



# EUROPÄISCHE AKADEMIE

zur Erforschung von Folgen wissenschaftlich-technischer Entwicklungen  
Bad Neuenahr-Ahrweiler GmbH

Direktor: Professor Dr. Dr.h.c. Carl Friedrich Gethmann

## NEWSLETTER

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### EDITORIAL

■ As it is proved by its name, the Europäische Akademie is a research institution of the type of an academy. This means that a substantial part of its activities is not implemented by its scientific staff (as with scientific institutes), but by external scientists who are invited for special projects.

As opposed to national academies, such as the Royal Society or the Académie Française or the traditional German regional academies of the Union der deutschen Akademien (in Berlin/Potsdam, Düsseldorf, Göttingen, Hamburg, Heidelberg, Leipzig, Mainz, and München) or the Akademie der Naturforscher Leopoldina (in Halle), the scientists are not appointed for life but for a period of time for concrete projects; interdisciplinary project groups then work on a specific topic. Thus, these kind of projects can be realised exactly with those scientists who are qualified due to their specialist knowledge and their ability to cooperate in an interdisciplinary area.

Furthermore, they are appointed from all over Europe; therefore, the Europäische Akademie is not restricted to just one region or one nation in Europe. While the organisational form of the scientific institute has been widely proved for disciplinary research, the concept of interdisciplinary project groups is to be preferred for the type of an academy.

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### FOCUS

#### Perspectives on Psychopharmacological Enhancement

Stephan Schleim, Knut Schnell, Henrik Walter

**In a society which increasingly values intellectual capacity and productivity, there is a growing pressure on individuals to perform accordingly. The discovery of pharmacological substances for treatment of affective, attention and sleep disorders which cause less severe side effects than previously has created a demand among some intellectuals to benefit from these even beyond clinical contexts. However, the scientific evidence of their enhancing effects in the healthy population is scarce and equivocal. Meanwhile, little effort has been made to critically inform the public about the promises and perils of the currently available and soon to be expected substances. Here we argue that a public discourse based on both an assessment of empirical evidence and an evaluation of social implications is necessary.**

#### From affective to cognitive enhancement

■ While the 1990s faced an increasing demand for relatively harmless antidepressant drugs like selective serotonin reuptake inhibitors and left the decision mostly to psychiatrists to allow people not exactly meeting the criteria of psychiatric diseases “to feel better than well”, public attention has more recently shifted to the enhancement of cognitive skills. Stimulant substances like methylphenidate, a treatment for attention-deficit hyperactivity disorder, or modafinil, indicated for sleep disorders such as narcolepsy, are now widely believed to improve cognitive performance even in the healthy user. However, the relatively few studies explicitly addressing the question of their effects outside of clinical contexts have not consistently shown a positive impact. For example, improvement in attention through consumption of methylphenidate has been shown to be accompanied by an increase in impulsiveness which in turn caused subjects to answer exam questions before processing all relevant information and, thus, to make more mistakes. Even studies using similar experimental protocols have led to different results. This situation may be due to the generally small number of volunteers in non-

clinical pharmacological research and uncontrolled individual variance, including complex genetic and social factors. Interestingly, some studies have shown an increase in self-reported confidence in task performance not accompanied by actual improvements. Thus, some people believed to do better when in fact they did not. Considering that stimulant drugs – due to their complex dopaminergic and noradrenergic effects – are regularly prescribed to patients with affective disorders to alleviate an otherwise refractory anhedonia, these results are not surprising; they may in turn explain the widespread but still unproven opinion that these substances do indeed have a positive impact on cognition. While the availability of empirical data can be expected to increase in the future, the ecological validity of such investigations remains unclear. Especially the question of what conventional test procedures somehow relating to the ambiguous concept of “cognition” tell us about the lifetime and career impact of psychopharmacological substances cannot be answered by experimental trials themselves. A benchmark to determine the applicability of putatively enhancing substances in everyday life is thus needed and probably has to in-

clude controlled real-life settings over a long period of time.

An essential question concerning the suitability of pharmacological drugs in everyday life that is hard to decide in advance is that of safety risks. Such risks include short-term effects like nervousness, nausea, or tremor, mid-term effects such as sleep disorders or dysphoria, as well as possibly irreversible long-term effects like morphological changes of neural tissue or even neurodegeneration. While risks may be acceptable in clinical contexts where they are weighted against severe symptoms of diseases, they would be less tolerated by healthy individuals who want to increase their normal level of performance. Due to their systemic impact on the complex system of neurotransmitters in the human brain, it is unlikely that any of them will be completely devoid of side effects, even though there is some optimism about the development of still safer substances. Furthermore, even substances very similar on the molecular level may differ a lot in their profile of effects and side effects. This may also be mediated by a number of individual factors, including genetic variance, that have to be controlled for appropriately. Thus, it has to be investigated for each particular substance to what degree psychopharmacological drugs would be suitable for public use. This is a lengthy and expensive process that – even if their effectiveness were established – cannot be decided in general. In order to answer this question individually for every substance, their admission procedure has to be more conservative than conventional clinical trials, because of the different weighting of benefits against risks in the case of enhancement.

**Is an improvement really an improvement?** Leaving the empirical level in a narrower sense behind, the question of whether all kinds of (test) improvement result in an overall (life) improvement also deserves closer attention. Considering for example memory enhancement it can be doubted that more is always better. Biologically, we have a mechanism that persistently filters out information and, thus, reduces the workload on memory. It is through conscious learning that we try to focus on information we consider as relevant to reach a certain goal. Under these circumstances it is important to disregard other information, otherwise our capability to learn will be diminished. If a particular substance improved our memory function beyond a certain level, this could also mean that more irrelevant information is consolidated in the neural connections. This shows that appropriate substances should not improve memory in general without maintaining the distinction between information that we regard as relevant and irrelevant. It could thus turn out that in order to benefit from memory enhancement the subject has to concentrate more eagerly on the target information, which in turn constrains the resources of attention. Without these additional resources or without their proper application, memory enhancement could

even cause a decrease of cognitive performance. The example of post-traumatic stress disorder demonstrates that in certain situations forgetting may be necessary in order to maintain psychological health. A recent experiment with histone deacetylase in a neurodegeneration model of mice has shown that this substance aiming at the prevention of memory loss restored the effects of a fear conditioning that had previously been forgotten. Having a memory system that is working too well could thus imply the recurrence of bad memories and might ultimately lead to psychological illness. On the social and philosophical levels, we could ask ourselves whether the idea of cognitive enhancement – if it became a widespread model – might defeat itself. At the beginning, a small group of vanguards could secure for itself a small advantage over the others. However, the more people follow their example, the less outstanding their performance becomes. The underlying question is whether cognitive performance is a positional good, i. e. a good which gains its value considerably through its relative distribution in the society. By contrast, for an artist creating her oeuvre independently of any other interests according to the principle of *l'art pour l'art*, cognitive enhancement could be a good of inherent value, that is, a good which is valuable regardless of its overall distribution. Pushing her capabilities, for example her richness of associations, her attention and motor skills beyond the normal edge might result in entirely novel works she could not have created without enhancement. However, if she created *l'art pour le commerce*, if she offered her creations on the market, their value would be relative to those artworks offered by others. Now we can ask ourselves in which situations people will be prone to make use of psychopharmacological means. Most probably, competitive environments play a pivotal role here, environments where people compete with others to reach a certain goal that is not available to all or to offer their abilities on a market where there are also other players offering theirs. If cognitive performance plays a substantial role in these fields determining who belongs to the winners and who does not, then it is obviously a positional good. Therefore, the advantage of someone's cognitive enhancement fades away with the others' access to the same means. Restricting access, on the one hand, practically through the mechanism of prices, would lead to an unequal distribution of its benefit. Those who could afford the substances, one may argue, are already those who have an advantage without access to cognitive enhancement, because they can afford private schools or tutoring, among many other possibilities. Avoiding the issue of distributive justice by providing equal access to everyone, on the other hand, would diminish the individual's benefit, as we have seen. Thus, the alternative is that either cognitive enhancement provides a benefit to some and results in less distributive justice, or, while justice is being upheld, there is no (relative) benefit for the individual. This

may be called the “self-defeating dilemma of cognitive enhancement”. However, it should also be noted that in a world with equal access to the means of enhancement at least the gross product of overall performance would be higher. That is, on a macroscopic level there could be reasons in favour of cognitive enhancement other than those on a microscopic level, on which we have focused here. It is this argument transhumanists primarily rely on in defending the benefit of enhancement for mankind as a whole. However, a careful evaluation of the way people use and abuse the technology already available may suggest a more modest evaluation of the benefits a multiplication of technical possibilities – including psychopharmacology – into the indefinite would bring.

### Getting the public involved

As we have seen, the issue of psychopharmacological enhancement covers questions in a very complex way on various levels. First of all, the empirical data currently available do not justify the recommendation of even one single substance as a candidate for cognitive enhancement, be it with regard to the effects or the risks for the healthy user. Nevertheless, we can set the course today to be in a better situation tomorrow. This could be done by encouraging and financially supporting scientific investigations of promising pharmacological substances. Currently, applications of psychopharmacology outside of clinical contexts are not regarded by many as a viable research target. Secondly, we have given arguments that an improvement in one particular sense may not amount to an improvement in general. The socio-cultural costs to be expected may not outweigh the benefits. Unfortunately, though, only few scientists are communicating such considerations to the public. By contrast, they may provoke an outcry on public conferences with bold claims stating that “every second student of mine has used such substances”. The real numbers of stimulant abuse in US colleges for example indicate a lifetime or past-year prevalence of stimulant abuse – that means at least one illicit consumption per time period – in the order of five to ten percent. Others may advertise that there are “40 molecules in the pipeline”, suggesting that whatever policy decisions will be made, this will not stop the “impending breakthrough of cognitive enhancement”. Such numbers are naive in that they do not consider how many substances turn out to be unsuitable for their intended purpose throughout the lengthy process of clinical trials. Furthermore, even if ten percent of these molecules passed the required tests for admission as a treatment, this would still not guarantee that only one of them is suitable for the purpose of enhancement. In order to allow a discussion including citizens and policy makers leading to an informed decision aimed at maximizing social welfare we suggest that the empirical findings as well as the wider social considerations are communicated to the public correctly.

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*Dr. med. Knut Schnell is specialist in Psychiatry and Psychotherapy at the Division of Medical Psychology at Universität Bonn. He is working in the fields of Neuro-imaging and Experimental Psychopathology.*

*Professor Dr. med. Dr. phil. Henrik Walter is director of the Division of Medical Psychology at Universität Bonn. He is also associate medical director of the Department of Psychiatry.*

*A literature list can be requested at [schlein\(at\)uni-bonn.de](mailto:schlein(at)uni-bonn.de)*

## WORKING GROUPS

■ Project Group "Pharming. Genetically Modified Plants and Animals as Future Production Site of Pharmaceuticals?": 19./20.5. in Bilbao (Spain)

■ Project Group "Potentials and Risks of Psychopharmaceutical Enhancement": 4./5.8. in Bad Neuenahr-Ahrweiler

### Responsibility for Future Generations.

#### Implementation of Sustainability in Schooling

■ On its 8th meeting in Berlin on 11th June and its 9th meeting in Bad Neuenahr-Ahrweiler on 16th July the project group worked on the identification and systematisation of those competences which are necessary to cope with the challenges of a sustainable development and which should be the output of any rational "education for sustainable development". In this connection it is of interest as to which peculiarities are significant for those challenges, for example to react adequately on the scientific diagnoses of a climatic change, to deal rationally with the problems of biodiversity, or to install incentives effectively that encourage sustainable production and consumption. In this respect the group among others identified the problems of information (incomplete information as well as some kind of "information overflow"), the problem of complexity (adequate decision making depends on unmanageable masses of conditions), the openness of options (decisions have to be made without sufficient knowledge about the alternatives), the problem of incompatibility of objectives (provision with short-term and long-term orientation collide with each other), the problem of dilemmas (even people motivated to reduce their CO<sub>2</sub>-emissions will not do so if nobody else does and their own contribution is far beneath any threshold of significance).

In order to get closer information on the challenges induced by the climatic change, the working group combined its 9th meeting with a short workshop on these topics during which Professor Lukas Meyer (University of Bern), Professor Ortwin Renn (University of Stuttgart) and Dr. Stephan Lingner (Europäische Akademie Bad Neuenahr-Ahrweiler) gave helpful advice.

The Europäische Akademie welcomes Dipl.-BW Jan A. Bollinger who will support the group with a

study that gives advice to schools on how to establish profiles of their own as institutions with a focus on education of sustainable development. Mr. Bollinger participates in the doctorate programme of the Europäische Akademie.

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## Fuel Cells

■ The sixth project meeting of the project group "Fuel Cells and Virtual Power Plants as Elements for a Sustainable Development Innovation Barriers and Implementation Strategies" took place on June, 28th in Bad Neuenahr-Ahrweiler. Further inputs in the areas of technology comparison with respect to sustainability, legal aspects as well as innovation barriers and strategies were discussed. Additionally, the preparation of the midterm meeting planned for the beginning of November was started by the project team.

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## CONFERENCES

### Interdisciplinary symposium: New applications of genetic engineering in livestock

■ Last year, the first "zoopharming" product reached market approval: it is a recombinant human protein for medical use that is produced in the milk of transgenic goats. This is only one example of upcoming applications of livestock genetic engineering. Other applications include enhancement of productivity (e.g. higher milk or meat yields), alterations of product quality (e.g. leaner meat), disease resistance (e.g. against udder inflammations), and alterations of environmental variables (e.g. reduced levels of phosphate in the faeces). Also, transgenic livestock may be used for xenotransplantation where genetic engineering is hoped to improve the animals' suitability as organ donors for humans. Currently, livestock genetic engineering is becoming increasingly feasible: the techniques to remove, modify, replace or add genes are being refined, and an increasing amount of genomic information about farm animals can be utilised. However, while genetic engineering in livestock opens a huge range of possibilities, it also raises safety and justification concerns: does genetic engineering affect animal welfare? Is it safe and morally acceptable to apply genetic engineering to farm animals for the various purposes that are envisaged? The symposium addresses livestock genetic engineering with an interdisciplinary panel of speakers. They will give talks on the state of the art of the technology and its applications, animal welfare considerations, and ethical aspects.

The organisers gratefully acknowledge funding obtained from the programme of the German Federal

Ministry of Education and Research "Innovations- und Technikanalyse", and from the Hermann und Elise geborene Heckmann Wentzel Stiftung.

*Conference venue: Berlin-Brandenburgische Akademie der Wissenschaften (BBAW). Registration is still possible: Katharina Mader, M.A.*

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## NEWS

### Post Graduate Master Study Programme in Medical Ethics

■ Since 2005 the Europäische Akademie – in cooperation with the FernUniversität in Hagen and the Johannes-Gutenberg-Universität Mainz – has successfully been running a post-graduate study programme (M.A. in Medical Ethics). The registration period for the winter term 2007/2008 of the study programme is still running. Deadline will be 15th September 2007.

The programme takes into consideration that during the past few years the importance of medical ethics has considerably increased as regards clinical practice, medical research and health policy. Due to medical progress as well as societal and economic changes the capability for ethical reflections has turned out to be a required secondary competence for doctors and other people working in medical sectors in their professional workaday routine.

The study programme comprises four terms of distant learning. The method of distant learning which has been successfully used at the FernUniversität in Hagen for many years, enables students to acquire and improve their competence in medical ethics parallel to their professional career.

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## Medical Ethics

■ On 21st June the sponsors' club ("Verein der Förderer") of the Europäische Akademie organised a meeting of the working group Medical Ethics ("Arbeitskreis Medizinethik"). Professor Dr. phil. Quante, philosopher at Universität Köln, spoke about the dignity of man and the quality of life. Although for a long time the term quality of life has been playing a minor role in the debate of medical ethics, it is now being discussed to an increasing extent. In particular due to the fact that the population is increasingly growing older and more and more people are becoming in need of care, the quality of life has turned out to be an important factor for the valuation and further development of the health system.

### Managing Committee / Partners Assembly

■ The 21st meeting of the Managing Committee and the Partners of the Europäische Akademie took place in Bad Neuenahr-Ahrweiler on 5th July 2007. During this meeting the accountant's report as well as the report on the situation in 2006 were stated and the managing director was released for the financial year 2006. The accountant's report was accepted by the auditors firm without any restrictions.

### PUBLICATIONS

#### Thorsten Galert

■ "Auch das Gehirn lässt sich dopen – Plädoyer für eine Debatte über Enhancement-Präparate", *Deutsche Zeitschrift für klinische Forschung* 7–8/2007:16–18

■ Together with Stephan Schleim

"Eingriff ins Gehirn oder Angriff auf die psychische Integrität?", *Nervenheilkunde* 7/2007:618–622

#### Carl Friedrich Gethmann

■ "Praktische Vernunft und technische Kultur", in: B. Rolf, K. Draken, G. Münnix (Hgg.), *Orientierung durch Philosophieren*, Berlin 2007 (Philosophie und Bildung, Bd. 6; Nachdruck von 1.4–105)

■ "Verantwortungsvoller Umgang mit Wissen" (Interview), *Energiewirtschaftliche Tagesfragen* 5/2007:54–56

■ "Modell für ein neues Gesundheitssystem": *RBB Kulturradio* 14.6.07

■ "Kampf der Kulturen": *Newsletter der Europäischen Akademie GmbH* 6/2007(72):1–3

■ *Berlin-Brandenburgische Akademie der Wissenschaften* (Hg.), *Kausalität. Streitgespräch in den Wissenschaftlichen Sitzungen der Versammlung der Berlin-Brandenburgischen Akademie der Wissenschaften am 9. Dezember 2005 und am 5. Mai 2006*, Berlin 2007, 106ff, 125f

#### Felix Thiele

■ Together with Jörg A. Auer, Allen Goodship, Steven Arnoczky, Simon Pearce, Jill Price, Lutz Claes, Brigitte von Rechenberg, Margarethe Hofmann-Amttenbrink, Erich Schneider, Ralf Müller-Terpitz, Klaus-Peter Rippe, David W. Grainger "Refining animal models in fracture research: seeking consensus for changing the agenda in optimis-

ing both animal welfare and scientific validity for appropriate biomedical use", *BMC Musculoskeletal Disorders* 2007:8:72 (1 August 2007)

### LECTURES

#### Thorsten Galert

19.6.07

■ "Die Bedeutung des Persönlichkeitsbegriffs für die Ethik des Neuroenhancement"

Seminar "Neuroethik: Philosophie, Recht und Hirnforschung" (Stephan Schleim, M.A., Dr. jur. Dr. rer. pol. Tade M. Spranger, Dr. med. Susanne Erk and Prof. Dr. med. Dr. phil. Henrik Walter), Klinik und Poliklinik für Psychiatrie und Psychotherapie der Rheinischen Friedrich-Wilhelms-Universität Bonn

#### Carl Friedrich Gethmann

14.6.07

■ Laudatory speech on the occasion of awarding the position of a scientist in residence to Professor Dr. Julian Nida-Rümelin by the Universität Duisburg-Essen

25.6.07

■ "Ethische Probleme der Lebendorganspende". Alfried Krupp Wissenschaftskolleg Greifswald

10.7.07

■ Laudatory speech on the occasion of awarding the honorary doctor degree (Dr. phil. h.c.) to Professor Dr. Dr. h.c. mult. Dr.-Ing. e.h. Jürgen Mittelstraß by the faculty of humanities, Universität Duisburg-Essen

17.7.07

■ "Das abendländische Vernunftprojekt und seine Grenzen". Conference "Glaube und Vernunft im Kontext der universitas litterarum", Katholisch-Theologische Fakultät, Universität Regensburg

#### Stephan Lingner

22.6.07

■ "Rational Risk Assessment at the Nano-level". Nanotechnology Symposium, Abbott GmbH & Co. KG, Ludwigshafen

### PERSONALITIES



RUTH KLÜSER, born in 1972, studied chemistry at the Rheinische Friedrich-Wilhelms-Universität in Bonn (1991–1998). She worked as a student assistant and wrote her diploma thesis on syntheses of heterocyclic components at the department of organic chemistry. She gained her Ph.D. degree in 2003 on the basis of studies on combinatorial chemistry, mainly as a modern concept of determination of active agents. At the same time she was graduate assistant at the Universität Bonn and was involved in a project of the BMBF (Federal Ministry of Education and Research) "Validated Lead/Target Systems" within the scope of the part-project "Model-experiments for the combinatorial synthesis of biologically active heterocyclic systems (new pharmaceutical leads) with the building kit principle".

In 2004 she joined the German Aerospace Centre (Deutsches Zentrum für Luft- und Raumfahrt – DLR): Initially she worked as scientific temporary member of staff and subsequently as a junior scientist in the department of solar research for two years, her main research focus being on the production of solar hydrogen and the solar detoxification of water. The project group HYDROSOL she worked for attracted international recognition and was awarded different prizes, most notably the 2006 Descartes Prize for Collaborative Scientific Research which is endowed with a total of 1 Mio. Euro. She has been working at the Europäische Akademie since 2006, coordinating the project "Societal Implications of Electrical Power Grids".

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