MEDIA AND DIGITAL CULTUR

by Winfried Marotzki (p. 3)

New Information-Technologies and Modern Biographies – The Project of Media Formation
Today's societies are increasingly based on information. Such information societies base social activities and transactions rather on knowledge than on interpersonal face-to-face-relations. Even personal interactions are often mediated by technology. As education science is concerned with questions as to how new generations can be prepared optimally for future life, this transformation towards a information based society is one of its major contemporary focus points. In the face of technologies as TV and radio, education science had developed the concept of media competency which tends to hold up an instrumentalist view towards media. Yet the current author claims this concept falls short of meeting the demands of new media like the internet. For new media necessitates a focus on orientation knowledge rather than on instrumental knowledge of facts. This is why the author proposes the concept of media formation (Medienbildung). Media formation provides a procedural knowledge and know-how on one's own creative action in the media. This aspect of (self-) reflection is completed by a strong awareness of the internet as a space of digital cultures. As far as such new cultures emerge, the self- and world-views of human beings may change and undergo a process of formation (Bildung).

DISCRETE OPTIMIZATION

by Robert Weismantel (p. 17)

In the past 20 years challenging technological and economic questions have revealed the importance of mathematical models for optimization.
The term „discrete optimization" expresses the fact that one deals with indivisible resources whose use should be optimized. The non-divisiblility of resources applies in particular to optimization questions that reflect decisions. A decision is either „yes" or „no". Half a decision can never be taken.
With the following explainations we want to ellucidate some aspects of the research in the field of discrete optimization without going into mathematical details. The exposition illustrates and discusses the following major issues:

1.) The discrete optimization model is broadly applicable. It is suited to model many important scenarios both in theory and in practise.
2.) Efficient algorithms for discrete optimization models are based on mathematical theory that emerges from the interaction of many mathematical disciplines.

ECONOMICS AS AN EXPERIMENTAL DISCIPLINE

by Joachim Weimann (p. 9)

Experiments are presently a well established method of economic research. They are constructed as laboratory experiments in which subjects are confronted with well defined decision problems and cases of strategic interactions as analyzed by game theory. The article presents a brief history of experimental economics starting with the early beginnings around 1950. This history is actually highlighted by the 2002 award of the Nobel-price to Vernon Smith, one of the pioneers of the experimental method. One of the most interesting aspects of experimental research is the tension between the fundamental behavioral assumptions used in pure economic theory and experimental results that show that theses assumptions are systematically violated in several special circumstances. In particular the assumption of strict rational behavior cannot be confirmed in all economically relevant experimental settings. In market environments experiments show that the theoretical predictions are right, but if subjects interact in non market settings, the assumption of rational payoff maximization often has been falsified. There a several attempts to overcome the discrepancies between theory and experimental evidence. We identify two particular strategies used in the literature. The first sticks to the assumption of strict rationality but alters the assumptions about the underlying motives of subjects behavior. For example, subjects may not only look at their own absolute payoff, but also at their own relative payoff. This may explain why subjects are willing to sacrifice money in order to improve their relative position. The second strategy sticks to the assumption that subjects behave in their narrow self interest, but assumes that they behave not fully rational. The hypothesis is that simple but successful heuristics are at work.

THE MUSICIAN'S BRAIN AS AN OBJECT OF SCIENTIFIC INQUIRY

by Thomas F. Münte (p. 23)

In this short review I examine several recent studies that have used professional musicians as models for experience-driven neuroplasticity. I argue that there are two advantages to studying musicians: the complexity of the eliciting stimulus, music, and the extent of their exposure to this stimulus. In a first study, string players and non-musicians attended to one of two streams of auditory stimuli characterized by a specific pitch. Musicians showed a prolonged attention effect in their brain potential. Also, the attention effect was shifted frontally compared to that of the non-musicians. In a second study we investigated auditory spatial processing in conductors, pianists and non-musicians. Only the conductors showed behavioral selectivity of sound sources located in the peripheral auditory space. Finally, a group of drummers was compared to woodwind-players and non-musicians in a passive listening task. A drum sequence was manipulated such that some beats were anticipated by 80 milliseconds. The drummers showed a mismatch response in their brain potential not only for the anticipated beats but also for subsequent beats suggesting a more complex representation of the temporal aspects stimulus sequence in this subject group. Taken together these studies suggest qualitative differences of the neural correlates of auditory processing between musicians and non-musicians. Moreover, these differences appear to be shaped by the specific training of a musician.

SIMULATION: THE VIRTUAL LABORATORY

by Graham Horton (p. 45)

Since the rapid rise in computer availability and processing speed, simulation has developed into an important tool in almost all branches of Science and Engineering. We are now able to study many natural, technical and economic processes using computer simulation as a „virtual laboratory". The simulation group at the Computer Science Department of the Otto-von-Guericke-University Magdeburg was founded in 1985.
In this article, Simulation is characterised briefly from a Computer Science perspective. Then, Markov chains are described, which form an important and typical example of a simulation problem. In the third section, the current teaching and research of the simulation group is presented, including an original contribution to the solution of Markov chains.

NEW IMMUNOLOGICAL SIGNALS FROM MAGDEBURG

by Burkhart Schraven (p. 29)

During the last twenty years „immunology" has developed to a interdisciplinary scientific field that is of high relevance in most areas of medicine. There is almost no medical discipline in which immunological problems do not play a major role in clinical routine work. We have divided this article into three major parts: In the first part we discuss some of the most urgent immunological problems that need to be solved in the future. It is clear that we cannot cover all aspects of clinical immunology in this part of the article and therefore we apologize if we have not mentioned all issues that are of general importance. In the second part we discuss, for the more interested reader, the current knowledge about the membrane proximal signal transduction mechanisms in human T-lymphocytes. The third part of the article then focuses on the research projects that are conducted at the Institute of Immunology of the Medical Faculty of the University of Magdeburg. Finally, at the end of the article we discuss our opinion regarding the perspectives of biomedical research in Magdeburg.

COMPUTATIONAL MECHANICS – BASIS FOR THE DEVELOPMENT OF INTELLIGENT PRODUCTS

by Ulrich Gabbert (p. 53)

In the development process of new products in mechanical, electrical and chemical engineering, in transportation and civil engineering, in medical engineering and many other fields computational methods are used to an increasing extent, due to their ability to create realistic computer models of engineering products, which are the basis to analyse and to optimise product features. Such computer based design and development processes are of an increasing importance in engineering because the time to market as well as the development costs can be reduced and useful information about the product behaviour under different operating conditions are available in a very early stage of the development process. Therefore the development and engineering application of such powerful computational methods and software tools are of great commercial importance. The paper starts with an introduction in the field of computational mechanics as well as the software developments. Then, based on recent research projects from different fields of application it is shown, that computational mechanics may result in new intelligent solutions and products.

DRYING TECHNOLOGY AS AN EXAMPLE OF MODERN PROCESS AND PRODUCT ENGINEERING

by Evangelos Tsotsas (p. 63)

Modern drying technology has to successfully treat dryer design and control, energetic optimization and process integration, while characterizing, understanding, preserving and improving product quality. It is, in this sense, a combination of process systems engineering and of product engineering, as the two main frontiers of actual and future development of chemical and process engineering – and a good example for respective, modern curricula. This challenging position results from the fact that solids, i.e. structurally complex, designable materials with potentially high added-value, are processed by drying – including functional foods, pharmaceutical preparations, catalyst carriers and optoelectronic components, among many others.
While research at the Otto-von-Guericke-University tries to cover the entire range of drying science and technology, the following selected examples are discussed in the present paper: 1) Steady-state and dynamic modelling of fluidized bed drying. 2) Distributed property approaches, like population balances, and their importance for a better assessment of product quality. 3) Experimental techniques, including acoustic levitation, for the determination of single-particle drying kinetics, methods for separating equilibrium effects from genuinely kinetic influences. 4) Establishment of structure-property relations by modelling of intraparticle transport phenomena (homogenisation, pore networks) and magnetic resonance. 5) Tool-boxes for dryer design, flowsheet simulations in solids processing. 6) Peripheral aspects, like the avoidance of fouling during heat recovery from dryer exhaust gases or of moisture migration during the storage of solids. 7) Formulation of solids by spray fluidized bed granulation, agglomeration or coating.

SENSORS – STATE-OF-THE-ART AND CHALLENGES

by Peter Hauptmann, Ralf Lucklum (p. 71)

Sensors are basic elements for the measurement and further electronic processing of physical or (bio)chemical values of the surrounding. They have considerably influenced innovative developments of the last 15 years. The complex field of sensors is described by selected examples. The importance of using sensors in different areas is shown. Own contributions to the field of resonant sensors, especially ultrasonic sensors and acoustic microsensors, are presented. Sensors will play an important role in the future, too, therefore information about future trends is given.