laude” (Very Good), were Dr. Sara Brinkmann (Criminal Law and Procedure), Dr. Alina Frank (Private International Law and Family Law) and Dr. Maximilian Heuger (Civil Service Law). They each received a third of the prize, which by way of exception was raised from € 5,000 to € 5,400, for the “Best Dissertation of the Faculty of Law 2016”.

Since 1996, the prize in support of young researchers at the Faculty of Law has been sponsored first by Goethe-Buchhandlung Düsseldorf and from the end of last year by Goethe + Schweitzer GmbH (Schweitzer Fachinformationen).

31 prizes in 20 years

The awardees were presented their prizes in recognition of their outstanding academic achievement by Thomas Dohme, Managing Director of Goethe + Schweitzer GmbH/Schweitzer Fachinformationen, in the Heinrich Heine Hall at the University: “We trade in specialist litera-

ture, in Düsseldorf above all in special law books, so it’s only natural that we want to support young and talented researchers at the Faculty of Law. In the some 20 years that we have sponsored the prize, we have been able to support 31 prizewinners, including today’s awardees, to the tune of about € 110,000.”

In his welcome address, Professor Lothar Michael, Dean of the Faculty of Law, expressed his thanks for the generous and continuous donation of the dissertation prize. Following the laudations by the doctoral supervisors, Professor Helmut Frister (Chair of Criminal Law and Criminal Law and Procedure), Professor Dirk Olzen (Chair of Civil Law and Civil Procedure Law) and Professor Johannes Dietlein (Chair of Public Law and Administrative Science), the prizewinners presented their dissertations:

Dr. Sara Brinkmann – On the application of §§ 359ff. of the Criminal Procedure Code. Possibilities and Limitations of Error Correction in the Reopening of Proceedings in Criminal Law

The Criminal Procedure Code holds ready its own rules, as laid down in §§ 359ff., for accessing a judicial decision after the actual end of the proceedings. The dissertation examines the question of to what extent this set of rules, which comprises only 18 paragraphs and still bears mostly unchanged the characteristics of the Criminal Procedure Code of the Reich, can



Photo: Ulf Oberländer

Awarded prizes for the best dissertations at the Faculty of Law in 2016 (from left): Dr. Sara Brinkmann (29), Dr. Maximilian Heuger (28) and Dr. Alina Frank (28). Sponsor Thomas Dohme, Managing Director of Goethe + Schweitzer GmbH/Schweitzer Fachinformationen (far left), and Professor Dr. Lothar Michael, Dean of the Faculty of Law (far right), presented the dissertation prizes on 16 May.

be used for the later correction of criminal court decisions. Potentially erroneous decisions are categorized according to type and examined in terms of their possible correction through a reopening of the proceedings. Brinkmann draws the conclusion that the scope of §§ 359ff. of the Criminal Procedure Code can be applied much more broadly than the title of Part IV of the Code suggests and that reopening proceedings holds tremendous potential for correcting errors that cannot be excluded even in the best organized criminal proceedings.

Junior lawyer at Düsseldorf court

Dr. Sara Brinkmann (29) was born in Ratingen in 1988. She began her Law degree in 2008 at the University of Bielefeld then changed to Heinrich Heine University Düsseldorf in the winter semester of 2009. From October 2012 to May 2017, she worked as a research associate at the Chair of Criminal Law and Criminal Law and Procedure under Professor Helmut Frister. She was awarded her doctoral degree by the Faculty of Law of Heinrich Heine University Düsseldorf in August 2016. Sara Brinkmann joined the Higher Regional Court of the District of Düsseldorf as a junior lawyer in September 2016.

Dr. Alina Frank – Selected Legal Problems of the German-French Optional Matrimonial Property Regime

The optional community of accrued gains is a common matrimonial property regime available to mixed-marriage couples in Germany and France since 1 May 2013 on the basis of the agreement dated 04.02.2010. Our modern times are characterized by increasing mobility and migration and the agreement's primary aim is to solve trans-national problems which might occur as a consequence. The dissertation compares the common matrimonial property regime with German and French legislation and examines how the legal questions left open by the agreement can be answered. Key topics addressed are the background to the regime and its impacts on a marriage in accordance with Art. 1-7 and 19-20 of the German-French Agreement on the Optional Matrimonial Property Regime. The dissertation focuses on the termination of the agreement, its application and the conditions for establishing and ending a matrimonial property regime. It also discusses its effect on spouses' property rights during the marriage, i.e. restrictions on disposal and joint liability.

Dr. Alina Frank (28), born 1989 in Essen, studied Law at Heinrich Heine University from the 2008 winter semester to the 2013 summer semester and specialized in "German and International Procedural Law, German Private Law

and International Private Law.” She passed the First State Examination in Law in 2013. Alina Frank worked first of all as a student assistant at the chair of Professor Dirk Olzen. She continued to work there as a research associate after completing her studies and up until January 2016, also after Professor Katharina Hilbig-Lugani (Professor for German, European and International Procedural Law, German and European Private Law and Private International Law) followed the call to the chair following Professor Olzen’s retirement. She joined Duisburg Dis-

trict Court as a junior lawyer in February 2016, where in the framework of the administrative part of her training she spent three months in the German Embassy in Tokyo, Japan. Alina Frank will sit the written part of the Second State Examination in Law in October 2017.

Three months in Tokyo

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Dr. Maximilian Heuger – Age Differentiation in German Civil Service Law

Age differentiation is encountered in almost all areas of civil service law. The following can be listed by way of example: legal age limits for the appointment of civil servants, their promotion and retirement, age-related differentiations in appointment procedures as well as ones associated with laws on working hours and holidays as well as salary and pension. Heuger reappraises the problems of age differentiation

Dissertation on civil service salaries

systematically develops profound and practice-oriented solutions for many still unresolved legal issues. On account of the often fiscal motivation of age-related differentiations, the Federal Constitutional Court’s current jurisdiction on civil service salaries is also discussed and undergoes critical assessment.

Dr. Maximilian Heuger (28), born 1989 in Dinslaken, commenced his Law degree at Heinrich Heine University Düsseldorf in October 2008. He passed the First State Examination in May 2013. Parallel to his studies, he worked from July 2009 to June 2013 first at the Chair of Criminal Law and Criminal Procedural Law under Professor Helmut Frister. In June 2013, he transferred as a research associate to the Chair of Public Law and Administrative Science headed by Professor Johannes Dietlein, his doctoral supervisor. In February 2016, Maximilian Heuger commenced his legal clerkship under the responsibility of the Higher Regional Court of the District of Düsseldorf in preparation for the Second State Examination in March 2018.

“WE TRADE IN SPECIALIST LITERATURE, IN DÜSSELDORF ABOVE ALL IN SPECIAL LAW BOOKS, SO IT’S ONLY NATURAL THAT WE WANT TO SUPPORT YOUNG AND TALENTED RESEARCHERS AT THE FACULTY OF LAW.”

Thomas Dohme, Managing Director of Goethe + Schweitzer GmbH/
Schweitzer Fachinformationen



Colour-blind ears?

Jasmin Pfeifer is investigating hardly known perceptual disorder

It is “just” a perceptual disorder. One of which scarcely anyone has ever heard, in many cases not even the person affected. But also one which can make daily life difficult and gloomy: Amusia.

BY VICTORIA MEINSCHÄFER

For several years now, Jasmin Pfeifer has been conducting research into “congenital (inborn) amusia”, first for her Masters thesis and now in the framework of her doctorate under Professor Peter Indefrey (Department of General Linguistics). “There are three different types of congenital amusia that are often combined with each other: These are – despite normal hearing – firstly the inability to perceive different pitches, then the inability to recognize a rhythm and finally the inability to remember melodies.” In some cases, the inability

No feel for rhythm

to recognize a rhythm can be so extreme that amusics cannot clap in time with a ticking metronome. “It really isn’t the case that they don’t want to. They simply cannot hear the rhythm,” explains Pfeifer. What appears even more unbelievable is their inability to recognize a melody:

“If you play the tune of Happy Birthday to them without the words, they can’t recognize it.”

Amusia can best be compared to colour blindness, even if, by contrast, the cause is not explained. Although amusia occurs more frequently in some families, unlike colour blindness it is still unknown whether it is hereditary. Men and women are evidently equally affected; overall it is assumed that two to three percent of the population suffers from amusia. “Although this perceptual disorder has been known for 15 years, very little research is being done,” says Pfeifer. “It’s not life-threatening and many people are not even aware that they have this specific problem.”

For some years now, she has used posters to look for participants and once tested all the first-semester students in a year’s intake in order to obtain norm values in a standard diagnostic test. “Suspected amusia is confirmed in 50 percent of those who come to us.” The test candidates are often relieved that there is finally a name for their disorder and that they are not simply “un-musical”. “In one extreme case, a young woman

“IF YOU PLAY THE TUNE OF HAPPY BIRTHDAY TO THEM WITHOUT THE WORDS, THEY CAN’T RECOGNIZE IT.”

Jasmin Pfeifer, doctoral researcher at HHU Düsseldorf

wanted to present a medical certificate about her amusia to explain her poor results in the past at music school,” she recounts.

For most of those affected, amusia does not cause any major problems in everyday life. They have mostly learnt simply to blank out the music that constantly surrounds us. Only a few perceive music as such an unpleasant whirr or noise that even using an elevator with background music or going to the shops is really unpleasant. “In some cases, amusics even listen to music in their free time,” Pfeifer was surprised to discover, “but they’re only interested in the lyrics”. Earworms, however, are completely alien to them.

Earworms are alien to amusics

Pfeifer herself is working on the topic from a linguistic perspective and studying the impact of amusia on language perception. To this purpose, the participants underwent different tests in the laboratory. “There is a standard test, the MBEA (Montreal Battery of Evaluation of Amusia), and questionnaires from which we can tell whether participants can recognize different pitches, rhythm and melodies. The path from the ear to the brain works perfectly well, but the first step in processing the stimulus in the brain seems to be disturbed.” Pfeifer is now exploring by means of EEG, a non-invasive method to measure electrical brain activity, which processing step is interrupted.

The perceptual disorder evidently does not have an effect on amusics’ language production itself, but they do have difficulty in hearing emphases. “For example, the word ‘desert’ means ‘a barren landscape’ or ‘to be a deserter’, depending on the emphasis. It became clear in the lab that amusics could not spot the difference.” In

real life, on the other hand, amusia does not generally cause any problems because there is almost always a context with facial expressions and gestures. “Many amusics do, however, have difficulties with irony as this is often indicated by varying pitch,” Pfeifer has observed. This is astonishing because pitch in spoken language often varies to a considerable degree. In one of her studies, differences in intonation between questions and statements were tested and even in the case of a large difference of seven semitones amusics still had problems.

If amusia becomes better known, this could also have an impact on schools, for example. “Amusia is to music lessons what dyscalculia – that is, impaired arithmetic thinking – is for mathematics,” explains Pfeifer. “In fact, affected children ought to be given special help or at least their work left ungraded.” But that is still no doubt a long way off. In the meantime, Pfeifer regularly gives lectures to budding music teachers, for example at Folkwang University of the Arts, whom she tells about this perceptual disorder, which most of them find inconceivable.



Photo: Ivo Mayr



Jasmin Pfeifer is looking for further participants who want to be tested for amusia. If you think you are unmusical, cannot tell tones and melodies apart or have problems with rhythm, contact her under pfeifer@phil.hhu.de.

To smoke or not to smoke: That is the question ...

Protection of non-smokers: Study participants in favour of stricter smoking laws

Many Germans are in favour of a complete ban on smoking in cars when children and adolescents are present. This is one of the interim results arrived at by the organizers of the German Study on Tobacco Use (DEBRA), a survey being carried out on smokers' behaviour in Germany and led by Professor Daniel Kotz of the Department of General Medicine at Düsseldorf University Hospital (www.debra-study.info).

Of the more than 10,000 people interviewed, over 71 percent demand a ban on smoking in cars when children and adolescents are present. What is particularly interesting is that two out of three of the smokers asked would also welcome such a tightening of the law on the protection of non-smokers. With over 36,000 participants over three years, DEBRA is one of the most extensive studies on smoking in Germany. A cigarette break at work, smoking shisha at a party, an e-cigarette in the park or a quick puff in the car: According to the Federal Centre for Health Education, tobacco consumption is part of everyday life for 16 million people in Germany. That places

120,000 deaths through tobacco

Germany amongst the top ten countries worldwide with the most smokers. At the same time, the German Cancer Society estimates that about 120,000 people die in Germany each year from the direct health-related consequences of tobacco use – over 3,000 of them from passive smoking.

About 28 percent of the people interviewed in the framework of the DEBRA Study said that they smoked. The largest percentage was the 21 to 34 age group, in which almost 40 percent said they smoked. It also emerged that the percentage of smokers with a low level of education and low income was the highest. In addition, considerably more men than women in the group interviewed were smokers.

No general demand for a ban on sales

One of the core objectives of the DEBRA Study is to find out whether and to what extent the population backs measures to limit tobacco use. First analyses showed that the persons interviewed were in favour of higher taxation of the tobacco industry's turnover, alongside a stricter ban on smoking in cars. Over 67 percent of those interviewed said that they would support higher taxation if the revenue were used to combat problems caused by smoking, such as ones related to health and the environment. Raising the minimum legal age required to purchase cigarettes from 18 to 21 attracted less support (43.1 % = support; 32.1 % = no support). What is quite clear: Few people demand a general ban on the sale of tobacco products. Only 23 percent of those interviewed would welcome a move in this direction.

ABOUT THE STUDY

The DEBRA Study is a large-scale survey currently being conducted by the Addiction Research

Photo: private



Photo: private



Dr. Sabrina Kastaun, Professor Daniel Kotz



► Smoking is part of everyday life for 16 million people in Germany.

and Clinical Epidemiology Unit at the Department of General Practice, Düsseldorf University Hospital. It examines smoking behaviour in Germany and to what extent age, gender or life situation play a role in whether and how much individuals smoke. The study aims to gather data on smoking behaviour from about 36,000 people: Over three years, every two months a group of 2,000 people over the age of 14 are interviewed. These ongoing surveys provide a direct insight into the effect of possible political influence or awareness-raising campaigns. The aim of the study is to collect up-to-date and detailed information about the characteristics of smoking behaviour and in particular smoking cessation in Germany and make it available

for science, politics and everyday clinical practice. The DEBRA Study has been set up in cooperation with University College and King's College in London, the University of York, and University Medical Centre Göttingen. It is funded by the Ministry for Innovation, Science and Research of the German Federal State of North Rhine-Westphalia.

S. B.

► **Contact:** Professor Daniel Kotz, Tel. +49(0)211-81-16327, Daniel.Kotz@med.uni-duesseldorf.de, Dr. Sabrina Kastaun, Tel. +49(0)211-81-19527, Sabrina.Kastaun@med.uni-duesseldorf.de, Düsseldorf University Hospital, Department of General Practice, Werdener Str. 4, D-40227 Düsseldorf, www.debra-study.info



Publication: Kastaun S, Brown J, Brose LS, et al. Study protocol of the German Study on Tobacco Use (DEBRA): a national household survey of smoking behaviour and cessation. *BMC Public Health* 2017; 17:378., DOI: 10.1186/s12889-017-4328-2 (<https://bmcpublihealth.biomedcentral.com/articles/10.1186/s12889-017-4328-2>)

UriCell: Stem cells extracted from urine

The Institute for Stem Cell Research and Regenerative Medicine (ISRM) uses iPSC (induced Pluripotent Stem Cells), a Nobel Prize winning technology, to study liver and brain-related diseases (fatty liver, jaundice; Alzheimer's, microcephaly). iPSCs are routinely generated from cells isolated from skin biopsies, bone marrow, amniotic fluid or blood. However, these procedures are invasive, time-consuming and painful for the donor.

A landmark publication by a research group in China showed that it is possi-

ble to generate iPSCs from cells found in urine. This study inspired the researchers in Düsseldorf to shift to urine as a source of stem cells. The team led by Professor James Adjaye discovered that there are at least five different types of cells shed into urine. They succeeded in identifying kidney stem cells which behave in a similar manner to mesenchymal stem cells isolated from bone marrow.

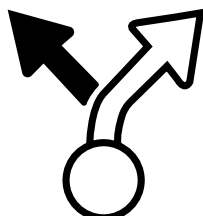
On the basis of this scientific principle, his team developed the UriCell

concept and entered it in the "HHU Ideas Competition 2016" where they won the audience award. They subsequently also took part in the "NUK Business Plan Competition" and won the second prize of € 5,000, in addition to the audience award.

Red.

► **Contact:** Professor James Adjaye, Institute for Stem Cell Research and Regenerative Medicine, Faculty of Medicine, HHU Düsseldorf, Tel. +49 (0)211-81-08191

How the brain makes decisions



Interview with psychologist Professor Tobias Kalenscher on neuronal processes of decision-making

BY ARNE CLAUSSEN

MAGAZINE: Your research field is “Decision Neuroscience”, that is, the neuroscientific aspects of decision-making. Can you please explain exactly what that is?

Kalenscher: In the final analysis we’re asking ourselves the question: “What makes us decide one way or another?” We want to understand which biological mechanisms play a role in decision-making and what influences our decisions: For example hormones or other biological factors. We frequently make good economic decisions in the sense that we follow our true preferences. However, often enough we also make systematically irrational decisions.

We are poor at making decisions about our future

Humans are particularly poor at “intertemporal decisions”, that is, decisions affecting the future. An example of such an obviously irrational decision, with which everyone is familiar, can be found in the following situation: I want to stick to a diet, have set a preference and intend to live more healthily in order to stay fit and in shape in my old age. But now there’s that chocolate cake on the table which I’d love to eat – and do. By failing to resist temptation I display another preference at that moment which contradicts my original one. This is typically human, but a huge enigma

from a scientific perspective. Why are we unable to decide in harmony with our future interests?

MAGAZINE: Your example is related to economic decisions. What other forms of decision-making processes are you investigating?

Kalenscher: Equally difficult are social decisions. The classic decision economics perspective would be non-social: We should only take care of ourselves and completely ignore others’ wellbeing – at least concerning non-kin. This classic assumption clearly contradicts reality: We donate money to charities; we give money to beggars on the street; we buy birthday presents to make our friends happy. We therefore accept costs in order to help outsiders. This awareness can be formalized: By means of well-controlled experiments it is possible to demonstrate that people have social preferences. We’re asking: What happens in the brain when we make such social decisions? And what are the underlying evolutionary reasons which make us consider others’ the wellbeing?

MAGAZINE: Not only humans but also animals exhibit social behaviour.

Kalenscher: The first thing that occurs to me here is insect populations, such as bees. We know, for example, that bees often don’t sting to protect themselves but instead for the good of the entire colony – although they die through the sting.

“IT IS ASSUMED THAT THERE IS A SUBJECTIVE VALUE FOR ALL TYPES OF DECISIONS.”

Professor Tobias Kalenscher, Chair of Comparative Psychology



Photos: Jochen Müller

Professor Kalenscher in his laboratory: “We can measure the tiniest amounts of neural transmitter substances in nerve tissue and assess their impact on decision-making processes.”

However, more interesting than insects are mammals. Some primates act prosocially. But we don't observe such behaviour only amongst primates but also amongst rodents. In experiments with rats, we were able to show that they prefer choice alternatives that produce food for both themselves and their fellow rats over alternatives that produce food only for themselves and leave their fellow rats empty-handed. Hence rats show social preferences. Something must happen between the rats which reinforces such prosocial behaviour.

MAGAZINE: How can the neuronal representation of such preferences in the brain best be described?

Kalenscher: It is assumed that there is a subjective value for all types of decisions. Subjective, for example, in the way that some people prefer to drink coke, others lemonade or water.

This subjective value is represented in the brain in the shape of networks or nerve cells.

Social preferences in the animal kingdom

What happens when this subjective value is modulated? Let's take the example of the diet again: The chocolate cake is terribly delicious and of course I love eating it. But if I stick to my diet successfully then I manage to decide against my favourite food and behave in such a way that it matches my long-term interests: So I have a salad. The subjective value of the chocolate cake seems to change through the intervention of other areas of the brain.

The same would appear to hold valid for social preferences. The natural and initial impulse to keep as much money as possible for myself initially goes against an altruistic decision. But if I want to make someone else happy my social preferences must overwrite this natural impulse.

MAGAZINE: Can you please tell us about your research work in more detail?

Kalenscher: We work a lot with test persons and use various methods in the process, for example functional magnetic resonance imaging to identify brain activity patterns. We're collaborating in this area with Professor Bernd Weber at the Center for Economics and Neuroscience (CENS) in Bonn. We also conduct psychopharmacological experiments, in which test persons take certain drugs so that we can examine what effects they have on their decision-making behaviour. What

How does stress affect decisions?

impact does acute stress have, for example, and which neuro-hormonal processes occur then in the body? Under stress, the hormone cortisol is released or the sympathetic nervous system and neuromodulators, such as noradrenaline, are activated. We examine then how noradrenaline and cortisol interact in decision-making.

MAGAZINE: How do you select the test persons and does this selection have an impact on your experiments' results?

Kalenscher: That's a very important point. Our test persons belong to what is known as the "WEIRD" sam-

ple, which stands for "Western, Educated, Industrialized, Rich and Democratic Countries". Our test persons are mostly students from an educated family background and who are educated and, by international standards, wealthy, that is members of a privileged group. This is naturally not a representative cross-section of the overall population, by no means as far as poorer countries are concerned. That's why we also have to do randomized tests with "non-WEIRD" candidates. We're involved in some collaborative projects with Kenya, for example, where we're working together with test persons from slums in Nairobi.

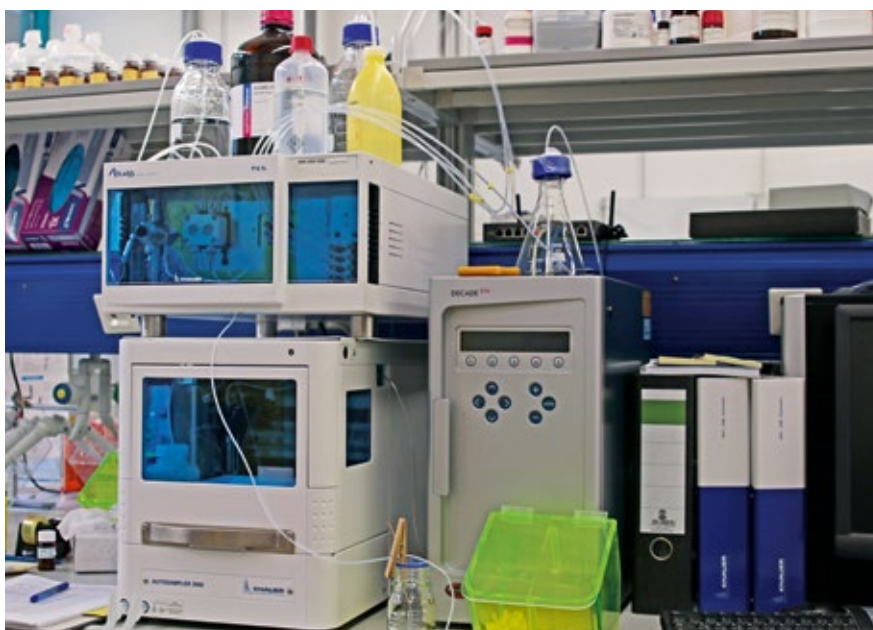
MAGAZINE: To what extent does wealth influence the results?

Kalenscher: A poor person who has to live on less than one US dollar a day is mostly concerned with his daily survival. Future-oriented decisions are secondary for him because he cannot plan for the future. Westerners, by contrast, who do not have such existential worries, can concern themselves with questions such as diets or their old age pension.

MAGAZINE: The term WEIRD also contains "West". Do you compare your research results with similarly situated population groups in Asia?

Kalenscher: We're working closely with a Chinese management laboratory at Zhejiang University in Hangzhou. Together we're studying "social discounting": We're very generous towards people who are near and dear to us; this generosity decreases with increasing social distance. First comparisons

High-Performance Liquid Chromatography (HPLC): This technique can be used to identify and quantify chemical components in a liquid. Professor Kalenscher and his team use HPLC for what is known as microdialysis, where very small amounts of brain liquid are extracted from a specific area of the brain and the presence of neurotransmitters, such as dopamine or serotonin, for example, can be analysed.



“IT’S FAR MORE INTERESTING FOR STUDENTS IF THEY CAN INTERACT DIRECTLY WITH THE RESEARCHERS WHO HAVE WRITTEN THE PAPERS.”

Professor Tobias Kalenscher, Chair of Comparative Psychology

between German and Chinese test groups show differences in their social preferences.

MAGAZINE: So far you have spoken about “normal” decision-making processes and your study of them from a neuroscientific perspective. Are you also investigating pathologically modified processes?

Kalenscher: We always take the clinical aspect into account as well. For example, our work plays an important part in understanding drug dependency or diseases in general where changes in decision-making behaviour are important. Let’s take, for example, spontaneous acts of extreme violence. We observe time and again in these cases that those individuals are especially aggressive, uninhibited and have an impulse control disorder who have endured damage to the brain beforehand or suffer from some other neurological disorder.

Cognitive impacts of Parkinson’s disease

We’re working closely with Professor Schnitzler at Düsseldorf University Hospital on Parkinson’s disease. Parkinson’s patients have, on the one hand, motor symptoms, most commonly known is the tremor. But there are also non-motor symptoms, for example in the cognitive area. For various and not yet quite fully understood reasons, Parkinson’s disease leads to the degeneration of dopaminergic neurons in the

brain. We want to understand the cognitive symptoms in order also to be able to improve treatment possibilities for Parkinson’s patients in this respect too. If drug therapy fails, motor symptoms can be treated with what we call deep brain stimulation. In this procedure, a very fine electrode is introduced to a specific area in the basal ganglia and this area then stimulated with electric signals. We assume that the stimulated area actually switches off in the process and this deactivation corrects the dysbalance of the neural circuit that results from the dopaminergic neurons’ death. Motor symptoms clearly improve as a result, but it’s still not well understood what impact this therapy has on cognitive symptoms. And that’s what we want to understand.

MAGAZINE: On 30 June you’re holding the “Düsseldorf Symposium on Decision Neuroscience” for the sixth time. What was it that made you launch this conference in 2012?

Kalenscher: At that time, I was teaching a course on decision-making processes in the Masters degree programme in Psychology. In the framework of that course we read a lot of articles, which was rather abstract and I thought to myself: “It’s far more interesting for students if they can interact directly with the researchers who have written the papers.” As luck would have it, at that precise moment one of our students was an intern in Stanford with Samuel McClure, who was the author of one of the main papers in our course. We invited Professor McClure and other renowned guests to Düsseldorf. This idea proved to be very fertile both for our students – who were able to gather direct experience in scientific discourse – as well as for me and my colleagues



“Modified decision-making processes play a significant role in many diseases.”

because we were able to bring so much expertise together in one place.

MAGAZINE: Which contributions did you find particularly impressive?

Kalenscher: Joshua Buckholtz from Harvard University, who is investigating the neuronal causes behind psychopathy, attended last year. He drives around the USA with a mobile MRT scanner built into a truck and visits prisons, where he tests psychopathic mass murderers – people we know from television. Many – but not all – of these psychopaths have an impulse control disorder. It’s not properly understood why they are unable to control their impulses. Buckholtz’s

son was a participant in Davos shows that our research field is not only academic but also relevant to everyday practice: Decision makers in the global economy listen to us researchers! Perhaps greater knowledge about the biological principles of decision-making processes will also lead to better policies.

Decision makers in the global economy listen to researchers

hypothesis is that a dysfunction in the brain’s reward system plays a significant role here. At the moment of the psychopathic act, the subjective value of that act becomes so great – so much of the reward substance dopamine is released – that all other preferences are overwritten.

This year Brian Knutson from Stanford was a speaker. He was one of the protagonists of the World Economic Forum last year in Davos. His tremendous expertise in the field of economics is inspired by biology. The fact that Knut-

Professor Tobias Kalenscher

was born in 1974 in Düsseldorf University Hospital and grew up in Mettmann. He studied Psychology at HHU from 1994 to 2001. He moved to Ruhr University Bochum and the Department of Biopsychology under Professor Onur Güntürkün for his doctorate (2005), after which he was a postdoctoral researcher and later independent researcher at the Swammerdam Institute for Life Sciences of the University of Amsterdam. In April 2011, he was appointed Professor of Comparative Psychology at HHU.

His special research interest is decision-making processes. In this context, in 2012 he established the conference series entitled “Düsseldorf Symposium on Decision Neuroscience”, which took place for the sixth time this year.

StayConnected@HHU – Researcher Alumni Programme launched at HHU



THE JUNIOR SCIENTIST AND INTERNATIONAL RESEARCHER CENTER (JUNO) OF HEINRICH HEINE UNIVERSITY DÜSSELDORF HAS LAUNCHED “STAYCONNECTED@HHU”, ITS INTERNATIONAL ALUMNI PROGRAMME FOR RESEARCHERS

With **StayConnected@HHU**, HHU wants to nurture its contacts to researchers who have worked in Düsseldorf in the past and are now continuing their academic career abroad. Together with their colleagues in Düsseldorf, researcher alumni can apply to JUNO for funding in support of research stays back at HHU.

Internationality and global networks

Last year, JUNO secured € 100,000 from the Alexander von Humboldt Foundation for its international researcher alumni activities, the main part of which has now been invested in **StayConnected@HHU**. It links the work undertaken by JUNO in the areas of “International Affairs” and “Training Measures for Junior Scientists”: Researchers become part of university life from an early stage through Welcome Services and a programme of cultural and recreational activities (the **GetConnected@HHU** programme). In addition, junior scientists can participate in training measures to which researcher alumni contribute as lecturers. Special funds make it possible above all to invite researcher alumni back to HHU and to exchange staff between Düsseldorf and universities abroad. The long-term goal is to enhance the University’s internationality, visibility and global networks.

FUNDING OPPORTUNITIES IN THE FRAMEWORK OF THE STAYCONNECTED@HHU PROGRAMME

- ▶ Research stays by international HHU Researcher Alumni at HHU in order to establish and expand research collaborations with HHU colleagues
- ▶ Staff exchanges (Masters students, doctoral and postdoctoral researchers) between research groups of international HHU Researcher Alumni and HHU research groups
- ▶ Site visits by international HHU Researcher Alumni to co-supervise doctoral researchers, become members of thesis advisory committees and participate in doctoral examination procedures at HHU

The first researcher alumni and/or staff of researcher alumni have already come to HHU through **StayConnected@HHU**. Detailed information about projects funded within the programme and the researchers behind them can be found under www.juno.hhu.de/researcher-alumni-interviews.

Information on the Researcher Alumni Programme and how to apply for lump sum funding for research stays in the framework of **StayConnected@HHU** is also available on the website of the Junior Scientist and International Researcher Center.

🌐 www.juno.hhu.de/researcher-alumni

- ▶ **Contact:** Dr. Uta Brunner, Dr. Sigrun Wegener-Feldbrügge, researcher-alumni@hhu.de, www.juno.hhu.de/researcher-alumni, <https://www.linkedin.com/groups/13517733>



University House

University House was placed at the disposal of Heinrich Heine University by the van Meeteren Foundation. Its purpose is to provide information and advice as well as foster an exchange between science, culture and education. In the framework of a large spectrum of events, the University offers local citizens the possibility to experience here cutting-edge research as well as its results and shares university life with the city.

Further information, programme, bookings:

University House
Schadowplatz 14
40212 Düsseldorf
Tel. +49 211 81-10345
Email hdu@hhu.de
www.hdu.hhu.de