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Dear Readers

Consuming an annual report on economic research is not to everybody's taste. Knowing this, we have tried to make this report as entertaining as possible. Nonetheless, writing about the progress of our research – which we found exciting and hope to have documented adequately in what follows – may be more motivating than reading.

A truly exciting development at our institute in 2003 shall be mentioned first. It will be appreciated by all who have followed the institute's affairs over the past years. Almost exactly ten years after its founding in 1993 the institute has now grown to full size with David Audretsch joining us as the director of a third research unit in November 2003. David has been coming in from Indiana University at Bloomington, USA, and he will need some time to build up his group for which he chose the label "Entrepreneurship, Growth and Public Policy". A short programmatic statement on what he is going to do is already enclosed below.

The two existing research groups, the Strategic Interaction Group and the Evolutionary Economics Group have continued their work successfully as described in detail in the report. They have also continued to strengthen their scientific ties both nationally and internationally. As an organizational step towards normality an advisory board has been appointed for the institute according to the by-laws of the Max Planck Society with Professors Siegfried Berninghaus, Karlsruhe; Richard Day, Los Angeles; Jean Luc Gaffard, Nizza/Sophia-Antipolis; Steven Klepper, Pittsburgh; Hartmut Kliemt, Duisburg; Franco Malerba, Milan; Stan Metcalfe, Manchester; Richard R. Nelson, New York; Martin Weber, Mannheim, as members.

Last, but not least, Manfred E. Streit, our founding emeritus, has been able to acquire additional research funds in 2003 to continue his research activities in our institute for another two years.

In concluding we should like to thank all our colleagues and friends who have supported the institute's activities in one way or other, often very generously, in the past year. Yes, we get by with a little help from our friends ...

Jena , December 2003

Ulrich Witt
Managing Director

Evolutionary Economics Group

Research Program and Projects

Modern economies show a breathtaking pace of institutional, technological, and commercial transformations. Are there any regular features in these changes that allow us to explain the causes of change, the transition patterns and the consequences? In a longer term perspective, the history of the human economy is an interplay of periods of stasis and change. The rapid and encompassing forms of modern economic change are a rather recent development. Their conditions and contingencies can better be understood if they are put in perspective with the long-term record of evolutionary change in the human economy. This basic assumption provides the basis for the research conducted in the evolutionary economics group.

The implications of such an approach are multi-faceted. They range from an interpretation of economic behavior that is more naturalistic than is customary in economics (sometimes defined as the science of subjective value) to a more complex view of the dynamics of change as an interaction of self-regulating and self-augmenting processes. By necessity, many of the established abstraction strategies developed under the guidance of an economic theory of value need to be rethought, adapted, or even replaced. In order to be able to achieve this, a thorough understanding of the historical changes in institutions, in production, and in consumption is necessary at the descriptive level. In view of the complex and multi-faceted challenges awaiting this kind of research into the evolutionary transformation of modern economies, it is impossible for our group to address all relevant questions at the same time. Priorities had to be set and a selection of research topics be made. Thus, the evolutionary economics group has started to explore, in an exemplary fashion, several distinct, but related, aspects of change at different layers of the economy that appear to be particularly significant.

The selection of aspects presently under investigation shows up in the theses completed, the conferences and workshops, and the publications on which we report below. However, there are also several ongoing research projects that can be associated with five different current research areas. The topics belonging to these thematic areas and the researchers involved with individual or joint projects are the following.

Towards an Evolutionary Theory of Consumption

Alexander Frenzel Baudisch, Andreas Chai, Ulrich Witt, Christian Zellner



C. Zellner, U. Witt, A. Frenzel Baudisch, A. Chai

During their phylogeny, humans have been forced to find ways of satisfying their physical needs in consuming food-stuffs, clothing, shelter, and, perhaps, in acquiring some remedies for aches and illnesses. While the technology that made this consumption feasible for a growing human population changed considerably over time, it was only after the industrial revolution that consumption opportunities grossly exceeded the physical needs that had dictated consumption patterns for thousands of years. With this take-off of exponential growth, a puzzle emerges: since the physical needs can now increasingly be satiated with relative ease, how can consumption increase to enable the expansion of demand to keep pace with the expansion of supply? What else can be identified as motives for an expanding demand? How do these motives come about and how do they evolve?

Up to the present day, economics has shown little interest in such questions. The subjective sphere of preferences and utility is basically an unexplained "black box" and the historical growth of consumption is therefore attributed to an insatiable consumer demand, which will automatically rise with an increase in income. By recognizing the basic biological underpinnings of consumption, in contrast, a much richer approach becomes feasible. It can be analyzed how consumers utilize and combine both their cognitive and pecuniary resources to satisfy an innate set of 'wants' in a ever-changing environment fraught with uncertainty and surprise. Focusing on the dynamics of consumer knowledge and its impact on consumption habits, we seek to systematically understand the changing nature of post-industrialized consumption patterns: Where does the additional demand come from? What additional consumption is triggered, and how? Are these processes, and the demand they create, unlimited, and can they also reliably back all economic growth to come?

The year 2003 was an important period for this research area with two new doctoral candidates, Andreas Chai and Alexander Frenzel Baudisch, starting in the team and with Christian Zellner later joining them with a post-doc research project. The aim for all of them is to further develop and empirically test the validity of the previous theoretical work on the evolutionary theory of consumption (Witt 2001a and Wilhelm Ruprecht, forthcoming, who completed his doctoral dissertation in 2002) and to extend its interpretation in new directions.

Andreas Chai's project focuses on the coevolution of novelty demand and consumption habits. It has been widely recognized that the emergence and dissemination of novelty is the ultimate source of endogenous change. While many scholars have emphasized the key role 'alert' entrepreneurs play in introducing novelty into the economic system, much less attention has been directed towards understanding the nature of consumer demand for novelty, although it is an equally necessary condition for economic evolution. This project will empirically investigate the dynamic nature of this phenomena, with a particular emphasis on how the dynamic organization of consumption habits interacts with the changing consumption environment through the consumer's learning and adaptation capabilities. Empirically, the historical evolution of the demand for tourism will be examined in order to test these hypotheses.

Alexander Frenzel Baudisch's project focuses on the demand for new consumer technologies and its evolution. From a perspective on consumer wants it has to be pointed out that technologies as such do not satisfy consumer needs and wants, but the services provided by the technologies do. Since it is the technological services that satisfy consumer wants until physical satiation is reached, the acquisition of items incorporating the consumer technologies is not subject to satiation in the same way. These intermediary aspects of service provision, satisfaction of needs, and technology demand are addressed in Frenzel's work. On the consumer side, wants and needs are assumed to be subject to a developmental process driven by consumer learning. Demand is constrained by consumer income, time, and cognitive capacity. Producers trying to meet and shape the evolving demand bring forth products of variable quality. The interplay between consumer wants and consumption constraints is theoretically elaborated and analyzed in the form of one or more case studies. Through this interplay, demand patterns are formed that in turn are met by the supply of technological products of variable quality.

Christian Zellner's post-doc project focuses on the evolution of consumption patterns in low-income countries, which allows for an important modification of framing conditions of the theory. Consumption behaviour in the context of less developed countries, where incomes have not yet risen to the levels of advanced industrialised countries, is likely to be strongly influenced by traditional patterns. This raises the question of whether the regularities underlying qualitative change in consumption patterns will eventually lead to a worldwide convergence of consumption patterns. While the learning mechanisms discussed by Witt (2001a, 2001b) are expected to be rather universal across societies, they are themselves contingent on the mechanisms that guide people's attention when acquiring consumption knowledge. This leads to the hypothesis that cultural factors play a significant role in shaping the observed consumption patterns, which is empirically investigated in a cross-cultural compara-

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tive framework. From a global perspective, the fundamental significance of systematic biases in consumption behaviour derives from the substantial externalities known to be associated with Western consumption patterns. The extent to which consumption externalities will expand globally as incomes in poor countries rise – and the prospect for their mitigation through public policy measures – may thus critically depend on the nature and strength of cultural influences.

Together these projects represent a coordinated effort to build an evolutionary theory of consumption that is designed to provide a new framework for analyzing dynamic consumer behavior and to critically explore the implications of what could be labeled a naturalistic perspective on economic behavior. In the future, such a theory may provide substantial impulses to the normative debate on sustainable forms of consumption.

Related Publications:

Ruprecht, W., forthcoming. 'Towards an Evolutionary Theory of Consumptions'. PhD Dissertation. Friedrich-Schiller-University, Jena.

Witt, U., 2001a. 'Learning to Consume - A Theory of Wants and the Growth of Demand'. *Journal of Evolutionary Economics* 11, 23-36.

Witt, U. (ed.), 2001b. 'Escaping Satiation – The Demand Side of Economic Growth', Berlin: Springer.

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The Theory of Designed Economic Institutions and their Evolution

Uta-Maria Niederle, Christian Schubert, Georg von Wangenheim, Ulrich Witt

Institutions as discussed in economics are defined as sets of behavioral regularities that are supported by sanctions and allow individuals engaged in social interaction to better predict the behavior of others. Such institutions may evolve spontaneously or be designed deliberately and imposed by a small but powerful subset of a population. Spontaneously evolving institutions have been widely discussed in economics. Economists explain their emergence by increasing benefits from compliance when the number of followers grows. However, designed institutions and their evolution over the course of time have rarely been investigated.

The central questions guiding our research in this area are fivefold: How do designed institutions and their enforcement emerge? Under what conditions are they stable? How do they change over the course of time as a consequence of, and as a reason for, technological evolution? Which policies can influence the evolution of designed institutions in what ways? Which criteria may guide the normative evaluation of such policies? To approach these questions, the researchers involved here started to work on various sub-projects that are expected to eventually merge into broader answers to the guiding questions.

Uta-Maria Niederle embarks on a specific example of institutions that are on the edge between spontaneous and designed institutions, viz. the emergence and further evolution of property in the long term (Niederle 2003). Starting from possessive behavior in animal societies, she investigates the defining steps in human society that turn possession into property. The first results that she was able to obtain, backed by case studies, indicate that property as an institution does not simply adapt its specificities to the most efficient forms, as is often claimed in the economic literature on property rights. Rather, the evolution of



*G. v. Wangenheim, U. M. Niederle,
C. Schubert, U. Witt*

property is a complex phenomenon that is frequently triggered by exogenous shocks or internal slow developments that induce dissatisfaction with the distributional or allocative effects of the current institutional setting and then depends on perceptions of power and possibilities. The latter are formed in a social communicative process and shape another such process in which new rules on property eventually become recognized and accepted. In particular, the social communicative processes imply path dependencies that render impossible an exact prediction of the effects of external shocks or internal developments on the evolution of property.

The research of Georg von Wangenheim partly builds on his earlier work on enforcement organizations (to be published in Wangenheim 2004). He is interested in the emergence and the stability of organizations enforcing designed institutions when they suffer from the usual internal agency problems of organizations and are embedded in a society of individuals who adapt their rule compliance to the enforcers' activities. Considering Prisoners' Dilemma situations, which on the basis of spontaneous institutions can only be overcome under exceptional conditions (cf., e.g., Witt 2001), he shows that an enforcement organization is stable only under certain conditions. If these conditions are violated, there is a unique stable Nash equilibrium in pure strategies: general defection in the Prisoners' Dilemma and absence of enforcement, which is self stabilizing due to the ineffectiveness of the organization. The best way to overcome such instability problems seems to be the assignment of a multitude of enforcement fields to the enforcement organization.

In a further project, Georg von Wangenheim investigates the evolution of coalitions in a legislative body consisting of voters with different voting weights, or equivalently, parties of different size. Preferences are Euclidean, i.e. each voter has a most preferred policy and dislikes alternatives the further they deviate from his bliss policy, but the order of the most preferred policies of the voters varies between successive votes on different issues in a way which is at best imperfectly predictable. The evolutionary aspect enters the scene when voters learn how valuable persistence of a winning coalition is compared to the gains from inducing an individually better decision outcome by leaving an incumbent winning coalition.

Christian Schubert concentrates his research on the evolutionary theory of economic policy making, i.e. on the institutionalized conscious design of legal institutions. This will be analyzed from three different angles (see also Witt 2003). First, the positive political economy of actual collective decisions will be discussed – regarding, e.g., judicial decision-making, the influence of informal social norms on adjudication is of major theoretical interest. Second, it is investigated which policy instruments can be used to realize given ends – this is the instrumental aspect of a theory of policy-making. Third, the adequacy and legitimization of alternative policy goals will be discussed in light of what we know about the evolutionary character of economic behavior and economic systems. From the point of view of Normative Individualism, property interpreted, the phenomenon of variable preferences constitutes a major challenge to normative economics. Taking a contractarian perspective, Schubert proposes to develop a conventionalist methodology (in the spirit of Rawls) to endogenize the "original position" model which plays a key role in any contractarian theory. This implies a re-focusing in the analysis of collective decision-making procedures: They are not conceptualized as mechanisms to aggregate given preferences, but rather as tools to organize social learning processes. This refers to a unifying theme in the evolutionary theory of economic policy-making: It focuses on the problem of how best to generate new (positive and normative) knowledge on collective problems and problem-solutions.

Related Publications:

Niederle, U.-M., 2003. 'Zwischen Spontanität und Autorität'. Marburg: Metropolis.

Wangenheim, G. v., 2004. 'Games and Public Administration: The Law and Economics of Regulation and Licensing'. Cheltenham: Edward Elgar.

Witt, U., 2001. 'Between Appeasement and Belligerent Moralism: The Evolution of Moral Conduct in International Politics'. *Public Choice*, 106, 365-388.

Witt, U., 2003. 'Economic Policy Making in Evolutionary Perspective'. *Journal of Evolutionary Economics* 13, 77-94.

The Developmental Approach to the Theory of the Firm

Klaus Rathe, Silke Scheer, Ulrich Witt, Hagen Worch

The primary objective of the research done in this area is to understand the dynamics of firm organization. Many contributions to evolutionary economics are inspired by analogies to the Darwinian theory of natural selection. However, in a broader sense, evolution also encompasses *development* (understood as a sequence of irreversible and non-repetitive changes). In fact, development – and, perhaps, developmental (or ontogenetic) analogies – seems to be particularly relevant to understanding systematic changes in firm organizations. Research in this area is therefore devoted to exploring the potential of a *developmental approach* to the theory of the firm.



K. Rathe, S. Scheer, U. Witt

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In contrast to what the static theory of the firm suggests, firms are not given as such, i.e. as one of several feasible contractual arrangements between input owners. Instead, to found and run a firm as an ongoing concern is genuinely an entrepreneurial act (Witt 1998, 2003). Therefore, the analysis of the entrepreneurial input is crucial to a developmental approach. The focus is on the level of the individual firm and its interaction with the environment. Specifically, we are interested in two sources of developmental regularities (see Rathe and Witt 2001): internal organization and co-evolution of the firm with its environment. The working hypothesis for the first source is that internal organization develops in terms of cognitive or entrepreneurial regimes (see Witt 2000). In a growing firm the entrepreneur faces increasing difficulty in motivating and coordinating individual firm members. This challenge of cognitive leadership may lead to particular sequences of governance structures, depending on the size and age of the firm. Although this idea has some commonality with the notion of a life cycle of firms, firm development is expected to be *contingent* (rather than a non-contingent deterministic or stochastic growth process).

The second, external source of developmental regularities relates to the interaction between the firm and its environment. Contributions to the Schumpeterian tradition describe industry evolution as a population of firms that evolves along cumulative R&D processes exhibiting increasing returns. Life cycles or developmental patterns of individual firms are not directly relevant to the understanding of the observed patterns on the industry level alone. We complement this work by systematically relating life cycle considerations on different levels, i.e. firms, markets and industries. While the evolution of industry shapes the environment that an individual firm faces, the total of developing firms constitutes the evolving industry. In this perspective firms co-evolve with the industries in which they are operating.

In 2003 three dissertations that focus on various parts of the outlined research agenda were under way. Klaus Rathe focuses on the interaction between developmental processes going on at the firm and the industry level to provide a theoretical perspective for a synthesis of the two main research questions outlined above. Various models of firm growth and industry evolution are discussed extensively as precursors to a developmental approach. In addition, the relationship between macro- and microevolution both in theoretical biology and economics is discussed. The central argument developed is that neither selectionist (industry evolution) nor developmental (firm growth) models alone capture the essential dynamics of firm growth processes because firm development is interactive in nature. Elements of a theory of interactive development of firms and industries are presented.

Silke Scheer empirically investigates the dynamics of entrepreneurial leadership within firms from the perspective of organizational psychology. As outlined above, cognitive leadership as the entrepreneurial input is arguably crucial to a firm's success. In particular, the success of cognitive leadership should vary during the firm's growth. While the entrepreneur is ex-

pected to successfully coordinate the actions of individual firm members in small (young) firms, she or he will face increasing difficulties in a (rapidly) growing firm. How the entrepreneur reacts to this challenge is analyzed. By integrating insights from social and cognitive psychology, the effects of cognitive leadership on the motivation of the employees and on the internal coordination of the firm will be tested on the basis of a questionnaire.

Hagen Worch conducts detailed case studies of individual firms and researches related material from business history sources which are able to support the developmental approach. According to that approach, as firm organizations grow they should reach size thresholds at which they become increasingly involved in problems of coordinating their daily operations. Reorganizing the coordination structure turns out to be one possible developmental pattern in order to preserve the firm's competitiveness. The attempt to keep to the established structure represents a different developmental pattern, which usually results in decline in organizational coherence and stagnation. To assess the regularities of organizational change at those thresholds is a major goal of Worch's dissertation. He tries to identify the factors that trigger the different developmental patterns and in terms of profitability and subsequent growth potentials. The findings are to be compared to those of the organizational ecology literature. Although organizational ecology started out as a direct analogy construction to Darwinian selection theory, it is now increasingly paying attention to the evolution of individual firms.

Related Publications:

Rathe, K., and Witt, U., 2001. 'The Nature of the Firm - Static versus Developmental Interpretations'. *Journal of Management and Governance* 5, 331-351.

Witt, U., 1998. 'Imagination and Leadership - The Neglected Dimension of an Evolutionary Theory of the Firm'. *Journal of Economic Behavior and Organization* 35, 161-177.

Witt, U., 2000. 'Changing Cognitive Frames - Changing Organizational Forms: An Entrepreneurial Theory of Organizational Development'. *Industrial and Corporate Change* 9(4), 733-755.

Witt, U., 2003. 'Market Opportunity and the Organizational Grind - The Two Sides of Entrepreneurship'. *Advances in Austrian Economics* 6, 131-151.

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What Factors Determine Empirical Patterns in the Evolution of Industries?

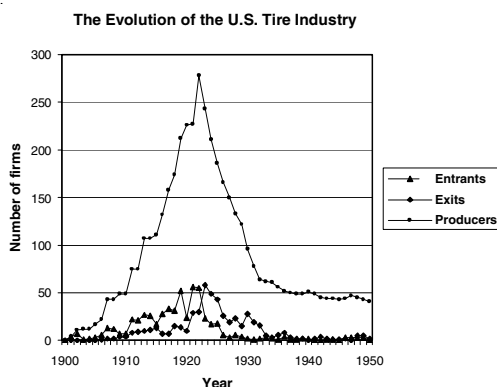
Guido Bünstorf

Recent empirical research has established important findings on the evolution of industries and on the factors that underlie the differential success of competing firms. A number of developmental patterns of industrial evolution have been identified (Klepper, 1997). One widespread pattern is that, as the product of the industry matures, the number of firms becomes drastically smaller, because entry dries up while many established producers merge or fail. Moreover, in this "shakeout" of firms, significant differences have been observed between the failure rates of different kinds of firms. In some industries, firms' pre-entry activities in related industries can explain the differences in subsequent performance (Klepper and Simons, 2000). In other industries, spin-offs (i.e., employee startups from existing firms) are disproportionately more successful than other firms (Klepper and Sleeper, 2002).

At present, the empirical findings on industrial evolution are based on a small number of (mostly U.S.) industries. Additional comparative research is necessary to establish their general validity over sectors, periods of time and countries, and also to identify the determinants of the observable differences in developmental patterns. The present research project, which was started in the fall of 2002, is a contribution to this endeavor. In 2003 progress was made along two lines.



Guido Bünstorf



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First, in joint work with Steven Klepper of Carnegie Mellon University (Pittsburgh, U.S.A.), we thoroughly investigated U.S. automobile tire producers (Buenstorf and Klepper, 2003). The evolution of this industry was characterized by a sharp shakeout during the 1920s and 1930s (see figure). Moreover, both diversifying rubber firms and spinoffs were among the biggest and most long-lived U.S. producers. In addition to probing into the survival rates of different kinds of firms, we also investigated the location patterns of firms. We find that whereas the prior existence of tire firms in a region increases the likelihood of further entry of tire firms in that region, this does not hold for the entry of spinoffs. This result suggests that spinoffs rely less than other firms on the benefits from intra-industry proximity, which invites further investigation into the nature of agglomeration economies.

Second, comprehensive datasets on farm tractor producers in both the U.S.A. and in Germany were collected in 2003. The tractor industry is an attractive object of study because of its close technological relationship to the automobile industry, which has been the subject of extensive earlier research. Preliminary analyses suggest that in spite of the technological proximity, the evolution of the industries proceeded quite differently. There are, moreover, pronounced differences between how the U.S. and the German industries developed over time. In addition to the tire and tractor industries, two further industries will be studied in the present research project. Data on the evolution of the German laser industry have already been collected. Through studying German magazine publishers we plan to extend the project beyond the manufacturing sector to further test the generality of the previous results.

The findings on industrial evolution indicate that firms can transfer relevant knowledge between activities in related industries, and also that spinoff founders rely on knowledge acquired in their prior employment that is not available to other founders. At the same time, the different patterns of survival and success observed in different industries have yet to be explained. Under what conditions do entrants into an industry benefit from their pre-entry experience? Why are specific kinds of pre-entry background more relevant for success in some industries than they are in others? The answers to these questions promise to shed new light on the role of firms' knowledge bases in the competitive process, an issue that has attracted much attention in resource- or capability-based approaches to the theory of the firm. It is the theoretical motivation of the present project to get a more thorough understanding of the capabilities of firms and of the processes in which they are adapted and transferred.

The empirical research on industry evolution may thus have far-reaching implications for organizational theory and regional economics. The international comparison moreover helps

to identify the impact of institutional factors on competitive processes. The present project consequently has direct links to other research done in the Evolutionary Economics Group, particularly to the work on the development of firms and on the nature and evolution of designed institutions.

Related Publications:

Buenstorf, G., and S. Klepper, 2003. 'The Origin and Location of Entrants in the Evolution of the U.S. Tire Industry'. mimeo.
 Klepper, S., 1997. 'Industry Life Cycles'. *Industrial and Corporate Change* 6, 145-181.
 Klepper, S., and K.L. Simons, 2000. 'Dominance by Birthright: Entry of Prior Radio Producers and Competitive Ramifications in the U.S. Television Receiver Industry'. *Strategic Management Journal* 21, 997-1016.
 Klepper, S., and S.D. Sleeper, 2002. 'Entry by Spinoffs', MPEW: Papers on Economics and Evolution # 0207.



T. Brenner, D. Fornahl

Local Industrial Clusters

Dirk Fornahl and Thomas Brenner

Background and aims

Local economic processes have attracted enormous interest in recent years. Scientists of different disciplines have realised that despite globalisation the local circumstances are of decisive relevance for firms in many industries.

The interaction between local institutions and other firms in the region is important for the competitiveness of firms. Therefore, the understanding of the relevance of these local circumstances has become the subject of many economic analyses and political discussions and programmes. The success of some regions, such as Silicon Valley in California or the districts in the so-called third Italy, has further increased the interest in local processes.

Furthermore, most industries show a quite unequal distribution in space (an example is given in Figure 1). Natural resources, nearby markets and costs of transportation are not sufficient to explain this characteristic of spatial distributions. Different alternative explanations have been investigated in recent years. A huge number of case studies is one result of these investigations, a multitude of more or less unrelated theoretical concepts is another.

Over the last five years, an attempt has been made in this project to develop a more general theory. This theory deliberately excludes all local specificities of clusters and concentrates on the factors and processes that are common among all local clusters. By using spatial data and by comparing all regions, this approach can complement existing case studies, but goes far beyond them. The main aim is the analysis of the processes that are involved in the emergence of local industrial clusters on a general level: why, when, where, and how do such clusters emerge? Besides this explanatory aim, the question of how political measures can influence the emergence of local industrial clusters is also addressed.

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Fig. 1: Spatial distribution of workers in the instruments industry in Germany.

Theory of the emergence of local industrial clusters

Most case studies of local clusters and most concepts for the explanation of their existence or success have one aspect in common: some self-augmenting process is claimed to be crucial for the studied developments. Therefore, the set up of a theory of clustering is based on the modelling of such a self-augmenting process (see Brenner 2001). Various mechanisms can be put forward that cause such a process. Examples are spin-offs, the accumulation of human capital, and spillovers. Concerning the theoretical predictions, the specific causes for the self-augmenting process are always the same (see Brenner 2001): Depending on the strength of the self-augmenting processes in an industry, clustering may or may not occur. If clustering occurs, the following dynamics are predicted (see Brenner 2004). During the first phase of the life cycle of local industrial clusters, usually when new markets or technologies emerge, many regions have, in principle, the potential to develop an industrial cluster, i.e. to contain a quickly growing firm population in the industry under consideration. Local circumstances and chance determine the growth processes in each region (see phase 1 in Figure 2). The second phase is characterised by the effects of the self-augmenting processes that cause a differentiation between the regions. Those regions that have exceeded a critical mass of firms and circumstances develop into a local cluster, while in the other regions the firm population becomes or remains comparably small (see phase 2 in Figure 2). The third phase of the life cycle of a localized industrial cluster is characterised by a situation in which a few local clusters exist that are quite stable. Only if the external circumstances dramatically change, for example, if a new technology replaces the old technology, might existing clusters disappear.

This theory leads to two questions that require an empirical analysis to answer them. First, the conditions that are responsible for the existence of local industrial clusters should be studied. Since not all industries show clustering, there seem to be specific characteristics of industries that cause the existence of local clusters. Second, a better understanding of the mechanisms that in some places do, and in others do not, lead to a local self-augmenting process is required. Such an understanding would allow for statements about adequate political measures for supporting the emergence of local clusters.

Existence of local industrial clusters in Germany

From the general theoretical model outlined, it follows that there should be a few regions that contain many firms of an industry and many regions that contain only few firms of this industry in reality. Depicting the number of regions in which a certain number of firms is found depending on this number of firms, a bimodal distribution should result (see Figure 3, straight line). If there are, instead, no local positive externalities, a unimodal distribution can be expected. The form of this distribution is determined by the geographic differences between the regions and stochastic influences. Empirical studies show that the unimodal distribution frequently has a form similar to the one depicted in Figure 3 by the dotted line (see Brenner 2004).

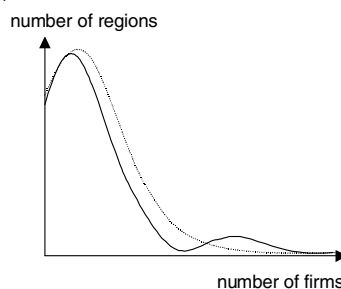


Fig. 2: Distribution of the number of regions containing a certain number of firms.

Thus, it can be assumed that a bimodal distribution characterises industries in which local clusters exist. Therefore, for each industry (3-digit level) for the years from 1995 to 2001 whether the unimodal or the bimodal distribution describes reality better has been statistically checked. It can be shown that in Germany around half of the manufacturing industries and around one fifth of the service industries are significantly better described by the bimodal distribution (see Brenner 2003b and 2004).

Besides identifying the industries that are described by a bimodal distribution, the above method can also be used to identify existing local industrial clusters in Germany. It is assumed that all regions that contain a number of firms that falls into the right peak of the bimodal distribution contain a local cluster in the industry under consideration. A list of local industrial clusters is obtained (see Brenner 2003b or 2004). The spatial distribution of the identified local industrial clusters is given in Figure 4.

Emergence of local industrial clusters

The questions of why, where and when local industrial clusters emerge is of high political interest. In the literature this is mainly discussed on the basis of case studies. In the research project three different strategies have been chosen to inquire into these questions.



Fig. 3: Number of local industrial clusters in each administrative district in Germany.

1) On the basis of the identification of local clusters the characteristics of industries that lead to clustering have been studied. Above, a distinction has been made between those industries that contain clusters and those industries that show no clustering. However, where empirical data are available for several years, it is also possible to identify industries in which new clusters emerge. Logistic regressions can be used to examine the characteristics that distinguish industries with local clusters and industries in which clustering emerges from those industries without clustering (see Brenner 2002 and 2004). As it turns out, industries that *contain* local clusters are characterised by a high share of intra-industrial spillovers. Industries in which clustering *emerges* are, in addition, characterised by a high number of process innovations and a high degree of local cooperation between suppliers and research institutes. It may be concluded that the latter two factors are somehow involved in the emergence of local industrial clusters. Although, local clusters might be different and emerge for different reasons, the results show that in a significant number of industries or cases, process innovations and local cooperation play an important role.

2) On a mainly general level we study the functioning of local mechanisms that are claimed to play a role in the emergence of local clusters. One approach analyses the impact of co-location on the innovativeness of firms (see Brenner and Greif 2003). Another approach studies the local dynamics of foundation activities. Research is conducted along two lines here. First, the interrelation between local industrial clusters and firm foundation activities are studied (see Fornahl and Menzel 2003). This project offers some new insights. In addition, a framework is developed by which empirical observations and further theoretical considerations can be structured. The core element is a feed-

back concept. On the one hand, firm foundations have quantitative and qualitative effects on the life cycle of a LIC in its different stages. On the other hand, the developmental stage of the cluster has an impact on the firm foundation processes and the firm's orientation. Second, in the stage in which a cluster is emerging, a high number of firm foundations can be observed. We analysed, on the basis of empirical data, the question in which regions, sectors and years such shifts in the level of foundation activity appear and which explanations for these observations might exist. One underlying factor for the dynamic process seems to be herd behaviour based on regional role models. Regional firm founders can serve as positive examples for other regional agents. Such examples influence the mental model of agents and thus influence the decision-making and foundation activities in general. The theoretical considerations are accompanied by empirical research based on expert interviews as well as on a survey of nearly 100 firms conducted in Jena in order to empirically test the described processes.

3) The characteristics of the processes that lead to the emergence of local industrial clusters are explored further by means of simulation studies (see Brenner 2003a, Brenner 2004). To this end a spatial distribution of regions, similar or identical to those in Germany, is implemented on the computer. Most of the factors that influence the emergence of local clusters are included. These are the local labour market, foundation processes, innovations, policy makers, cooperation between firms, and local education. The main aim of this study is to understand the temporal structure of the emergence of local industrial clusters. The results show that, if a new market emerges, there is an initial phase of firm foundations. After this initial phase the developments in the regions start to separate the regions into those that develop into a cluster and those that fall behind. The time span of this process seems to be relatively short (simulations suggest 2-5 years). After this second phase the situation stabilises. Policy measures that are implemented after this phase show little impact. In contrast, the support of start-ups seems to be most effective just after new markets have appeared, while the support of innovations and cooperation promises to be most effective during the second phase of the life cycle of clustering (see Brenner 2003a).

Policy Implications

What further political implications can be derived from the present research project with regard to eliciting and supporting regional economic growth? Is it possible to influence the emergence of local industrial clusters and, if so, by what political measures?

The theoretical and empirical studies conducted so far allow for some advice in this regard (a more detailed discussion can be found in Brenner and Fornahl 2003). First, there are usually some initial developments that precede the emergence of clusters. These are, for example, the foundations of firms that become crucial for the further development of the region, the joining of forces of several economic agents, or the occurrence of important innovations. Policy measures can rarely influence most of these initial developments. Take, for example, networks and firm foundations, which have been studied in detail in the research project.

The information flow within a region based on formal and informal contacts plays an important role for the emergence of many local industrial clusters, since it promotes the diffusion of knowledge and the innovation activity. These contacts or networks within a region often form the starting point for the development of a local cluster. Policy making has only limited possibilities to influence informal networks. In contrast, formal cooperation is more easily accessible to policy making directly, e.g. by the policy maker's own involvement in the network, and indirectly, e.g. by moderating appropriate communication structures. Even then, however, the emergence of networks presupposes some pro-active agents, particularly firms. If they are missing in a region, network promotion has little impact on the economic development of the region.

The support of firm foundations might be important especially during the initial phase of the emergence of clusters but, of course, potential firm founders need to be there in the first place. Education may be important for how many people have the ability and characteristics

that are necessary for founding a firm. Our research has pointed to the impact of role models on the entrepreneurial attitude. The foundation rates increase in regions where a prominently visible successful foundation has occurred. Policy makers can increase this effect by supporting the emergence of these positive examples or by increasing the visibility of already existing ones. However, since localized industrial clusters develop through different stages, firm foundations have a different impact during that development. The prospects of such policy measures can therefore only be assessed, if the current developmental stage of a local industrial cluster can be identified.

This aspect can be accounted for in simulations (see Brenner 2003a). As stated above, all political measures are likely to become ineffective once the respective markets stagnate and the local clusters have already emerged and stabilised. Furthermore, different policy measures are most effective at different points in time during the emergence of local clusters.

The analysis conducted in the research project shows that none of the policy measures discussed can induce industrial clustering directly. Policy measures can only increase the likelihood that a local clusters emerges in a certain region. There are regional factors, such as the existence of specific persons, firms and innovations, that can rarely be influenced from the outside. These factors are prerequisites for the success of policy measures. Hence, policy measures should be applied at a point in time late enough to judge whether these prerequisites are given and as soon as possible to develop an impact.

Related Publications:

- Brenner, T., 2001, 'Self-organisation, Local Symbiosis and the Emergence of Localised Industrial Clusters', MPIEW: Papers on Economics & Evolution #0103.
- Brenner, T., 2002, 'Innovation and Cooperation During the Emergence of Local Industrial Clusters', MPIEW: Papers on Economics & Evolution #0205.
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An Evolutionary Analysis of Long-term Qualitative Change in Human Labor

Christian Cordes

In all European countries the structure of employment and especially the problem of unemployment have caused lasting political concern. However, employment statistics aggregate over the huge variety of labor inputs and systematic long-run changes in the labor markets. An examination of the historical evidence of the latter changes can therefore provide important insights into these developments and their influence on contemporary labor issues. In a long-term perspective, the most significant feature is the fundamental change in the qualitative structure of human labor inputs.

To examine these massive qualitative socio-economic changes, the approach used in my study focuses on some causes of novelty that induce qualitative change and that are internal to the economy and internal to the agents. The generation of novelty is generic to all cases of evolution and a crucial qualification for evolutionary dynamics (see Witt, 2003; Dosi & Nelson, 1994). Evolutionary economics is committed to identifying, understanding, and theorizing about real generative mechanisms or driving forces underlying the flux of observable events and continuous change (see Foss, 1994). Human novelty-introducing creativity is one such fundamental driving force behind the observable economic process (see Metcalfe, 2002).

The present study is concerned with the genesis of novelty and examines some motivational underpinnings of human creative behavior from an individualistic perspective. The internal make-up of agents is explicitly addressed, as is their creative agency.

The Changing Quality of Human Labor Inputs

Most fields of today's labor economics have become a branch of applied microeconomics, lacking a historical dimension. However, an examination of the empirical evidence provided by economic history can yield important insights, also for contemporary labor issues. Conversely, economic history, including labor history, can benefit from the infusion of a properly conceived economic theory. In most of the models used by contemporary labor economists, human labor is at best decomposed into bimodal categories such as 'low and high skill', 'production and non-production', 'manual and non-manual', or 'blue and white collar', if it is not considered to be homogeneous (see, e.g., Hamermesh, 1996, p. 55).

In order to be able to carry out a more profound evolutionary analysis it is essential, in contrast, to focus on the many different qualities of human labor and the changes they have undergone in historical times. Accordingly, human work as a factor of production needs to be disaggregated so that the changing structure of the input factor human labor in long-term development, as well as the resulting implications for the socio-economic system, can be examined. For this purpose, a categorization of human capabilities has been worked out in the present study. Such a taxonomy of human labor inputs may be considered to be a methodological prerequisite for understanding the role of the rich variety of entities and phenomena related to human labor.

Moreover, the taxonomy turned out to be conducive to an analysis of the variety of motives and cognitions underlying heterogeneous labor supply and of the fundamental driving forces of socio-economic evolution.

In the historical record, a major recurrent pattern of socio-economic evolution can be identified: humans learnt to ease certain sorts of labor by applying tools. What is more, they found ways to successively transfer qualities of human labor to artificial devices that could be combined with non-human energy sources later on. In the long-run, the evolution of human labor appears as a sequence of switches between regimes in which the knowledge

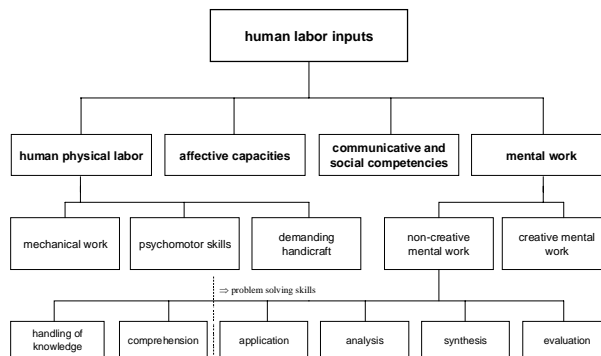


Fig. 1. A taxonomy of human labor inputs

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about the potential and the economic feasibility of possibilities to transfer certain sorts of labor to artificial devices is mirrored in a characteristic structure of qualities of labor employed in the production process.

In the pre-industrial agricultural economy, physical labor was the dominant quality of human labor employed in production. After man had learnt to combine mechanical devices with non-human sources of energy, the physical aspects of human labor became less important. Instead, more and more aspects of mental work were required as labor inputs. In the further course of technological evolution, even simpler forms of mental work were transferred to machines. Controlling and monitoring tasks as well as transmitting, processing, and registering of information are automated by electronic devices. At the same time, sophisticated technology and a soaring innovativeness in goods and services require a growing amount of problem solving skills and creative work. As a consequence, employment possibilities remained in higher mental work.

Depending on the attained technological knowledge about the transferability of certain sorts of human labor to artificial devices and about the possibilities to tap non-human energy sources, instances of upskilling or deskilling occurred in socio-economic development. The concrete human capability, which could be substituted with artificial devices and non-human forms of energy, determined an increase or decrease in the vocational demands on the workforce. This historical process altered the qualitative structure of human labor inputs significantly and is closely intertwined with technological advancement. Moreover, the possibility to ease or replace a certain quality of human labor with mechanical appliances or electronic automata permitted a multiplication and acceleration of tasks formerly done by humans. The resulting productivity gains triggered periods of strong economic growth.

Human Labor Effort and the Search for Novelty

Given the significance of technology in the course of socio-economic evolution, the driving forces behind the continuous accretion of technological knowledge deserve particular attention. In the study a hypothesis about the motivational underpinnings of human technological creativity is suggested, which is able to explain some of the long-term developments in human labor and technology described in the first part of the thesis. The motivational underpinnings seem to be similar for human beings. They can therefore be assumed to represent a commonly shared feature of human preferences or wants.

According to virtually all psychological theories of motivation, organisms strive to increase pleasurable stimulation and to decrease painful experiences. There is a universal desire to avoid negatively assessed activities and stimuli (see, e.g., Weiner, 1992). In physiological psychology, the importance of findings of adaptation level theory with respect to perception, motivation, and judgment of stimuli is well known. This concept explains the motivational mechanisms behind approach/avoidance tendencies in behavior. Adaptation level effects are pervasive in human actions (see, e.g., Scitovsky, 1992).

The propositions of adaptation level theory also apply to human physical performances. This leads to the following hypothesis:

Hypothesis 1: Physical activity beyond an individual's level of adaptation yields negatively assessed stimuli. Hence, the organism is motivated to find ways to avoid physical effort exceeding that level.

Hypothesis 1 implies that perception, intellection, and action of the organism are directed at transforming an existing, unsatisfying situation.

In this context, learning plays a crucial role: people are able to learn to prevent unpleasant stimuli, i.e. to meet, for example, a want for physical ease. Via avoidance conditioning, which is a form of instrumental conditioning, the instrumental response prevents the occurrence of an aversive stimulus (Domjan, 1996, ch. 11). In the realm of technology, avoidance learning and cognitive learning are of particular importance. The following hypothesis is proposed:

Hypothesis 2: The utilization of services provided by tools is an adequate instrumental response to avoid the aversive stimulus triggered by physical activity beyond an individual's adaptation level. One motivation for employing tools, implements, and machinery, and thus one driving force of technological evolution and technological creativity is, therefore, the indirect satisfaction of the want to avoid excessive physical activity.

The satisfaction of the proposed want for ease becomes feasible by the utilization of services provided by tools. Once this means-ends-relationship is recognized, it may be assumed to be a major motivation for humans to exert creative mental work by constructing artificial appliances and thus to accumulate a certain kind of knowledge. In the course of the evolution of technological culture, people have accumulated continuously more and more knowledge about the linkages between the services of tools and wants. There is a large amount of historical evidence from inquiries into the evolution of technology to substantiate the perpetual struggle of man against physical drudgery by means of technical progress (Mokyr, 1990, p. 205).

As an outstanding exception in evolution, the human species learned an efficacious way to meet the challenge of scarce resources provided by the environment: the usage and manufacture of more and more complex tools. The shift to using tools and technology to adapt to a dynamic environment was a major behavioral change for man. Instead of the slow and inflexible adaptation of anatomical structure and physiological function over successive generations by selective survival, tool-use and the resulting cumulative culture of technology embodied a reproductively advantageous, flexible, much faster, and bioenergetically more efficient course of adaptation. These artificial aids provided by exosomatic cultural evolution entailed an unprecedented increase of the efficiency of human physical effort in subsistence and production. As the production process gained in complexity, each subsequent generation became more genuinely 'tool-dependent'.

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Urban Change and the Law

An enquiry into the economic rationale of land use law

Christian Schubert

Property rights concerning land use are subject to intense regulation almost everywhere in the industrialised world. This holds within densely populated urban agglomerations in particular where conflicts between incompatible land uses are ubiquitous. In Germany, for instance, over the last 100 years, a complex web of private and public law regulations ('Baurecht', including both Nuisance and Zoning Law) has developed that constrains land use decisions of individual urban landowners, regulates land use conflicts, and influences the development of urban structures. That 'Baurecht' has recently come under increasing critical scrutiny. It is regarded as (i) an imprecise and ineffective tool to influence land use decisions (and urban development); (ii) a source of inefficient and unfair rent-seeking insofar as it artificially restrains the supply of real property; (iii) a stumbling block for corporate investors' siting decisions, and finally (iv) as undemocratic in prescribing hierarchical procedures for settling land use conflicts. In response to the critique a far-reaching reform is under way that attempts to make German land use law more 'decentralized', 'market-like' and 'co-operative'.



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Regional Industrial Clusters (such as Leuna/Germany) are one prominent example for the workings of processes of spatial self-organization

The reform has been and continues to be inspired mainly by economists relying on insights from Law & Economics (Schatz 1996). Starting with a seminal paper by Coase (1960), the *Law & Economics* school has tried to develop 'rational' legal rules for co-ordinating individual land use (Cooter and Ulen 1999). In contrast, my thesis attempts to shed light on the economic rationale of this body of law from an evolutionary perspective. It argues that its function is to adjust the institutional underpinnings of complex system dynamics in a way that is generally agreeable, rather than to provide for the efficient allocation of a given and closed set of land use rights.

'Rational' Law from a Coasean Perspective

According to Coase (1960), if transaction costs are sufficiently low, land use conflicts can be resolved efficiently through decentralized bargaining by the parties involved who hold the information about the true costs and benefits of alternative real property rights allocations. Building on this idea, Calabresi and Melamed (1972), among others, have developed precise principles guiding the efficient design of land use law: In the case of a land use conflict, if transaction costs are sufficiently low, the court should assign *injunctive remedies* (i.e. clear land use prohibitions); then, the parties involved may 'bargain around the law' if, from their point of view, an alternative rights allocation proves superior. If, on the other hand, transaction costs are too high for that to happen, judges should assign *damages*, i.e. they should award them to the party that would have 'sold' the relevant property right if a Coasean bargaining had taken place (i.e., if transaction costs would had sufficiently low). Put differently, from the Law & Economics perspective, the court ought to 'mimic' the market result, in order to realise an efficient (i.e. land rent maximizing) property rights allocation.

However, in contrast to that normative ideal, in real-world conflict settings, parties have repeatedly been observed either to rely on informal social norms instead of decision-theoretic bargaining concepts or to refuse to bargain at all, even if transaction costs were relatively low (Ellickson 1995). On closer inspection, it turns out that even in Coase's original model, i.e. at the theoretical level, the parties involved in a land use conflict are stuck in a bilateral monopoly. Hence, it would be rational for them to engage in (wasteful) strategic threats and counter-threats that make it unlikely to ever reach a mutually beneficial property rights exchange (Schlicht 1996).

Moreover, in contrast to Law & Economics' static concept of the economic system that is to be governed (either centrally or decentrally), urban agglomerations are open social systems that (i) display complex non-linear dynamics and (ii) generate endogenous change and novelty (Boschma and Lambooy 1999, Krugman 1998). Such conditions can better be analysed by means of theoretical tools used in Evolutionary Economics. Accordingly, political and judicial decisions about the allocation of land use rights can be regarded as institutional interventions into an ongoing process of economic self-organization. Three points are then center stage: first, in general, evolving social systems exhibit genuine *uncertainty*; second, within complex urban systems, externalities are not objectively 'given', but *cognitively constructed*; third, the mainstream approach starts from an inadequate *normative* assumption: It does not make sense to focus on allocative efficiency as a policy goal when the social system under consideration is an open, endogenously evolving one.

Urban Agglomerations as Open Evolving Systems

What does it mean to describe urban systems as 'complex' and urban change as an 'evolutionary' phenomenon?

The dynamics of such urban systems are characterised by two features: First, structural change of urban agglomerations is *path-dependent*. This means that from an *ex ante* perspective, the interaction of the individual land users can generate multiple equilibria on the macro level; the macro result is then indeterminate. Which (temporary) equilibrium is reached depends crucially on historical (random) events in the early course of development. On the micro level, path-dependency is caused by the fact that many individual land use choices are interdependent: Firms often prefer to locate where other firms have settled before; private households prefer to buy or rent houses near other households with certain characteristics (and to avoid households with other 'undesirable' characteristics), etc. This interdependency causes positive feedback loops, i.e. self-augmenting dynamics.

The second feature of the micro behavioral dynamics underlying land use choices is the following. Many individual land use decisions are interdependent in the sense described above for an *epistemic* reason: Firms and private households attempt to exploit highly specific *knowledge spillovers* by locating near certain other land users. Geographical proximity makes it easier to learn about costs and benefits of alternative locations by observing other agents' experiences; it makes it cheaper to engage in face-to-face communication, a mode

of interaction that becomes the more important the more economic goods and services are based on knowledge. Hence, the key 'welfare contribution' of urban agglomerations does not consist of maximizing the aggregate land rent of a given geographical area; rather, it consists of the exploration of new (and exploitation of given) productive knowledge spillovers that are typically observed within densely populated areas (Anas et al. 1998).

Two policy implications seem to flow from these insights. First, the processes of urban change should allow spatial knowledge spillovers to be explored and exploited; thus, individual land users should be given the maximum number of autonomous opportunities that is compatible with their neighbors' analogous autonomy. They should be free to try out innovative land uses and land use combinations. Second, since, however, the spatial macro patterns resulting from the interplay of individual land use decisions may often be evaluated as 'undesirable' by the individuals concerned, this negative evaluation should be accounted for in some way. As a rule, individual land users are 'unsatisfied' with the macro results if the latter imply negative distributional effects (this problem of 'spontaneous disorder' [Schelling 1978: ch. 1] can be observed with economic innovations in general, see Witt 1996). Thus, the normative dimension of urban change has an epistemic ('Hayekian') and a distributional aspect – the legal rules governing urban change should be analyzed accordingly.

A Constitutional Economics Perspective on Urban Change

The two normative ideas just mentioned can be integrated into an overarching conceptual framework if a *contractarian* viewpoint (Vanberg 1999) is adopted. Then, the (legal) rules of the market game are judged as acceptable if they can be rationalised as being part of a social contract that is agreed upon by all individuals affected from behind a 'veil of ignorance'. The veil metaphor serves as a model for the moral viewpoint of a fictitious impartial observer. What arguably counts from this observer's perspective is not an exclusive focus on the static efficiency characteristics of alternative legal rules, but rather their epistemic implications and their distributional impact. Moreover, within an endogenously evolving urban system, this impact can only be imperfectly anticipated. This means that, in order to be generally acceptable, legal rules cannot be drafted once and for all time, but have to be continuously adjusted in the light of their real-life impact. In the context of land use conflicts, this adjustment is the key task of both local planning boards and courts: If new land uses generate a new conflict, the real property rights of the parties concerned have to be materially re-defined. As Hayek (1949: 20, *my italics*) has emphasized, this problem cannot be solved by simply pointing to the superiority of exclusive rights: According to him, this holds in particular in the context of real property, "where the recognition of the principle of private property helps us very little until we know precisely *what rights and obligations ownership includes*". In a contractarian perspective, it includes those rights and obligations that can plausibly be agreed upon by all individuals concerned.

Yet, the contractarian approach is not compatible *per se* with an evolutionary perspective on economic systems, because there are two powerful objections that have to be constructively answered. The first one has been developed by David Hume (1748/1992) who argued that (i) historically, social order has been established by informal social conventions, rather than by 'artificial' lawmaking, as suggested by the 'social contract' metaphor; inspired by this observation, he claimed that (ii), informal conventions are also normatively prior to con-



Jena's Goethe-Gallery mall illustrates what can be achieved by the conscious, rent-maximizing arrangement of individual land uses

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sciously designed contract rules. For it is only through conventions (such as, e.g., 'pacta sunt servanda') that contract rules develop any normatively binding force. Hence, any reasoning about which rules of the game should be regarded as 'generally agreeable' has to start from the given institutional background of a given society. Contractarian conclusions are, then, unavoidably historically and culturally contingent.

The second, more specific, objection has been put forward by Friedrich A. v. Hayek (1949, 1973) who argued that 'constructivist' law making can harm the economic system's capacity to process decentralized knowledge, in order to allow for an ever more complex specialization of labor. In this view, it is only spontaneously evolved 'rules of just conduct' that can provide the adequate institutional underpinning of market processes. But even Hayek admitted that 'sometimes' these informal rules have to be 'corrected' because institutional change can lead into development 'traps'. Thus, a contractarian approach to normative economics can be compatible with an evolutionary 'world-view', provided that the side condition of maintaining the economy's knowledge-processing capacity is accounted for. Moreover, Hayek points to the need to evaluate collective decision-making procedures according to their capacity to generate and diffuse new knowledge about the effects of legal rules.

If these two objections can be accounted for by a properly conceived contractarian approach, then, in principle, it should be compatible with the evolutionary model of urban change, i.e. should be able to serve as a basis for an economic analysis of those legal rules that govern the processes of urban change. The most promising candidate for providing such a basis is the contractarian approach implied by John Rawls' (1971/1995) theory of 'justice as fairness' which will be outlined in the next section.

A Rawlsian Framework for the Economic Analysis of Law

The political philosopher John Rawls is one of the key contributors to the renaissance of analytical contractarian thought in the 1960s. He developed the hypothesis that behind a 'veil of ignorance' rational agents will vote for the 'Difference Principle' according to which, "social and economic inequalities...must be to the greatest benefit of the least advantaged members of society" (Rawls 1971/1995: 302). Hence, inequalities are not unjust *per se*; rather, they are unjust if they imply a distributional pattern that systematically excludes individuals from the co-operative surplus of economic interactions. Thus, Rawls explicitly accounts for the interdependence between allocation and distribution.

What is more important, though, is the way in which he tries to justify the implications of his 'veil of ignorance' model (which plays a key role in any contractarian theory). Starting from the agents' social preferences and the moral intuitions and social norms underlying them, an interactive social learning process is modeled. In the course of that process the 'common denominator' of these preferences is distilled, which in turn serves to derive a set of general principles that are to govern the design of the rules of the market game. Thus, the design of the contractarian 'impartial observer' model is not *ad hoc*; rather, it is (i) explicitly based on the agents' moral common sense and (ii) modeled as the outcome of a social learning and deliberation process. Collective decision-making procedures (such as, e.g., administrative procedures, public hearings, and lawsuits) are then to be evaluated according to their capacity to organize such a deliberation process.

In such a perspective, the economic analysis of law undergoes a fundamental refocussing: Legal rules are 'rational' if they (i) establish a decision-making procedure that generates generally agreeable 'rules of the game' in the Rawlsian sense, or (ii) if they can be rationalized as the plausible outcome of the application of a Rawlsian 'veil of ignorance'.

Some Applications

How can the very abstract reasoning of the contractarian approach outlined be applied to concrete legal regulation issues in the context of (German) land use law?

While the mainstream 'Coasean' approach to the economic analysis of law regards land use law as a set of tools to allocate property rights in an efficient (i.e. land rent maximizing) way, the contractarian approach takes a different stance. Considering the evolutionary char-

acter of processes of urban change, the key task of law is seen as maintaining an institutional framework that allows for the decentralized exchange of real property rights in a way that is agreeable to all market participants. Put differently, the task is to *organize a market* under difficult conditions, namely, the conditions of an endogenously evolving open system whose future development can only imperfectly be anticipated. To exemplify what this means, three controversial land use questions are briefly discussed.

First, German as well as US land use law constrains the local municipality's leeway to engage in bargaining with private parties about the re-allocation of real property rights – there must be an 'essential nexus' or 'reasonable relation' conceivable between the *quid* and the *quo* of the bargain. While from a Coasean perspective, this constraint seems irrational, from a contractarian position it is part of the constitutional meta rules that delineate the scope of admissible moves within the post-constitutional market game. In particular, it reflects distributional norms, whose neglect hampers the Coasean bargaining solution (see above).

Second, in both German and US land use law the question of how to compensate individual landowners for regulatory interventions is a contentious one. Generally, courts award compensation if a given intervention is classified as a 'taking' ('Enteignung' in the German law). According to Law & Economics, this decision should depend on the incentive effects of alternative compensation rules. From a Rawlsian perspective, however, both the 'fairness' of the resulting distributional pattern and the intrinsic value of the individual liberty rights affected should play a role too.

Third, the siting of undesired 'not-in-my-backyard' facilities (such as, e.g., factories, incinerators, or power plants) often provokes fierce land use conflicts. Basing the siting decision on a monetary cost-benefit calculation alone has proved to be ineffective in increasing aggregate welfare, as the individuals affected voiced opposition against 'unfair' decision-making procedures (Frey et al. 1996). A Rawlsian approach allows these procedural preferences to be integrated into the conceptual framework guiding the economic analysis of law.

The gist of the argument of my thesis is that the economic analysis of law has to be re-oriented in light of what we know about the evolutionary 'ontology' of those social systems (such as, e.g., urban systems), which are the object of legal regulation. Within the process of open-ended, endogenous urban change, the institutional underpinning of a market order can only be maintained by continuously adjusting real property rights in a way that accounts for both the perceived 'fairness' of distributional effects and the intrinsic weight of individual rights. From an evolutionary point of view, the contractarian methodology has to be modified in order to base the normative evaluation of legal rules on the social preferences of the individuals concerned. Then, the set of collective-decision mechanisms should be assessed according to its capacity to reach this goal.

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Basic Research and Knowledge Transfer in National Systems of Innovation

Christian Zellner

What is the socio-economic significance of basic research in modern economies where the creation of new economic value increasingly depends on the quality of the knowledge base that underlies productive processes? What are the channels and mechanisms through which results of basic research become available to potential commercial application? And how is the economic contribution of basic research generally perceived by the public and by policy-makers? These were the questions addressed in the present thesis, which investigates the particular case of the Max Planck Society, which is the main basic research organisation in Germany.

The importance and social relevance of these questions is largely related to the problem that the benefits of basic research might be less readily visible as compared to those of the applied research and development activities whose explicit aim is to provide solutions to specific technological problems with a significant commercial value. The starting point of the study is the argument that the *a priori* independence of basic research from utilitarian concerns about the application of future results to "practical problems", by no means implies that basic research cannot have substantial economic effects. Related to this is the public discussion about what basic research should deliver in terms of its contribution to strengthening national innovative capacity. These points imply the need for thorough empirical investigations of how and when basic research leads to economic effects.

From an organisational perspective, this issue is inextricably linked to the question of how new knowledge from basic research is transferred into other search activities which are more directly motivated by technological constraints and problems. These other activities often, but not exclusively, take place in the commercial sector. In order to better understand the transfer mechanisms, an individualistic perspective has been adopted in the thesis, which focuses primarily on the individual scientists as repositories of knowledge. With such a focus, a broad notion of knowledge arising from basic research becomes available, the various elements of which can then be assessed with respect to their commercial relevance.

Accordingly, the working hypothesis is that a rather important aspect of the economic effects of basic research is the migration of scientists into the commercial sector of the innovation system. An empirical investigation of the economic significance of the migration pro-

cess must thus focus on the migrating scientists' destinations and career trajectories within and across commercial firms. Furthermore, it has to clarify the question of the extent to which scientists in a variety of functions and industries draw upon the knowledge they had previously accumulated as part of the research process. An implicit assumption in earlier studies on the subject has been that the contribution of basic research is confined to the codified knowledge it produces. Investigations into how new knowledge is transferred are therefore often restricted to mechanisms that rely on codification (publications in scientific journals, patents, etc.). This has led to a systematic neglect of the role of basic research in the context of incremental technological improvements, which, however, seems to be particularly relevant in the context of scientists' migration.

Study Design and Data

The hypothesis that the economic benefits of basic research arise, to a significant extent, from scientists' migration into the commercial sector of the innovation system is tested based on original survey data obtained from a sample of scientists formerly employed at the Max Planck Society (MPS), Germany's main non-university basic research organisation. Focusing in particular on the natural sciences, three institutes from the Biology & Medicine Section (BM) and six institutes from the Chemical, Physics, & Technology Section (CPT) were selected. Selection criteria included size, age and the institutes' specific history. The criteria also reflect a deliberate emphasis in the present thesis on the socio-economic role of basic research beyond the life -sciences.¹

At the Max Planck Society, about 700 PhD dissertations are completed annually (<http://www.mpg.de/englisch/forsch/wissnachwuchs.html>), suggesting a total number over the period studied (January 1990 – August 2001) of around 8,000 dissertations. Among the nine institutes included in the sample, data on published dissertations indicate that around 1700 dissertations were produced between 1990 and 1999.² This can only give a rough indication of the size of the actual population studied, because a) there might be some time lag between obtaining the PhD and the publication of the work; b) nearly half of the respondents (46.7 per cent) migrated after having held a post-doctoral position for some time; and c) a small number of individuals leaving a post-doctoral position had not in fact been enrolled at that institute for their PhD³.

In order to test the hypotheses, the career paths of a sample of 569 scientists, most of whom had left their respective Institute since 1990, were followed. By contacting them and asking them to complete the survey questionnaire, detailed data could be obtained on a) the characteristics of an individual's career, such as date of entry into the commercial sector, number of jobs held since, income earned, and so on, and b) these individuals' subjective assessments of the importance of their knowledge in the context of their current job or position. A response rate of 37.6 per cent meant that the resulting sample consisted of 214 individuals.⁴ The difficulties involved in finding these people are reflected in the distribution of migration dates:

Transition:	before 1990	8.9 percent
	1990 – 1993	16.4 percent
	1994 – 1997	24.3 percent
	1998 – 2001	50.5 percent

¹ Most empirical studies of the implications of scientists' migration for knowledge transfer concentrate on the life -sciences.

² Calculation based on the list of PhD -theses in *MPG-Jahrbuch Veröffentlichungen*.

³ These factors as well as the heterogeneity of Max Planck Institutes complicate the calculation of reliable turnover rates into industry. Schmoch *et al.* estimate the proportion of people in non-public destination sectors at around 40 percent (Schmoch *et al.* 2000, p. 16, graphic 3.3.-10). This is probably a conservative estimate, since a substantial number of scientists start their career in industry after having held a post-doctoral position elsewhere, often in the USA.

⁴ Out of the 214 respondents, 193 (90.2 per cent) left the MPS between January 1990 and August 2001.

Data on embodied knowledge transfers associated with the migration were always obtained with respect to the respondent's *current* job. The subjective ratings given thus reflect a variety of industries and functions. While functions tend to change over the course of a career, there is little reason that they should be systematically related to the disciplinary orientation of scientists' former institutes. By contrast, the distribution of people over industries is probably related to the specific Max Planck Institutes included in the sample. Therefore the distribution is presented in Figure 1 to inform the interpretation of the empirical results below.

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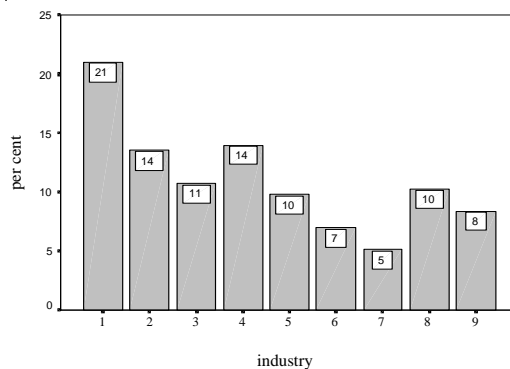


Figure 1: Relative share of respondents by industry

The classification used in figure 1 is as follows:

- 1 chemicals
- 2 pharmaceuticals & biotechnology
- 3 optics & instruments
- 4 IT & software development
- 5 semiconductors & telecommunications
- 6 electrical manufacturing & energy
- 7 automobile, aircraft, space
- 8 consulting, banking, insurance
- 9 other.⁵

Hypotheses and Empirical Results

In order to be able to investigate the hypothesis that a substantial proportion of the economic effects of basic research is associated with scientists' mobility, it is useful to distinguish between different elements of knowledge involved in basic research as in Figure 2.

⁵ It should be noted that the distribution of respondents over industries as given in Figure 1 is the distribution at the time of the survey. Comparing it to the initial distribution over the first destinations (not given here), no strong patterns are discernable – a result which suggests that there is little inter-industry migration over the course of the career.

	NON-SPECIFIC KNOWLEDGE	SPECIFIC KNOWLEDGE
Scientific Skills	analytical skills for the recognition, formulation and solution of complex problems	methodological knowledge about experimental procedures and research techniques
Propositional Knowledge	broad, general knowledge of and familiarity with the discipline	propositional knowledge from current research
Technicalities	application of information technology and data processing, including data analysis, the design of simulations and programming	knowledge about and experience with physical instrumentation and laboratory equipment

Figure 2: A classification of the knowledge components of basic research

In the classification, which was developed as part of the project, the actual "output" or product of the research process, namely specific propositional knowledge, represents but one aspect of basic research. Moreover, different types of knowledge appear to lend themselves to differing degrees to codification, suggesting that their successful application in the research process depends on their accumulation by individual researchers, who might later transfer them into other activities. The classification provided the basis for the derivation of a set of hypotheses seeking to specify in more detail how basic research leads to economic effects in the commercial sector of the innovation system. The hypotheses were tested with the data obtained from the 214 former Max Planck scientists in the sample. They were asked to rate the importance of each one of the six elements of knowledge on a scale from 1 (unimportant) to 6 (very important), judged from the perspective of their current job.

First, the statistical analysis shows that non-specific knowledge was rated more important than specific knowledge. This result holds for scientific skills and propositional knowledge as well as technicalities. In other words, the knowledge related specifically to the research questions the scientists worked on while employed by the MPS are not the most important elements transferred into the private sector. Rather, former Max Planck scientists indicated that they primarily draw upon their acquired analytical skills and problem-solving capacity, informed by a broad familiarity with their respective discipline. Given the *a priori* independence from utilitarian considerations under which basic research is conducted, this is indeed what one would expect.

Second, whether scientific skills are valued more highly than propositional knowledge is investigated. While theoretical arguments from the literature on science and innovation suggest that the set of skills scientists acquire as part of the research process may not only be important in the context of basic research, but beyond that, are also a crucial input into other types of (search) activities, propositional knowledge generated in basic research has received by far the most attention in innovation studies. The results show that scientific skills are indeed rated more important than propositional knowledge both for the categories of knowledge classified as "specific" as well as for the non-specific knowledge categories. This shows that methodological knowledge carries a higher potential for the creation of economic value in areas other than basic research.

Third, the relative importance of the knowledge categories in Figure 2 is analysed for different functions scientists take up in the destination sector. The questionnaire results show that a large share of the scientists moving into industry started their careers in the companies' research and development (R&D) departments, which play a central role in creating and sourcing commercially exploitable knowledge. The hiring of scientists for R&D seems to

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have several motives. Most importantly, it brings people into a firm who have a background in structuring and solving a diverse range of problems. Furthermore, the continuous recruitment of scientists represents a mechanism that allows the firm to systematically test and evaluate the potential of the latest extra-mural research with respect to its technological strategies. This potential arises from the fact that within a short time frame scientists are exposed to both worlds and thus have a substantial advantage in assessing potential implications of the basic research currently carried out in public research organisations from a commercial point of view.⁶

In the light of these considerations the hypothesis was developed in the thesis that specific knowledge (i.e. the knowledge elements on the right-hand side of Figure 2) is valued more highly by scientists in R&D than by those in other functions. This hypothesis is indeed strongly supported by the data from the questionnaires. It may be inferred that hiring scientists from basic research organisations is an important way for commercial firms to gain access to the latest methods, techniques and scientific insights. Naturally, it is of particular significance for firms in so-called "science-based" industries. The latter include not only biotechnology and the life -sciences, but also e.g., the semiconductor and chemical industries.

These empirical findings provide new evidence on the contribution of basic research to national innovative capacity. Most importantly, the thesis has substantiated the claim that important socio-economic effects of basic research accrue through the embodied knowledge transfers associated with scientists' migration into the commercial sector. In comparison to patenting activities and the foundation of spin-off companies, which are much emphasised in earlier studies, the economic significance of scientists' migration must not be underestimated. The migration process and the knowledge transfer it implies point to an efficient institutional division of labour in generating and exploiting new knowledge in a national innovation system. The currently not uncommon calls in public for making basic research more practically "relevant" do not seem to acknowledge the efficiency of that arrangement.

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⁶ The essence of this point is similar to Cohen and Levinthal's (1990) concept of "absorptive capacity", suggesting that R&D is not only required to internally solve technological problems, but also for firms to be able to effectively identify and assimilate externally produced knowledge.

Conferences and Workshops

Workshop on Evolutionary Economics, Buchenbach (Germany)

May 14 - 17, 2003

On the maps of Black Forest hikers, Buchenbach is just a lovely spot with some 3,000 inhabitants, located about 15 kilometers east of Freiburg. On the mental map of Germany's Evolutionary Economics community, though, Buchenbach has a far greater significance. For every two years, the village hosts the workshop and summer school of the standing committee for Evolutionary Economics within the 'Verein für Socialpolitik', Germany's main economic association. The latest (sixth) workshop, supported by the Fritz Thyssen foundation, took place from May 14 through 17, 2003. The main topics to be discussed concerned approaches to explain the evolution of firms and industries, the evolutionary theory of economic policy-making, institutional economics issues, and methodological problems. Several "keynote lectures" by distinguished scholars and a general panel discussion provided the participants with the opportunity to exchange their views on overarching questions regarding both the theory and the applied level of Evolutionary Economics.

Sylvie Geisendorf (Kassel) gave an introductory talk about the adequate concept of 'Evolution' to be used in theories of economic change. Analyzing the nature of evolutionary mechanisms that are effective in economic development, she concluded that the variation-selection paradigm known from theories of biological evolution is usable in economic contexts as well, but should be complemented by models of specifically human cognitive capabilities. In his keynote lecture, Ulrich Witt (Jena) also discussed the role of Darwinian concepts in evolutionary theorizing. According to him, the notion of 'Evolution' should ideally refer to only a few abstract principles which all domain-specific (as, e.g., cultural and biological) evolutionary processes share. Applying biological analogies directly to the economic realm would in his view rather lead to a neglect of the specificities of cultural, man-made evolutionary processes. Witt continued to develop a theoretical framework to model the linkages between the level of genetic inheritance and cultural, learning-based evolution.

These issues were also taken up by Geoffrey Hodgson (Hertford) who, in his keynote lecture, discussed the legacy of one of the modern classics in Evolutionary Economics, Nelson and Winter's "Evolutionary Theory of Economic Change". There, the authors apply core Darwinian concepts like variation, inheritance and selection to a firm-theoretic context. Hodgson criticized their approach as suffering from an inconsistent definition of the key concept of 'routine' which, according to him, should rather be modeled as a genotype and a replicator within the frame of a broad Darwinian analysis.

On a more applied level, Cornelia Friedrich (Dresden) employed analytical tools from Evolutionary Economics to examine similarities and differences between the so-called 'Old Economy' and the 'New Economy' regarding competition and market structure. In particular, she presented a simulation model based on replicator dynamics to study the evolution of market structure in different 'New Economy' (or 'E-conomy') scenarios.

Ferri Leberl (Dresden) presented a paper, co-authored by Michael Zeidler, that explores the question if the competition-based mechanism to uncover decentralized knowledge and transform it into 'objective' knowledge, so famously postulated by Hayek, is already discernible on an intra-individual level. In order to provide an answer, the authors have conducted a stock-market experiment where they tested the hypothesis that boundedly rational individuals are motivated by the market mechanism to put themselves, by way of imagination, in the position of trading partners in order to gather and process productive information.

Christian Hederer (Witten-Herdecke) introduced the workshop's part on the theory of policy-making. He examined the question of the distributional implications of innovation dynamics, which has largely been neglected by Evolutionary Economics scholars so far. He developed a conceptual framework that may help to examine the consequences of economic novelty in

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Geoffrey Hodgson (r.) in a discussion with Christian Cordes

Buchenbach

terms of social stratification patterns and 'social mobility'. One key research questions concerns, e.g., the possibility that the emerging 'knowledge society' may foster the social exclusion of some of its members.

Raimund Bleischwitz (Wuppertal) discussed the question how 'evolutionary economic policy' might be conceptualized when it is explicitly taken into account that the state has unavoidably limited knowledge resources at his disposal. To this end, he developed a theory of 'institutional design and reform' that may serve as a starting point to build up a theory

Jan Nill (Berlin) constructed a conceptual framework of 'ecological innovation policy' that appears to be necessary since the generation and diffusion of environmental innovations by markets is not self-evident. For according to Nill, evolutionary dynamics (as, e.g., path dependencies) may reinforce appropriability problems that are mainly due to ubiquitous externalities in the market-place.

Jan Schnellenbach (Marburg) discussed the hypothesis, put forward by the sociologist Ralf Dahrendorf, that the year 1989 has marked the end of any fundamental debate on economic systems, because a principal commitment to diverse variants of the market order seems to be largely undisputed nowadays. Schnellenbach showed that this hypothesis is difficult to reconcile with basic neoclassical approaches to economic policy-making. If, however, the scope of analysis were extended to epistemological problems, then a decentralised experimentation with policies might look reasonable.

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Alexander Ebner (Erfurt) developed the hypothesis that economic theories of policy-making should take into account a variety of institutional, network-based 'governance' modes that during the last decades have empirically emerged as intermediaries between the 'market' and the 'state'. As Egner argued, covering these phenomena would also provide one with better conceptual tools to examine the change of regulatory mechanisms over time.

Introducing the section on 'Industry and Firm' topics, Markus Becker (Odense/Denmark) proposed ways to operationalize the concept of organizational 'routine', central to any evolutionary theory of firm development. Based on empirical work on firm routines and their change over time, Becker identified their most important characteristics and developed hypotheses that established a link between them and both the antecedents and the outcomes of routines.

Hagen Worch (Jena) discussed two different theoretical approaches that aim to explain the organizational development and structure of firms, namely the 'developmental' and the 'organizational ecology' approach. In particular, both approaches differ in the role they accord to the entrepreneur. Comparing their explanatory power with the help of empirical case studies, Worch concluded that the former approach yields better predictions concerning the evolution of organizational patterns within firms. The search for regularities within processes of firm growth should therefore be based on the developmental approach.

Dirk Fornahl (Jena) presented recent empirical insights into the impact of role models on the decision to found a firm. This serves as a contribution to answer the question how the observable disparities in regional start-up activities and the related dynamics can be explained. According to Fornahl, it is only by taking into considerations factors like human capital and the influence of socially shared 'mental models' - which are moderated by regional learning processes - that the individual decision to start a firm can be analyzed appropriately.



A hike around the Feldberg, the Black Forest's highest mountain, gave workshop participants the opportunity to informally exchange views and discuss future common research projects

Based on empirical observations, Michael Stephan (Hohenheim) discussed firm strategies of corporate diversification in order to identify evolutionary paths of diversification patterns. With the help of evolutionary theorizing, he explored the question what factors determine these patterns.

Buchenbach

Jens Krueger (Jena) examined productivity dynamics in U.S. manufacturing industries. Based on econometric studies he developed the hypothesis that the observed productivity transitions can be described by means of a first-order Markov process. Krueger concluded that transitions work differently in high-productivity industries than in low-productivity ones. Hence, productivity growth among these industries is differential and leads to changes in the sector's composition over time.

In his keynote lecture, Gerald Silverberg (Maastricht) presented empirical and theoretical findings from a research project co-authored by Bart Verspagen. They analyzed the empirical phenomenon that technological innovations appear to arrive in clusters. Thus, although the innovation process is in principle characterised by high unpredictability and risk, it nonetheless seems to be more highly structured than a simple random process. Silverberg then presented a 'percolation' model of the innovation process that is capable of generating patterns of clustering in space and time that are similar to those observed in the real world.

The keynote lecture by Hariolf Grupp (Karlsruhe) centered on the question how 'National Innovation Systems' evolve in times of globalisation and technological competitiveness on an international scale. Taking the case of Germany, he examined the System's historical reactions to structural economic changes and the degree of persistence (contrasted to paradigmatic change) within technologies or industrial sectors over time. As one conclusion, Grupp identifies a surprisingly resistant 'innovation culture' in Germany over the last 150 years.

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Finally, Thorsten Hens (Zürich) presented a paper co-authored by Klaus R. Schenk-Hoppé on a Darwinian theory of portfolio selection, i.e. a contribution to the emerging literature on 'evolutionary finance'. The authors analyzed the long-run consequences of the competition of different portfolio rules in a stock market. In their model, the interaction of rational and irrational strategies can lead to non-converging stochastic time-series of asset prices.

The next Buchenbach workshop is scheduled to take place in autumn 2005.

Using Spatial Data to Study the Existence, Emergence and Characteristics of Local Industrial Clusters

May 23 - 24, 2003

The aim of this workshop was to establish a network of researchers in Europe who study local clusters with the help of an empirical approach based on spatial economic data. Such an approach has been so far mainly neglected in the literature. In recent years the main approach to understand the emergence of local industrial clusters, their location and characteristics has been based on case studies. The specific factors, prerequisites and characteristics of existing clusters have been analysed in detail and these findings have been generalised in various concepts and theories.

What is missing is a general approach that allows to identify local industrial clusters on the basis of spatial data on employment and firm numbers and to use the identification to study what makes local clusters different from other regions. Some first attempts have been made into this direction. The workshop brought together most of the scientists in Europe who have worked on these attempts in the past. In addition, some scientists joined the workshop who are willing to follow this line of research in the future.



Elisabet Viladecans Marsal, Mario Maggioni

Using Spatial Data to Study the Existence, Emergence and Characteristics of Local Industrial Clusters

Conferences and Workshops

In order to develop a network, the workshop consisted of several parts: One part consisted of presentations that informed the participants about the approaches that have been taken in the past. In addition, some presentations proposed new lines of research. Another part of the workshop consisted of sessions about different issues of network formation and further joint research .

Several talks have given an overview on the research done by the speaker. Luis Bertinelli and Eric Strobl informed about the studies on agglomeration and growth. They studied the spatial distribution of firms in Ireland, Belgium and Portugal. With the help of spatial data about firms and employment they compared the geographic concentration of different industries in the three studied countries. Furthermore, they studied the effect of co-agglomeration. Giulio Bottazzi presented his model on firm location that includes the aspect of clustering. He compared the predictions of the model with the spatial firm distribution in various industries in Italy and showed that the model can be successfully applied and used to identify differences between industries. Thomas Brenner reported his method to examine whether the spatial distribution of the firms in an industry corresponds to the predictions of his clustering theory. He applied this method to Germany and presented the resulting identification of local clusters. Håkon Finne informed about different approaches that have been used in the last years in the Scandinavian countries. There, various ways of identifying existing local clusters on the basis of spatial data about firms and employment have been applied. Mario Maggioni reported his dynamic approach on the emergence of local clusters. He showed that the dynamics that are predicted by his theoretical concept are in line with the developments in the studied industries in Italy and the U.S.A. and that the approach allows for predicting the further development. Elisabet Viladecans Marsal presented the results of her study of the spatial distribution of firms in Spain. She identified the agglomerations of various industries in Spain and explained the factors that influence the location of these agglomerations.

Michel Quéré reported his case study of the French region Sophia Antipolis. He used his findings as basis for some discussion about the directions that future research should take.



M. Quéré, C. Werker and A. Giltner (from left)



Luis Bertinelli

Therefore, his presentation belongs also to those talks that proposed new lines of research. Claudia Werker and Thomas Brenner gave another talk of this kind. They proposed to use simulations for developing a further understanding of the clustering process and to use empirical data extensively for setting up the simulation model. Finally, Mei Ho informed about her work on patents. By this she shed some light about the possibilities to include innovations into the above studies.

Beside these presentations, several sessions have discussed various aspects of the further development of the network and its work. Some discussion has concerned methodological issues. It has been agreed that the development of a data base with a common structure for all countries should be one aim of joint research. Furthermore, the same empirical methods should be applied to different countries to make the results comparable. Other discussions

have been spend on the organisation of the network and its future activities. Besides bilateral research projects, of which several projects have been started in the meantime, one large project has been set up so far. Further projects will be started if respective funding is found.

The workshop has been organised mainly to trigger joint research of scientists in Europe who use similar approaches. Quite a number of projects have been started as a consequence of the workshop involving different participants of the workshop and the resulting network.

Workshop on “Hayek and Cultural Evolution”

November 17, 2003

Friedrich A. v. Hayek’s theory of cultural evolution continues to inspire social scientists in general and evolutionary scholars in particular to this day. The workshop, jointly organized by the Max Planck Institute’s Evolutionary Economics Unit and the Public Economics department at the University of Erfurt, aimed at discussing conceptual and applied aspects of Hayek’s work in order to develop them further and to explore their fruitfulness for a theoretical explanation of cultural evolution.



Brian J. Loasby

The introductory talk given by Brian J. Loasby (Stirling/UK) centered on the cognitive foundation of Hayek’s work, his theory of the mind, elaborated in the ‘Sensory Order’. According to Loasby, Hayek’s approach can be combined with recent insights from neuroscience to develop a theory of the evolution of the process of domain-specific connection-building within the human mind, i.e. as a ‘theory of the evolution of the evolutionary process itself’.

Roberto Leombruni (Torino) investigated the link between Hayek’s views on economic methodology (his ‘explanation of the principle’ idea) and the corresponding views which are implicit in the practice and the claims of the Agent-Based Computational Economics. Leombruni identified divergences between both views in the realism of assumptions issue on the one hand and the concept of complexity on the other hand. He however concluded that Hayek’s insights can be used to provide for a sounder methodological basis of agent-based simulations.

Ulrich Witt (Jena) presented a game-theoretic model of Hayek’s views on the evolution of rules of conduct that is based on insights from social-cognitive learning theory. This formalization can contribute to a better understanding of the conditions under which the group selection processes postulated by Hayek do work. As Witt showed, beyond a critical size groups are indeed essential as carriers of a cooperative rule of conduct. In order to successfully diffuse, a cooperative rule must however be paired with a minimum degree of ‘aggressiveness’ or willingness to punish defectors, i.e. its adopters must avoid being exploited by non-cooperative players.

Horst Feldmann (Tübingen) set out to review the various criticisms that have been raised against Hayek’s theory of cultural evolution in the last 30 years. Regarding, e.g., the allegedly too narrow scope of applicability of his evolutionary approach, the naturalistic concept of rule-following, and the contradictions between Hayek’s group selection approach and his methodological individualism, Feldmann blamed the critics for having a too selective view on Hayek’s work.



Christian Sartorius (Berlin), commenting on the papers presented by Ulrich Witt and Horst Feldmann

Conferences and Workshops

EVOLUTIONARY ECONOMICS GROUP

Hayek and Cultural Evolution

Jürgen G. Backhaus (Erfurt) discussed Hayek's insights on the evolution of legal institutions. In particular, he examined the question whether the 'production' of legal rules and their 'evolution' are to be seen as mutually exclusive concepts. As Backhaus concluded, Hayek's concept of legal evolution cannot *per se* be turned against the idea of legislative fiat, i.e. the conscious design of law.

Christian Schubert (Jena) also focused on Hayek's theory of legal evolution. He critically examined Hayek's positive views on both the legislative and the judicial law-making process, his normative theory, and his concept of democracy, which is based on a deliberation (instead of a simple agglomeration) view on individual preferences. Schubert outlined ways to combine these threads in order to construct an overarching 'Evolutionary Political Economy'.

Turning to more applied issues, Horst Hölscher (Brighton) and Walter Heering (Brighton) reviewed Hayek's thoughts on monetary economics and monetary policy. Hölscher critically discussed Hayek's radical ideas, developed in the 1970s, to abandon the state monopoly on the for issuing money, i.e. to 'denationalise' it. Heering explored the role of money as a cultural institution. In particular, his talk centered on the spontaneously evolved rules that are implicit in the use of money, money's function to transform complex societies into a community based on multilateral reciprocity, and the trade-off between flexibility and stability of the monetary order.



Jürgen G. Backhaus

Honors

Honors

In October 2003 *Ulrich Witt*, head of the Institute's Evolutionary Economics group, has been awarded the degree of *Doctor honoris causa* by the University of Witten-Herdecke. In his Laudatio speech, Professor Carsten Herrmann-Pillath (Witten-Herdecke) praised the laureate for his "courage, as a 'scientific entrepreneur', to pave the way towards a new branch of economic theory, and his openness for the thoughts of others". According to Herrmann-Pillath, the latter aspect is most clearly reflected in Witt's strong commitment to inter-disciplinary work.



Ulrich Witt



Guido Bünstorf

Guido Bünstorf has been awarded the Otto-Hahn Medal for his PhD thesis on "Energy Use in Production: A Long-Term Analysis". The Otto-Hahn Medal is awarded by the Max Planck Society to younger researchers for outstanding research achievements and entitles the prize winner to a one-year stipend abroad. In the Laudatio, Bünstorf's dissertation was praised as a valuable contribution to a reconceptualization of economic production theory, in particular its underlying model of production factors. As a synthesis of diverse, yet fruitfully integrated strands of thought, Bünstorf's thesis is judged a pioneering work, usable as a foundation stone for a variety of further research projects that aim at analyzing production processes from an evolutionary point of view.

Strategic Interaction Group

Research Program

This group is now well established and actively publishing in international journals. The computer laboratory, located near the campus of Jena University, is completed and constantly used by the members of the Strategic Interaction Group. The video & computer laboratory, recently installed in the basement of the Institute, has also experienced its first experiments. The main intention of studying strategic interaction by performing experiments usually requires

- designing a game or market,
- deriving its benchmark (solution), normally by applying game theoretic concepts,
- developing the software for performing the experiment in the computer laboratory,
- inviting participants and running sessions so that one can analyze and test the data statistically.

The different tasks require various skills that are reflected by the variety of backgrounds of the researchers (economics, business administration, game theory, social psychology, informatics, mathematics and statistics).

More specifically, the group studies the predictive appeal of game theoretic concepts, bargaining and allocative behavior, risky decision making, e.g., on financial markets, trading via internet & e-commerce, learning in more or less complex environments, political decision making, and the differences between individual and group decision making. Members of the group have already published many articles in leading international journals.

The theoretical work of the unit is based on

- microeconomic theory in its more mathematical formulation,
- game theory and
- indirect evolution.

Although one usually expects only the qualitative effects of parameter changes to be reflected by experimental data, the standard in experimental research is to develop a benchmark solution. This requires rigorously defined (solution) concepts as in (mathematical) economics and game theory. This, of course, does not exclude concepts of (social) psychology when actually interpreting experimental behavior, nor does it exclude experimental work rooted in the research traditions of other social sciences.

Indirect evolution allows the endogenous derivation of the rules or the institutional setting, which are usually considered to be exogenously given. Special topics of indirect evolutionary studies by the research group are

- the evolution of moral preferences and emotions
- the timing of decisions
- the combination of learning and evolution and
- the co-evolution of various institutions.

The theoretical models are partly inspired by the observations of robust learning experiments. In such experiments participants do not just play one game repeatedly, rather, they play a variety of more or less closely related games. This allows learning (when encountering the same game repeatedly) to be distinguished from forward looking deliberation (when relating to or anticipating an institutional change). Furthermore, learning can be defined more broadly since one may not only learn from playing the same game repeatedly but also from experiences with structurally or parametrically different but related games.

The aim of the research is to advance the theory of bounded rational decision making. So far this theory consists mainly of a more or less related collection of ideas (satisficing rather than optimizing, discrete aspirations rather than continuous utilities, behavioral repertoires

Research Program

rather than unlimited analytical skills, limited rather than unlimited memory capacity etc.) whose interaction and mutual consistency has not been rigorously explored. When trying to progress in this direction, the hope is to rely on inspiring and illuminating stylized facts, e.g., in the sense of field evidence and appropriate experimental findings and on research in the neighbouring social sciences, e.g. in cognitive psychology.

The need to develop a theory of bounded rationality does not mean that the theory of perfect rationality, the traditional assumption in economics, is useless. However, bounded rationality theories allow the employment of the natural categories which human (and even more so non-human) agents apply to make their decisions. Bounded rationality does, of course, imply that advice based on perfect rationality is questionable (e.g. it is hard to maximize utility when not knowing one's own utility).

Theories of perfect rationality may, however, serve other purposes. Often we are not interested in why we have done something wrong but only in what would have been right. And as already indicated above, one way of interpreting experimental behavior is to compare it with rational behavior where, of course, ambiguity of rational behavior has to be avoided, e.g. by identifying utility with material reward and subjective beliefs by experimentally controlled probabilities. Thus the final goal is not to substitute the theory of rational behavior but to supplement it with a theory of bounded rationality which, if applicable, is better suited for behavioral advice, e.g. when comparing various institutional designs. The theory of optimal mechanisms, for instance, needs to be supplemented by one of reasonable mechanisms which perform soundly when assuming boundedly rational agents. For example, in business administration, where consulting does not mean to assess cost, demand and finally profit functions but to suggest practical changes in management and labor relations, the behavioral approach to mechanism design will focus on institutional changes to which boundedly rational agents respond in promising ways.

Research Program

Theses Completed in 2003

Information about Past Moves: Experimental Studies on Information Cascades and Pie-sharing games

Andreas Stiehler

In this thesis experimental studies have been presented which examine how individuals deal with information about past moves in information cascades and pie-sharing problems. The experimental studies presented in Chapters 2 to 4 aim at providing new insights into the process of individual decision making and understanding motivations which drive individual behavior. The considered problems differ in the way information about past moves influences players' decisions both theoretically and behaviorally.



Theses
Completed in 2003

Perceived Probabilities in Cascade Experiments

Chapters 2 and 3 consist of experimental studies on information cascades. Information cascades provide an explanation for the phenomenon of herding resulting from information externalities: In situations in which agents are able to observe actions of their predecessors faced with the same decision task, updating private as well as public information according to Bayes' rule may lead to pure imitation of predecessors' choices independent of agents' private signals. This has been shown theoretically by Bikhchandani, Hirschleifer and Welch (1992)¹, henceforth BHW. The BHW model has been tested experimentally by Anderson and Holt (1997), who run a prediction game reflecting the underlying cascade structure by urns and balls. Anderson and Holt's leading work is followed by a large number of subsequent studies in which the information structure has been varied and costly information sold. Results show that cascades actually occur in the laboratory but also that individuals frequently deviate from the rational cascade pattern. However, so far results from cascade experiments typically rely on the observations of binary urn predictions and buying decisions and thus can only draw a very rough picture of the underlying updating behavior. In this work, two experimental studies are presented where the design of the experiments allows to investigate individual updating behavior in more detail.

Chapter 2 (based on Oberhammer and Stiehler, 2003) deals with a simple cascade experiment which has been modified by implementing the BDM mechanism (Becker, De Groot, Marschak, 1964) to examine whether observed cascade behavior expressed by agents' urn predictions actually reflects Bayesian updating. Using submitted price limits for participation in the prediction game as indicators of subjective probabilities the explanatory power of the standard BHW model can be tested as compared to cascade models incorporating individual decision errors.

In **Chapter 3** (based on Stiehler, 2003) a cascade experiment is presented in which subjects are confronted with artificial predecessors who predict in line with the BHW model. Errors of predecessors are thus excluded by definition. Again the BDM mechanism is used to study subjects' probability assignments on the basis of their price limits for participating in the prediction game. In addition, the use of the strategy method allows us to investigate price setting behavior not only on an aggregate but also on an individual level.

Basis of the analysis was the examination of price setting patterns to check whether cascade behavior observed in the prediction game reflects the updating process as assumed by the theoretical models. In Chapter 2, the price setting patterns have been compared with the probability patterns according to both the standard BHW model (see figure 1) and error-rate models, i.e. cascade models which incorporate individual decision errors. The findings can be summarized as follows:

¹ There is also a theoretical work by Banerjee (1992), who has shown that information cascades may arise in a continuous action space assuming discontinuous preferences of the actors, whereas Bikhchandani, Hirschleifer and Welch (1992) have modeled information cascades assuming a discrete action space.

Result 1: Does cascade behavior reflect Bayesian updating?

Considering price setting data corresponding to urn predictions in line with both standard and error BHW models, the hypothesis that individuals update information according to the standard BHW model cannot be rejected. In this respect, the inclusion of individual decision errors does not significantly improve the explanatory power of the standard BHW approach.

The analysis of the resulting price setting patterns of the experiment presented in Chapter 3 allows us to answer the question whether individuals actually recognize cascade behavior of their predecessors and leads to the following result:

Result 2: Do individuals recognize cascade behavior of others?

Individuals do not recognize the cascade formation: Price limits increase the more coinciding predictions of predecessors are observed irrespective of whether additional information is actually revealed by predecessors' urn predictions (see figure 2). Individual price patterns of more than two thirds of the participants indicate that cascade behavior of predecessors is not recognized.

Theses
Completed in 2003

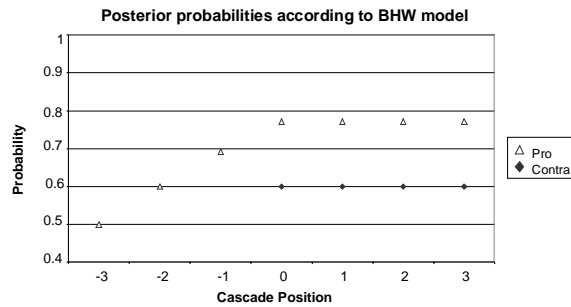


Figure 1: Resulting probability pattern according to the standard BHW model (assuming that subjects realize cascade behavior of others).

Result 2 clearly indicates that even those individuals who show cascade behavior in line with the theoretical models do not update information according to them. They do not recognize cascade behavior of others and thus tend to overestimate public information. These findings are in contrast to the standard BHW model (compare figures 1 and 2) as well as to error models based on rational expectations (see Anderson and Holt, 1997 or Anderson 2001). The fact that individuals do not take the reasoning of predecessors regarding their respective predecessors into account is in accordance with the results of Kübler and Weizsäcker (forthcoming). However, in the experiment presented in Chapter 2 in which errors of predecessors obviously occurred and the estimation of the depth-of-reasoning approach led to similar results as by Kübler and Weizsäcker (forthcoming), a significant trend towards increasing price limits throughout the cascade could not be detected (see Results 1). Thus, the role of decision errors as assumed by the considered error-rate models is generally questioned. The results presented here suggest that the occurrence of decision errors rather dampens the trend to trust predecessors' predictions increasingly the longer a cascade proceeds. To test such a hypothesis more experiments are needed which truly investigate the role of decision errors in the individual updating process.

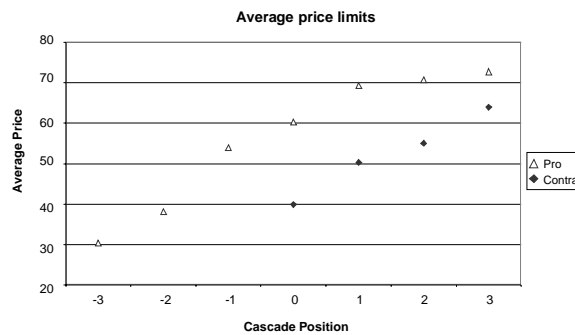


Figure 2: Mean of individual average prices at different cascade situations (characterized by cascade position and private signal).

Theses
Completed in 2003

From Ultimatum to Nash Bargaining

Pie-sharing games are appropriate to investigate different aspects of bargaining behavior. Concerning two-party bargaining situations there are generally two basic models that differ in respect to the rules how a pie p can be allocated: In the *Nash demand game* (Nash, 1950)², both players X and Y independently state their demands x and y . If they reach an agreement such that $x + y \leq p$, player Y gets y and X gets x . If they fail to reach an agreement both players get nothing.³ In the *Ultimatum bargaining game* (see Güth et al., 1982) players X and Y state their demands subsequently, such that the second mover Y is informed about the first mover's demand x before taking her decisions. She then can accept X 's proposal, leaving player X with x and herself with the remainder of the pie $y = p - x$, or she can reject the proposal leaving both players empty-handed. Obviously, the two bargaining models differ as to the fact, whether second movers are informed about first movers' demands or not.⁴

In **Chapter 4** (based on Fischer, Güth, Müller and Stiehler, 2003) both bargaining models described above will be linked by implementing a commonly known probability w by which the second mover is actually informed about first mover's demand. The resulting *w-games* are theoretically and experimentally investigated. It is shown theoretically that first mover demands increase monotonically with increasing w -values and uninformed second movers react respectively. We test experimentally whether participants understand the strategic implications of uncertain information transmission in the ultimatum game and how they adjust their demands to the different levels of w .

The experimental findings can be summarized as follows:

² For a survey of experimental studies investigating Nash's model of bargaining, see Roth, 1995, p. 40–49.

³ In the basic model a fixed disagreement alternative \bar{a} is paid in this case (see Roth, 1995, p. 40). For our purpose we simplify the model by choosing $\bar{a} = 0$.

⁴ Roth (1995a) distinguishes unstructured bargaining experiments from structured bargaining situations, in which choices of other bargainers can be directly observed.

Result 3: From Ultimatum to Nash Bargaining

First mover's and second mover's demands are qualitatively in line with the game theoretic solution of the w-game, that is, first movers' (uninformed second movers') demands are lower (higher) the lower (higher) the probability that the second mover gets actually informed. But the reaction is somewhat discontinuous, i.e. subjects tend to either treat the w-game like an Ultimatum, or like a Nash demand game. As in other pie-sharing (bargaining) experiments there is a strong focus on the equal split.

The findings of Chapter 4 indicate that a considerable fraction of individuals basically understand the strategic implications of uncertain information transmission, but their reaction patterns are rather simple compared to the theoretical solutions. Moreover, the high relevance of equal splits in bargaining situations is confirmed also in this.

A Dictator (Selection) Game

In **Chapter 5** (based on Brandts, Güth and Stiehler, 2002) an experiment examining a modified *dictator game* is discussed. In contrast to the pie-sharing models described above, it is only one player in a dictator game that determines how the pie will be allocated between him and the other (in this study two) parties involved. In the experiment participants first answered a personality questionnaire. They then played a 3-person game: One of the three players chooses, after inspecting the personality questionnaires, between an outside option and granting allocative (dictator) power over a pie to one of the other two players. Treatments differ in the procedure by which distribution power is assigned, which is either to a randomly determined or to a knowingly selected partner (dictator). It is studied whether the fact that a person (dictator) has been selected among others on the basis of personal information has an effect on her behavior. The regularities observed in the experiment lead to the following result:

Result 4: Dictator (selection) game

Knowingly selected players (dictators) keep less for themselves than randomly selected ones and reward the selecting player more generously.

Even though there are numerous (experimental) studies and models which deal with fairness and reciprocity within the pie-sharing process, the procedure by which an allocating party is selected has been neglected so far. But as the results show, selection may cause effects on motivation. In this sense, together with other stylized facts of this kind to be gained by further experiments, these findings will enhance our understanding of the motivations which drive individual decisions. In general, the results of the experiments presented here may help to complete process models as proposed by Güth (2000) or Güth and Ortmann (2003) and applied to ultimatum games by Güth (2001) which try to explain individual decision making based on boundedly rational behavior.

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**Theses
Completed in 2003**

Conferences and Workshops

March 20 - 21, 2003

Workshop “Bounded Rationality”

The strategic interaction group organized a joint workshop with the ABC-research group of Professor Gerd Gigerenzer, Max Planck Institute for Human Development, on bounded rationality in order to promote scientific exchange between our two research groups. The workshop was held on two consecutive days in Jena in March 2003. Overall, 10 talks, 5 of each research group, were given.



S. Kröger, K. Katsikopoulos

Jörg Rieskamp (ABC) gave the introductory talk, which partly focused on the general research program of the ABC-group and partly on his own research on learning models. The next talk of the ABC-research group was given by Barbara Fasolo. Her talk dealt with multi-attribute decision-making in the domain of Internet and consumer decisions. Michaela Gummerum (ABC) talked about an experimental study on games with children-subjects, and Masanori Takezawa (ABC) talked about different punishment motivations for norm violating behavior. The final talk for the ABC-research group was given by Thomas Dudey, who talked about the centipede game allowing for dummy players.

Werner Güth gave the introductory presentation for the strategic interaction-

group, and talked about his theoretical and experimental work on leadership. The next talk was given by Susanne Büchner and Ben Greiner (both strategic interaction-group), who talked about a new experimental design to study the solidarity game. Luis González (strategic interaction-group) presented his theoretical and experimental work on trust in mutual hold-up problems with competing firms. Gerlinde Fellner (strategic interaction-group) talked about endogenous partner selection in public good experiments, and finally, Anthony Ziegelmeyer (strategic interaction-group) presented his work on the revelation of incomplete preferences.

The presentations inspired lively discussions and exchange of research ideas. In view of the positive feedback further joint meetings with the ABC-group of Professor Gigerenzer are planned.



Graciela González-Farías, Luis González

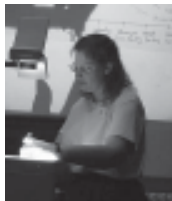
Conferences and Workshops

September 24 - 25, 2003

Workshop on “Strategic Interaction”

From Sept 24th to Sep 25th, the Strategic Interaction Group hosted an international workshop on “Strategic Interaction”. 10 internationally acknowledged scholars followed the invitation and besides the ESI Group, another four guests from the University Erfurt participated. The workshop served to exchange ideas among European and American research centers and to foster the ESI groups’ international cooperations. Among the high-quality presentations, a few shall be briefly picked out for a more detailed description.

Rachel Croson (Wharton School, Philadelphia) provided an overview of several experimental studies in the area of international comparisons of trust. She found significantly more



Rachel Croson

trusting and trustworthy behavior among ingroups than outgroups and among those who have engaged in personal discussion than in professional discussion.

Comparing behavior using the same paradigm in China, Japan and Korea with that in the US, she found surprising differences and interactions internationally—not only do Chinese trust more than other nationalities for example, Chinese participants trust outgroup members more than they trust ingroup members. Further, she observed that as the link between truster and trustee becomes more indirect, trusting and trustworthy behavior decrease as predicted. While this pattern remains, the rate of decrease varies by country.

Claudia Keser (IBM Watson Research Center, New York) presented an investigation on the effectiveness of reputation mechanisms to induce higher trust in risky exchange relationships, such as between buyer and seller. Specifically, she presented an experimental study that quantifies the increase in trust produced by two versions of a reputation management system. She also discussed some emerging issues in the design of reputation management systems.

Tim Cason (Krannert School of Management at Purdue University, West Lafayette) reported an experiment on two-player sequential bargaining with asymmetric information. The experimental design was simple enough to permit computation of predictions of models of bounded rationality and/or learning, yet rich enough to capture the forces at work in multi-round monopoly pricing environments. Data from four different continuation probabilities are used to test equilibrium predictions. He also considered quantal response equilibrium (QRE) to capture bounded rationality of subjects, and this approach captured many of the important features of the results.



Tim Cason

Harrie A.A. Verbon (Tilburg University) presented the results of experimental 3-person economies where income inequality can be the result of 'nature' or can be due to the choice by the rich individuals in the economy. He considered the effect of inequality and the generation of inequality on the willingness of individuals to provide efforts for the generation of returns on capital. Inequality appeared to have an unambiguously negative effect on growth if the inequality is the result of the rich individuals' choice in societies.



Jan Potters, Harry Verbon

Jan Potters compared lemons market experiments conducted in the Netherlands and in China. In a series of market rounds, sellers post prices for the good they offer for sale and buyers decide from whom to buy. Sellers know the quality of the good. Buyers only know the prior probability that a seller has a high or low quality good. By setting their prices sellers can try to build a reputation for trustworthiness by asking prices that correspond to the quality level of the good. His results indicate that buyers are sensitive to the reputation of the sellers. In the Netherlands this reputation seemed mainly individual-based. If a particular seller cheats, it is less likely that this seller will be able to sell in the future. In China, reputation also seemed to be a group attribute. If a seller is found to cheat, buyers are less willing to buy from any seller.

Workshop on Strategic Interaction

Conferences and Workshops

These results are consistent with the independent - interdependent dichotomy that is associated with Western versus Eastern cultures.

Simon Gächter (University of St. Gallen) experimentally investigated motivations to make voluntary contributions to public goods. His design consisted of two parts. In one part, he elicited the subjects' preferences toward voluntary cooperation with the help of a strategy-method experiment, developed by Fischbacher et al. (Economics Letters 2001). In a second part, subjects played a ten period random matching public goods experiment. He counter-balanced the design to control for order effects. He elicited beliefs about the contribution of other group members. The preference elicitation experiment allowed him to classify types of players. He found that 25 percent were free riders and 50 percent were conditional cooperators. In the random matching ordinary public goods experiment he found that subjects classified as free riders contributed less to the public good than all others. Subjects classified as conditional cooperators also behaved conditionally cooperatively in the ordinary experiment. He also found that the elicited preferences were remarkably good predictors of actual behavior in the ordinary experiment. He concluded that preference heterogeneity is important for understanding (the dynamics of) voluntary contributions to public goods.

Workshop Guests: Claudia Keser, New York (USA), Harrie Verbon, Tilburg, (Netherlands), Tim Cason, Indiana (USA), Rene Levinsky, Freiburg, (Germany), Matthias Sutter, Innsbruck (Austria), Henrik Orzen, Nottingham (UK), Jan Potters, Tilburg (Netherlands), Rachel Croson, Pennsylvania (USA), Simon Gächter, St. Gallen (Switzerland), Jens Grosser, Köln (Germany).

Video Laboratory - Experiments

The Jena video laboratory for economic experiments

The Jena video laboratory was implemented in order to observe experimental subjects in decision situations. In many experimental games it is observed that subjects do not behave according to standard economic theory (see f. ex. Güth and Tietz 1990, Roth 1995). To shed light on the decision process one objective of the laboratory is to "look into subjects' brains" by video recording the discussion of at least two participants who collectively decide on the action to choose (Ostmann 1990, Hennig-Schmidt 1999). Another purpose is to run control experiments to check whether theories, attributed by the researchers, actually are reflected in the group discussions. More on the methodology of economic experiments using groups as a decision maker can be found in Hennig-Schmidt (1999).

Typically economic experiments are run in anonymous environments. Experimenters use isolated cabins and computerized software in order to provide a constant and anonymous environment. The video laboratory allows the researcher to control for the effect of communication in games, which is known to induce more cooperative behavior in a variety of games (Roth 1995, Tullock 1999, Brosig et al. 2003). The video equipment allows for controlled communication channels between the eight cabins. Up to 4 cabins can communicate with each other via the audio and video hardware.

The laboratory allows conducting video experiments using 8 soundproof cabins with up to 4 subjects in each cabin. Each cabin provides in- and output for video- and audio signals. In addition, each cabin is equipped with a personal computer for subjects' decisions. The equipment allows the researcher to run a computerized experiment with additional recording of audio/video communication between cabins or video recording of group discussions in single cabins.

Exemplary experiments

In the following the design of two exemplary experiments conducted in the Jena video laboratory is sketched. The first experiment sheds light on the effect of communication on bargaining. The second experiment is concerned about the differences between individual and group decision behavior with regards to investment decisions.

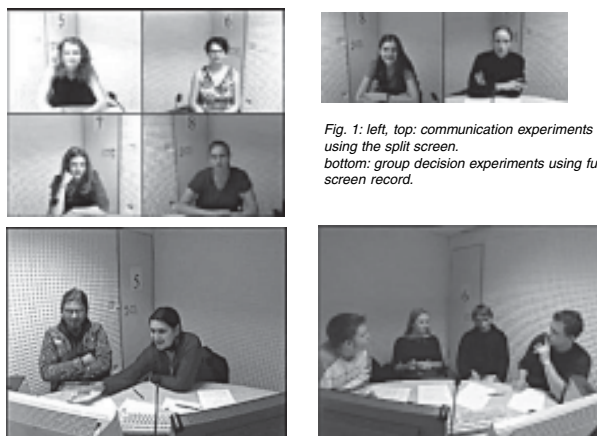


Fig. 1: left, top: communication experiments using the split screen. bottom: group decision experiments using full screen record.

Video Laboratory

Communication

Schmidt and Zultan (2003) conducted in the Jena video laboratory an experiment to disentangle communication and social effect in ultimatum bargaining (replication of Roth, 1995) and examine the components of the social effect with the help of unilateral communication. The Uncontrolled Social Utility hypothesis suggests that in the social environment created by face-to-face communication, preferences become hard to control. For example, people will probably be less likely to take advantage of other people who are similar to themselves, or who are part of their in-group (cf. Dawes, 1990).

The communication hypothesis, on the other hand, emphasizes the nonverbal channels available in face-to-face communication. Thus, the face-to-face communication is not qualitatively different from written communication, but is more efficient as it uses multiple channels, which are usually more reliable than the written or verbal channels.

In order to distinguish the effects of these two possible hypotheses, the experiment replicated Roth (1995) preplay face-to-face communication in ultimatum bargaining. In the social only communication treatment subjects had two minutes to converse before actual play is taking place, same as in the standard unrestricted face-to-face communication treatment. However, in the social communication treatment subjects are not allowed to discuss the game. These two treatments were compared to an anonymous no communication treatment in which only offers and responses were made via the computerized decision screens.

After establishing the social nature of face-to-face communication effects, Schmidt and Zultan began to examine them by separating the directions of communication. Thus two new treatments are created. In one the responder sees and hears the proposer through video interface for a two minutes preplay communication period, whereas as in the second the opposite is true: the proposer sees and hears the responder for a two minutes preplay

communication period. In both new treatments the communication is restricted to non-game content.

The video laboratory control system allows the experimenter to use 8 subjects per session that either play in the role of proposer or responder. In the bilateral communication treatment each subject observes on a video monitor a split screen of his own and the matched subject's video (Figure 1, top right) and an audio channel is provided by microphone and speaker. The laboratory equipment allows for rematching, thus using a no feedback design each subject played 4 games with 4 different partners while keeping the role constant. The separate computer screen provides a graphical user interface for the ultimatum decision.

Altogether 96 subjects participated in the experiment. The results of Roth have been replicated, especially no significant differences in actual conflict between bilateral social only and unrestricted bilateral communication were observed. Both unilateral communication treatments are qualitatively in between no communication and bilateral communication indicating that the interactive part of the communication is responsible for behavior.

Video Laboratory



Figure 2: cabin equipment

Group decision

Sutter (2003) conducted in the Jena video laboratory an experiment with regards to the decision behavior of groups. More specifically, the influence of the group size on the economic investment decisions was tested with a focus on decision behavior of individuals versus groups. The research question is relevant because economic important decisions are made by groups rather than individuals (e.g. central bank board, advisory board, household) and there is a trade off between the quality of the decision and the opportunity costs of the group members.

The experiment was designed in order to have a group size of one, two, and four subjects (see Figure 1, bottom, for a recording of the group decisions). As a vehicle of research the guessing game is used. The three cabins of group size one, two, and four were the three decision makers who had to provide a number between 0 and 100. The winner in each of the 4 rounds is the decision maker who provides a number closest to two-third of the average of all three numbers.

Altogether 210 subjects participated in the experiment and 30 independent observations have been collected. The four person groups were winning significantly more often when compared to the groups with fewer subjects. Sutter (2003) reports no significant difference between individual decision makers and groups of two subjects.

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Entrepreneurship, Growth and Public Policy

Research Program

Growth and the creation of socially sustainable employment have emerged as the two focal points of concern in economic policy in the developed economies. While unemployment rates below five percent or less were the norm in the post-war era, post-1989 era has found many of the OECD countries bogged down with stagnant growth and unemployment in the double digits. Public policy to promote growth and reduce unemployment has turned to the most prevalent and fundamental theories and knowledge in economics to address these problems.

While the prevalent model of economic growth of the post war era has considered growth as being a mere accumulation of capital and labor, this paradigm was not appropriate anymore in later periods where production shifted to increasingly knowledge intensive products. Correspondingly, the macroeconomic model of growth has been adapted in that knowledge has been endogenized. The intellectual breakthrough contributed by this extended growth theory was the recognition that investments in knowledge and human capital endogenously generate economic growth through the spillover of knowledge. However, we are still unaware *how or why* spillovers occur. The missing link is the mechanism converting knowledge into economically relevant knowledge. Kenneth Arrow and Richard Nelson had already recognized that knowledge is not the same thing as economically relevant knowledge, suggesting that spillovers may not occur automatically. Thus, in the standard models of endogenous growth, the essence of the Schumpeterian entrepreneur is missed. As pointed out by Schumpeter (1947) "the inventor produces ideas, the entrepreneur 'gets things done' (...) an idea or scientific principle is not, by itself, of any importance for economic practice." Indeed, the Schumpeterian entrepreneur by and large, remains absent in those models.

Entrepreneurship typically involves the application of knowledge created in one context to a very different context. Thus, entrepreneurial activity can account for the transformation of inventions to marketable innovations hence new products. It can also represent at least one mechanism constituting the missing link in the spillover process. Thus, entrepreneurship can be considered as one of the engine of economic and social development throughout the world. The role of entrepreneurship has changed dramatically between the traditional and contemporary economies.

The purpose of research unit *Entrepreneurship, Growth and Public Policy* is to undertake an explicit focus on the economics of entrepreneurship. This research agenda, which examines the process of change, will consist of four aspects. The first is to identify what the role of entrepreneurship has been and how it is historically evolving. This is a rather descriptive undertaking whose objective is to assess the importance of entrepreneurship.

The second aspect is concerned with those factors that shape the amount of entrepreneurial activity. Here, we will undertake theoretical and empirical work to investigate why and how entrepreneurship emerges.

The third aspect focuses on the impact of entrepreneurship on economic performance. Again, we will suggest theoretical and empirical work to explain this.

As the fourth aspect, this research unit will provide both a theoretical and empirical framework highlighting those aspects of entrepreneurship that can serve as a guiding light to direct policy makers in understanding the debates, the most important questions and issues. Just as the classical model of economic growth focused the policy debate on the policies facilitating investments in capital and access to labor, the endogenous growth model has shifted the policy focus to investments in knowledge. By contrast, focusing on the role played by entrepreneurship may suggest a very different set of policy instruments. Thus, a goal of this research unit is to suggest a new set of policy instruments to promote economic growth and employment generation that are unique and distinct from the instruments implied by the growth models mentioned above.

Publications

New Books from the Evolutionary Economics Group

Ulrich Witt, *The Evolving Economy. Essays on the Evolutionary Approach to Economics*. Aldershot: Edward Elgar, 2003, ISBN 1-84064-748-5

The Evolving Economy covers a broad spectrum of issues ranging from the biological foundations of economic behavior to the coevolution of firms, markets, and institutions. Ulrich Witt's individualistic approach synthesizes elements familiar from the writings of Veblen and Schumpeter on economic evolution. A conceptual debate on what the notion of evolution means in the economic context is as much emphasized as is the discussion of concrete hypotheses explaining why and how evolutionary economic change comes about.

Offering an outline of an alternative paradigm focusing on endogenous economic change, this book will be of great interest to economists and economic historians. Sociologists, philosophers and anthropologists will also find this work invaluable as it presents an encompassing assessment of the role of Darwinian thought for understanding human behavior and societal evolution.



Publications

Thomas Brenner/Dirk Fornahl (eds.), *Cooperation, Networks and Institutions in Regional Innovation Systems*. Cheltenham: Edward Elgar, 2003, ISBN 1-84064-983-6



This book addresses the role of cooperation, networks and institutions in the context of regional innovation systems. It emphasises the importance of these factors in the emergence of local clusters, using detailed examples which reached different stages of maturity.

The authors address the topic from an empirical, theoretical and political perspective, and highlight the local mechanisms which are involved in the development of innovation systems. They offer a comprehensive overview of different approaches in the field and present numerous case studies which stress the influence of networks and local institutions. Significantly, they also introduce several new approaches to regional innovation systems, including contributions which explicitly discuss the design and potential of policy measures to promote regional development. The policy recommendations are based on sound theorising which, in turn, is based on extensive empirical research.

This book is a valuable addition to a complex and growing literature which offers new perspectives and insights on cooperation, networks and institutions, and their role in the development of local systems of innovation. The combination of empirical, theoretical and policy-oriented approaches will ensure this book is essential reading for academics and policymakers in the fields of regional economics, innovation research and economic geography.

PUBLICATIONS

Uta-Maria Niederle, *Theorie der Institutionen am Beispiel von (vertraglicher) Versicherung (Evolution of Institutions and the Example of Contractual Insurance. Outline of a General Theory*. Marburg: Metropolis, 2003, ISBN 3-89518-419-5



In order to explain the evolution of real institutions a theory is needed that incorporates the dynamics of historical change of institutions. An example of such long-term development is the history of contractual insurance.

This volume intends to close the gap between abstract approaches using game theory and specific explanations in economic history. A general theory of institutional change has to integrate both contrasting approaches including the discussion of assumptions, methodological considerations, and evolutionary concepts of long-term gradual change. Illustrated by the example of insurance it is tested if the elements of a general theory that have been worked out in this volume can be put in concrete terms and correspond to the historical empirics.

It is shown that institutions have to solve ever-recurring problems, namely the problems of control and sanctioning. A solution of these two is only possible when institutions disseminate.

This diffusion process, however, is not controlled by objectively given opportunities and incentives. Above all, it is guided by subjective cognitive processes including the actors' world views and values. Distributional conflict over institutional arrangements is the main driving force in the process of institutional change and not improvement of allocational efficiency as assumed in the transaction cost literature.

Publications

Christian Sartorius, *An Evolutionary Approach to Social Welfare*, London: Routledge, 2003, ISBN 0-41532-335-5

A person finds a lost purse with a lot of money in it. Ought she try to return it to its owner or keep it herself? And even more interestingly, what will she actually do? According to standard economic theory, a rational person is supposed to maximize her utility and, at least when unobserved, keep the purse for herself. In reality, however, most people return the purse although they are unobserved or, at least, they feel uneasy about not doing so. Evidently, these people share a common attitude towards other people's property. In social life, norms and values like this typically help in settling potential conflicts of interest to the mutual benefit of all. While not evident immediately, social norms and values also play a crucial role in the theory of social choice. In the first half of the 20th century, the special acknowledgement by economic theory of the autonomy of individuals and their subjective view of the world had led to the serious problem that socially acceptable decisions could not be made in the absence of unanimity. In this work, social norms and values are reintroduced to overcome this shortcoming by applying a common standard and, thus, making individual preferences comparable. In particular, it is shown, how the adoption of these standards is part of every individual's social development, how the standards themselves arose in the course of social evolution and how human beings were endowed with the necessary learning mechanism by Darwinian evolution in the first place. This book will be of great interest to all those students, academics and researchers who are interested in evolutionary economics and social welfare as well as social psychology, evolutionary anthropology, evolutionary biology and philosophy.



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PUBLICATIONS

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J. Apesteguía, K. Pantz and A. Ziegelmeyer: Endogenous Formation of Coalitions in Oligopolies: An Experiment

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No. 02-2003

Manfred E. Streit: Von der Ordnungsökonomik zur Systemtheorie – Bemerkungen zu zentralen Forschungsparadigmen

No. 03-2003

Manfred E. Streit: Die Misere des deutschen Verbändestaates

Preprints

University Lectures

Winter Term 2002/03

Ulrich Witt: A Course in Evolutionary Economics

Summer Term 2003

Thomas Brenner: Technology Networks and Innovation Systems

Luis Gonzáles: Information Economics

Carsten Schmidt: Internet Economics

Winter Term 2003/04

Ulrich Witt with Uta-Maria Niederle, Christian Schubert and Georg von Wangenheim: Theory of Change of Economic Institutions

University Seminars

University Lectures Seminar Presentations

Winter Term 2002/2003

Strategic Interaction Group: Experimental Economics

Summer Term 2003

Thomas Brenner: Political Possibilities in Innovation Systems

Strategic Interaction Group: Experimental Economics

Winter Term 2003/04

Thomas Brenner: Political Possibilities in Innovation Systems

Carsten Schmidt: Internet Economics

Strategic Interaction Group: Experimental Economics

Lecciones Jenenses

October 29, 2003, Bruce Kogut, INSEAD Fontainebleau (France)

"Firms and Networks Over Time: Some Thoughts on Generative Rules and Simulations"

Seminar Presentations

March 12, 2003

Silke Scheer: *Analysis of a Selected Number of Variables of the Cognitive Leadership Process*

Hagen Worch: *Industrial Change in a Macroeconomic Perspective*

Dirk Fornahl: *The Impact of Regional Role Models on Start-ups: Some First Quantitative Insights*

June 18, 2003

Christian Cordes: *The Human Adaptation for Culture and its Behavioral Implications*

June 19, 2003

Klaus Rath: *Interactive Development of Firms and Industries*

June 25, 2003

Georg von Wangenheim: *Evolution of Designed Institutions – Arguments from Evolutionary Game Theory*

June 21, 2003

Silke Scheer: *Empirical Validation of the Theory of Cognitive Leadership*

Hagen Worch: *Identifying Variables for Measuring Organizational Development*

September 03, 2003

Alexander Frenzel Baudisch: *Consumer Wants Technology*

Andreas Chai: *Learning as a Epigenetic Processes: The Coevolution of Acquired Wants and Novelty Demand*

September 15, 2003

Christian Schubert: *A Contractarian View on Evolutionary Processes*

September 25, 2003

Dirk Fornahl: *Empirical Test of the Existence of Bubbles in Regional Firm Foundation Activities*

October 01, 2003

Christian Zellner: *Economic Development and the Evolution of Demand*

October 28, 2003

Uta-Maria Niederle: *Preferences in Consumption and Strategic Interaction: What is Different?*

December 03, 2003

Silke Scheer: *Charismatic Leadership and Motivation: What Differences are there with Respect to Cognitive Leadership*

Christian Cordes: *Veblen's 'Instinct of Workmanship', its Cognitive Foundations, and Some Implications for Economic Theory*

December 10, 2003

Alexander Frenzel Baudisch: *The Interplay of Consumer Wants, Consumption Knowledge, and Consumer Tools*

Andreas Chai: *Romantic Tourism and the Economics of Imagination*

Lectures

Lectures at the Institute**January 13, 2003, Peter Murmann and Thomas Brenner, Evanston/Jena (USA/Germany)**

"The Use of Simulations in Developing Robust Knowledge about Causal Processes: Methodological Considerations and Application"

January 13, 2003, Paolo Saviotti, Grenoble (France)

"Economic Development and Employment Generation by the Creation of New Sectors"

January 21, 2003, Wiebke Kuklys, Cambridge (UK)

"Psychometric Equivalence Scales – Evidence from the UK"

January 28, 2003, Wolfgang Kerber, Marburg (Germany)

"Applying Evolutionary Economics to Economic Policy: Problems and Perspectives"

February 11, 2003, Jack Vromen, Rotterdam (The Netherlands)

"Why the Economic Conception of Human Behaviour Might Lack a Biological Basis"

LECTURES

February 25, 2003, Stephane Bertrand, Strasbourg (France)

"Self-organized Criticality"

March 11, 2003, Jan Lambooy, Utrecht (The Netherlands)

"Evolutionary Economics, Self-organisation and Intermediate Structures"



new and old building of the institute

March 12, 2003, Dirk Engelmann, Prague (Czech Republic)

"Indirect Reciprocity and Strategic Reputation Building in an Experimental Helping Game"

March 18, 2003, Reinoud Joosten, Twente (The Netherlands)

"Repeated Games with a Twist"

March 25, 2003, Dorothea Kübler, Berlin (Germany)

"Social Norms and Economic Incentives in Firms"

March 25, 2003, Matthias Klaes, Stirling (UK)

"Evolutionary Economics: In Defence of Vagueness"

April 1 2003, Geoffrey Brennan, Canberra (Australia)

"The Economy of Esteem"

Lectures

April 2, 2003, Charles Noussair, Atlanta (USA)

"Formal, Informal Sanctions and the Collective Action Problem"

April 8, 2003, Benedikt Herrmann, Göttingen (Germany)

"Cooperation and the Power of Sanctions in a Cross-Societal Perspective"

April 29, 2003, Frédéric Koessler, Paris (France)

"Communication Equilibria with Partially Verifiable Types"

May 6 2003, Georg von Wangenheim, Jena (Germany)

"Evolutionary Approaches in Cooperative Game Theory - An Example from Voting Games with Varying Preferences"

May 20, 2003, Gerhard Wegner, Erfurt (Germany)

"Political Learning - A More Effective Alternative To Liberal Constitutional Reform"

May 20, 2003, Erich Kirchler, Wien (Austria)

"Economic Decisions in the Private Household – Selected Results of the Vienna Diary Study"

June 3, 2003, Francesco Parisi, Arlington (USA)

"Common Law Process and Legal Evolution"

June 10, 2003, Wulf Gaertner, Osnabrück (Germany)

"Procedural Choice"

June 10, 2003, Kai A. Konrad, Berlin (Germany)

"Moral Cost, Commitment and Committee Size"

June 17, 2003, Roger Koppl, Madison (USA)

"OK, I've Read 'The Sensory Order', Now What?"

June 24, 2003, Tom Warke, Cambridge (UK)

"Rationality and the Axioms of Economic Choice Theory"

July 1, 2003, Thomas Gehrig, Freiburg (Germany)

"On the Co-evolution of Insider Information and Idiosyncratic Beliefs"



seminar room

July 1, 2003, René Levínský, Freiburg (Germany)

"Ultimatum Offers and the Role of Transparency: An Experimental Study of Information Acquisition"

July 1, 2003, Esther Brügger, Bern (Switzerland)

"Imitation and Heterogeneity"

July 1, 2003, Rolf Walter, Jena (Germany)

"Geschichte als offenes System. Über Alternativen im Umgang mit Komplexität in der Wirtschaftsgeschichte"

July 8, 2003, Gerhard Hanappi, Vienna (Austria)

"Critical Masses and Prophecies - About the Meaning of 'Evolutionary' in Economic Modeling"

July 9, 2003, Jean Luc Gaffard, Sophia-Antipolis (France)

Introductory Lecture on his Book "Out of Equilibrium"

July 10, 2003, Jean Luc Gaffard, Sophia-Antipolis (France)

"Innovation, Competition and Growth: the Significance and the Role of Heterogeneity of Firms"

July 22, 2003, Heike Hennig-Schmidt, Bonn (Germany)

"Perceptions of Fairness and Equity in Bargaining - Insights from Observing People in Video Experiments"

August 19, 2003, Uta-Maria Niederle, Jena (Germany)

"Nature and Evolution of Property: an Economic View on Anthropological Findings"

September 2, 2003, Frédéric Koessler, Paris (France)

"Analogy-Based Expectations in 2-Person Games with Incomplete Information"

September 2, 2003, Rolf Sternberg, Cologne (Germany)

"Standorte der neuen Dienstleister – Erkenntnisse aus dem raum-zeitlichen Verteilungsmuster von Internet Domainnamen in Deutschland"

September 16, 2003, Jörg Felde, Halle (Germany)

"Transformational Leadership and Commitment"

September 17, 2003, Charlotte Phelps, Philadelphia (USA)

"Cooperation in Hierarchies"

September 30, 2003, Fredrik Tell, Linköping (Sweden)

"Strategy, Capabilities and Corporate Coherence: Exploring some Dynamics of Learning"

October 8, 2003, Eric Danan, Paris (France)

"The Cognitive Implications of Behavioral Rationality"

October 13, 2003, Jochen Schumann, Münster (Germany)

"Migration and Human Capital"

October 14, 2003, Claudia Werker, Eindhoven (The Netherlands)

"What Do We Know About the Invisible College of the Economics of Innovation and Technological Change?"

October 21, 2003, Dirk Helbing, Dresden (Germany)

"Supply Networks and Business Cycles as Unstable Transport Processes"

October 28, 2003, Tibor Neugebauer, Hannover (Germany)

"Intermediaries as Contractual Enforcers or Making Deals with Pepper"

November 4, 2003, Joachim Winter, Mannheim (Germany)

"Experiments on Survey Response Behavior"

November 4, 2003, Melvyn Weeks, Cambridge (UK)

"Social Interactions and Reproductive Externalities: An Investigation of Fertility Behavior in Kenya"

November 5, 2003, Giulio Bottazzi, Pisa (Italy)

"Dynamic Increasing Returns and the Distribution of Firm Growth Rates"

November 11, 2003, Andreas Chai, Jena (Germany)

"Attention, Fashion, and the Growth of Demand"

November 18, 2003, Robert Layton, Durham (UK)

"Evolutionary Theory and Economic Change: The Case of Rural France"

November 20, 2003, Brian Loasby, Stirling (Scotland)

"Organisation and the Human Mind"

December 8, 2003, Jürgen Eichberger, Heidelberg (Germany)

"Choice under Uncertainty with the Best and Worst in Mind: Neo-additive Capacities"

December 8, 2003, Andrew Austin, Prague (Czech Republic)

"Believing in Economic Theory: Sex, Lies, Evidence, Trust, and Ideology"

December 9, 2003, Andreas Freytag, Jena (Germany)

"Erfolgsbedingungen von Währungsunionen – eine empirische Analyse"

Visiting Scholars

In 2003 we were happy to host the following guest scholars at our institute for a lot of interesting exchange and mutual research:

Austin, Andrew (Charles University, Czech Republic) December 8 – 11, 2003
Assistant Professor at the Department of Economics at the Charles University, Prague, Czech Republic.

Research Interests: General Equilibrium Theory; Public Economics.

Avrahami, Judith (Hebrew University, Israel) March 24 – 26, 2003

Research Fellow at Hebrew University of Jerusalem, Israel.

Research Interests: Cognitive Science and Education; Rationality and Interactive Decision Theory.

Babicky, Vitezslav (Charles University, Czech Republic) February 11 – March 31, 2003 and June 3 – 18, 2003

Postgraduate at the Department of Applied Sciences, Charles University, Prague, Czech Republic

Research Interests: Mathematical Analysis; Physics and Astronomy.

Berlemann, Michael (Dresden University, Germany) July 1 – 4, 2003

Assistant Professor at the Department of Monetary Economics, Dresden University of Technology, Germany.

Research Interests: Monetary and International Economics; Central Banking; Political Economy and Public Choice; Health Economics; Experimental Economics.

Berninghaus, Siegfried (University of Karlsruhe, Germany) April 2 – 4, 2003
 Professor at the Institute for Statistics and Mathematical Economic Theory at the University of Karlsruhe, Germany.
 Research Interests: Game Theory; Decision Making under Uncertainty; Experimental Economics.

Bertrand, Stephane (Université Louis Pasteur, France) February 21 – 27, 2003
 Ph.D. student at the Université Louis Pasteur, Strasbourg, France.
 Research Interests: Behavioral Economics; Game Theory; Experimental Economics.

Bounmy, Kene (Université Louis Pasteur, France) Oct 19 – 27, 2003
 Ph.D. at Department of Economics at the Université Louis Pasteur, Strasbourg, France.
 Research Interests: Game Theory; Experimental Economics.

Brennan, Geoffrey (Australian National University, Australia) March 31 – April 10, 2003
 Professor of Economics at the Research School of Social Sciences, Australian National University, Canberra, Australia.
 Research Interests: Rationality; Political Theory and Public Choice; Economics and Philosophy.

Brügger, Esther (University of Bern, Switzerland) June 30 – July 3, 2003
 Ph.D. student at the Institute of Economics at the University of Bern, Switzerland.
 Research Interests: Microeconomic Theory; Computational Economics; Environmental and Resource Economics.

Cochard, Francois (Université Louis Pasteur, France) September 30 – October 5, 2003 and October 19 – 27, 2003.
 Ph.D. student at the Université Louis Pasteur, Strasbourg, France.
 Research Interests: Behavioral Economics; Industrial Organization.

Danan, Eric (Université de Paris, France) October 7 – 17, 2003
 Ph.D. student at the Department of Economics at Université de Paris, France.
 Research Interests: Decision Theory.

Eichberger, Jürgen (University of Heidelberg, Germany) December 8 – 9, 2003
 Professor at the Alfred-Weber-Institute for Economics at the University of Heidelberg, Germany.
 Research Interests: Economic Theory; Game Theory; Financial Economics.

Engelmann, Dirk (Charles University, Czech Republic) March 11 – 12, 2003
 Assistant Professor at the Center for Economic Research and Graduate Education, Charles University, Prague, Czech Republic.
 Research Interests: Microeconomics; Competition Theory; Experimental Economics.

Gaertner, Wulf (University of Osnabrück, Germany) June 10 – 11, 2003
 Professor at the Department of Economics at the University of Osnabrück, Germany.
 Research Interests: Rationality; Social Choice Theory; Distributive Fairness; Contract Theory.

Gaffard, Jean Luc (IDEFI Sophia-Antipolis, France) July 7 – 14, 2003
 Professor of the 'Institut de Droit et d'Economie de la Firme et de l'Industrie' (IDEFI) at the University of Nice, France.
 Research Interests: Economics of Innovation, Industrial Organisation; Growth and Fluctuations Theory.

Gehrig, Thomas (University of Freiburg, Germany) June 28 – July 1, 2003
 Professor at the Department of Economics at the University of Freiburg, Germany.
 Research Interests: Economic Theory; Game Theory; Finance.

Visiting Scholars



Eric Danan

VISITING SCHOLARS

Visiting Scholars



Kareev Yaakov

González-Farías, Graciela (CIMAT, Mexico) March 18 – 23, 2003
Professor at the Centro de Investigación en Matemáticas (CIMAT), Guanajuato, Mexico.
Research Interests: Mathematics, Statistics, Computer Science.

Greiner, Ben (University of Cologne, Germany) September 1 – 5, 2003
Ph.D. student at the Department for Economic and Social Sciences at the University of Cologne, Germany.
Research Interests: Game Theory; Experimental Economics; Trust; Reciprocity, and Fairness; Cooperation and Bargaining.

Gurtovoy, Ruslan (University of Dortmund, Germany) August 25 – September 2, 2003
Ph.D. student at the Department of Economics at the University of Dortmund, Germany.
Research Interests: Statistics; Allocation Theory; Economic Policy; Decision Theory.

Hanappi, Gerhard (Vienna University of Technology, Austria) July 5 – 12, 2003
Professor of Economics and Computer Science at the Vienna University of Technology, Austria.
Research Interests: Evolutionary Economics; Economics of Innovation and Growth; Simulations; Economic Systems Transformation; Macroeconomics.

Heady, Patrick (Max Planck Institute Halle, Germany) November 26, 2003
Research Fellow at the Max Planck Institute for Social Anthropology, Halle, Germany.
Research Interests: Social Anthropology; Statistics; Economics.

Iida, Yoshio (University of Kyoto, Japan) September 16 – 18, 2003
Assistant Professor at the University of Kyoto, Japan.
Research Interests: Public Goods and Experimental Economics.

Joosten, Reinoud (University of Twente, the Netherlands) March 13 – 21, 2003
Assistant Professor of Economics at the School of Technology & Management and at the Financial Engineering Laboratory at the University of Twente, Enschede.
Research Interests: Evolutionary Game Theory; Models of Learning; Technological Change and Growth; Industrial Organization; Managerial Economics.

Kareev, Yaakov (Hebrew University, Israel) March 24 – 26, 2003
Professor at the School of Education at Hebrew University of Jerusalem, Israel.
Research Interests: Cognitive Psychology; Decision Making.

Kirchler, Erich (University of Vienna, Austria) May 19 – 22, 2003
Professor at the Institute for Psychology at the University of Vienna, Austria.
Research Interests: Economic Psychology and Consumer Behavior.

Kliemt, Hartmut (University of Duisburg, Germany) April 4 – 8, 2003
Professor for Practical Philosophy at the University of Duisburg.
Research Interests: Political Philosophy; Health Ethics and Economics; Philosophy of Economics; Foundations of Game Theory and Game Theoretic Modelling.

Koessler, Frédéric (Université de Paris, France) April 24 – May 8, 2003 and August 26 – September 8, 2003
Research Fellow at the Department of Economics at the CNRS at the Université de Cergy-Pontoise, France.
Research Interests: Game Theory; Economics of Information; Experimental Economics.

Kuklys, Wiebke (Cambridge University, UK) February 25 – June 30, 2003
Ph.D. in Economics at the University of Cambridge, UK.
Research Interests: Game Theory; Experimental Economics; Microeconomics; Welfare Measurement.

Lambooy, Jan (Utrecht University, the Netherlands) March 6 – 15, 2003
Emeritus Professor of Economic Geography at Utrecht University.

Research Interests: Evolutionary Economics; Urban and Regional Economics; Complexity Theory.

Levínský, René (University of Freiburg, Germany) June 30 – July 3, 2003
 Research Fellow at the Department of Economics, University of Freiburg, Germany.
 Research Interests: Economic Theory; Game Theory; Finance.

Lorente, Loreto (Universidad Pública de Navarra, Spain) July 7 – August 6, 2003
 Associate Professor at the Department of Economics at the Universidad Pública de Navarra, Spain.
 Research Interests: Microeconomics; Fundamentals of Economic Analysis.

Loasby, Brian J. (University of Stirling, UK), November 17 – 21, 2003
 Professor Emeritus of Economics.
 Research Interests: Evolutionary Economics, Organizational Development, Cognitive Economics, the History of Economic Ideas, and Economic Methodology.

Mantzavinos, Chrysostomos (Max Planck Institute for Research On Collected Goods) February 3 – 5, 2003
 Research Fellow at the Max Planck Institute for Research on Collective Goods, Bonn, Germany.
 Research Interests: Institutions; Antitrust; Political Economy; Philosophy of Social Science; Rationality.

McDaniel, Tanga (University of Cambridge, UK) May 5 – 9, 2003
 Research Officer at the Department of Applied Economics at the University of Cambridge, UK.
 Research Interests: Microeconomics; Industrial Organization; Experimental Economics.

Meyer, Bernd (University of Osnabrück, Germany) May 24 – 25, 2003
 Professor at the Department of Economics at the University of Osnabrück, Germany.
 Research Interests: Macroeconomic Theory; Evolutionary Economics.

Mühlbacher, Stephan (University of Vienna, Austria) May 19 – 22, 2003
 Research Associate at the Department of Psychology at the University of Vienna, Austria.
 Research Interests: Economic Psychology.

Müller, Wieland (University of Tilburg, The Netherlands) October 15 – 17, 2003 and November 20 – 21, 2003.
 Associate Professor at the Department of Economics at the University of Tilburg, The Netherlands.
 Research Interests: Microeconomics; Game Theory; Experimental Economics.

Murmann, Peter J. (Northwestern University, USA) January 13 – 24, 2003
 Assistant Professor of Management and Organizations, Kellogg School of Management, Northwestern University, Evanston, Illinois.
 Research Interests: Capabilities Theories of the Firm; Evolutionary Theories of Organization; Industrial Organization; Theory of the Management in High Tech Industries.

Neugebauer, Tibor (University of Hannover, Germany) October 28 – 30, 2003
 Assistant Professor at the Department of Economics at the University of Hannover, Germany.
 Research Interests: Experimental and Behavioral Economics; Natural Resources; Game Theory.

Noussair, Charles (University of Atlanta, USA) March 31 – April 4, 2003
 Associate Professor at the Department of Economics at the Emory University, Atlanta, USA.
 Research Interests: Industrial Organization; Experimental Economics; Microeconomic Theory.



Loreto Lorente

Visiting Scholars

VISITING SCHOLARS

Visiting Scholars

Ortmann, Andreas (Charles University, Czech Republic) February 11 – 23, March 12 – 24, and June 3 – 18, 2003

Associate Professor at the Department of Economics at the Charles University, Prague, Czech Republic.

Research Interests: Industrial Organization; Game Theory; Experimental Economics.

Pagano, Ugo (Università degli Studi di Siena, Italy) March 5 – April 6, 2003

Professor of Economic Policy and Director of the Department of Political Economy at the University of Siena.

Research Interests: Property Rights Theory; Evolutionary Economics; Political Economy.

Parisi, Francesco (George Mason University, USA) June 1 – 15, 2003

Professor of Law and Director of the Law and Economics Program at George Mason University, School of Law, Arlington, Virginia.

Research Interests: Law and Economics; Comparative Law; International Law.

Phelps, Charlotte (Temple University, USA) September 15 – October 29, 2003

Professor of Economics at Temple University, Philadelphia, USA.

Research Interests: Foundations of the Economic Model of Behavior; Economics of Altruism; Family Economics.



Charlotte Phelps

Robeyns, Ingrid (University of Amsterdam, The Netherlands) November 11 – 13, 2003

Postgraduate at the Department of Political Sciences at the University of Amsterdam, The Netherlands.

Research Interests: Social and Welfare Economics.

Schumann, Jochen (University of Münster, Germany) October 11 – 13, 2003

Professor at the Department of Economics at the University of Münster, Germany.

Research Interests: Economic Theory.

Seki, Erika (University of Aberdeen, UK) September 16 – 18, 2003

Research Fellow at the Department of Economics at the University of Aberdeen, UK.

Research Interests: Public Goods; Environmental Resources; Behavioral Norms and Collective Behavior.

Warke, Tom (Cambridge University, UK) June 20 – 27, 2003

Professor of Economics at Cambridge University.

Research Interests: Utility Theory; Utilitarian Ethics; Axiomatic Bases of Economic Theory; History of Economic Thought.

Weeks, Melvyn (University of Cambridge, UK) November 4 – 5, 2003

University Lecturer in Economics at the Department of Economics, University of Cambridge, UK.

Research Interests: Microeconometrics; Macroeconometrics; Non-tested Hypothesis Testing and Simulation-based Inference.

Werker, Claudia (Eindhoven University of Technology, the Netherlands) October 6 - 17, 2003

Assistant Professor of Innovation and Technological Change at the Eindhoven University of Technology.

Research Interests: Innovation and Technological Change; Regional Innovation Systems; Innovation Policy; Economic Transformation Processes.

Winter, Joachim (University of Mannheim, Germany) October 21 – 22, and November 3 – 5, 2003

Professor at the Department of Economics at the University of Mannheim, Germany.

International Research Cooperation

DIME

Participation (by the Evolutionary Economics Group) in the European research network DIME (Dynamics of Institutions, Markets and Economies), including research groups from the UK, the Czech Republic, France, Denmark, Greece, Hungary, Italy, the Netherlands, Portugal, Spain and Germany. The network applies for EU funding within the Sixth Framework Program as a Network of Excellence. It uses an interdisciplinary and empirical approach that focuses on the co-evolution of technologies, corporate organizations and institutions as the fundamental driving process of economic change.

Endogenous Institutional Choice in Social Dilemma Situations

This research project has been funded by the Austrian National Bank ('Jubiläumsfonds'). It deals with endogenous institutional choice. The applied method is experimental economics. One doctoral student and two diploma students were employed in this project at the University of Innsbruck. Matthias Sutter (Strategic Interaction Group) is head of the project.

ETE

In 2002, the Evolutionary Economics Group participated as a founding member in a European research cooperation initiative, the ETE (Economic Transformation in Europe) - Network. Participating research groups are from the UK, France, Italy, Denmark, Norway, Sweden and Germany. The intention is to establish a program of interdisciplinary conceptual and empirical work under the general theme of sustainable economic transformation. Topics include, inter alia, the changing relationship between service and manufacturing activity in relation to innovation and the dynamics of growth; the role of wants and consumption behavior in the innovation process; the emergence of new institutional structures to guide the accumulation and application of innovative knowledge; and the scientific and technological capacity to implement sustainable development in Europe and on a global scale.

Coordinator: University of Manchester and UMIST, UK

Experimental Studies on Group versus Individual Decision Making

This research project has been funded by the Austrian Science Foundation (FWF). The aim of the project is to formalize the possible differences between individual and group decisions and to test for these differences in experimental studies. The main location of the project is Innsbruck (Austria), where two project assistants (postdoc and doc) will be working. Matthias Sutter (Strategic Interaction Group) is head of the project.

KASS - EU research project on kinship and social security

Participation (without external funding) in the European research network including research groups from Germany, Italy, Poland, Austria, Croatia, France, Russia and Sweden. The network applies for EU funding within the Sixth Framework Program as a Network of Excellence and focuses primarily on the comparative analysis of contemporary social transformation processes. (Strategic Interaction Group)

International
Research Cooperation

KEINS

Participation in a European Specific targeted research project (STREP): "Knowledge Based Entrepreneurship: Innovation, Networks and Systems", which is funded by the EU within the Sixth Framework Program. Participating research groups are from Italy, Britain, France, Sweden, Portugal and Poland. The task is to examine the relevance and features of knowledge-based entrepreneurship in Europe by looking at three types of it: start-up entrepreneurship, corporate entrepreneurship and academic entrepreneurship. Different methodologies and approaches, ranging from formal theorizing to case studies and quantitative empirical work will be integrated. (Evolutionary Economics Group, Entrepreneurship, Growth and Public Policy Group)

Trilateral Project - A Cross-Cultural Experimental Study on Interactive Decision-Making Involving Germans, Israelis and Palestinians

The main goal of this project (supported by the Strategic Interaction Group) is to understand how cultural differences affect strategic behavior in a variety of strategic environments by focusing on experimental studies with the participation of East and West Germans, Israelis and Palestinians.

MPIEW - Directory

Researchers

David B. Audretsch

Ameritech Chair of Economic Development and Director of the Institute for Development Strategies at Indiana University, Director of the Institute for West European Studies at Indiana University, Research Fellow of the Centre for Economic Policy Research (London), 1989 - 1991 acting Director of the Wissenschaftszentrum Berlin für Sozialforschung. Since 1991 - Research Professor, member of the Advisory Board to a number of international research and policy institutes, including the Zentrum für Europäische Wirtschaftsforschung (ZEW, Centre for Economic Research), Mannheim, the Hamburgisches Welt-Wirtschafts-Archiv (HWWA, Hamburg Institute of International Economics), the Swedish Foundation for Small Business Research, the American Institute for Contemporary German Studies (AICGS). Director of the group Entrepreneurship, Growth and Public Policy of the Max-Planck-Institute Jena: Links between entrepreneurship, government policy, innovation, economic development and global competitiveness.

Thomas Brenner

Research Associate (Dr. rer. nat., 1995, University of Stuttgart; Dr. rer. pol., 1998, Friedrich Schiller University, Jena; habil., 2003, Friedrich Schiller University, Jena): Localised Industrial Clusters, Industrial Spatial Distribution, Innovation Economics, Learning in Economics, Experimental Economics, Game Theory, Simulations, Computational Economics, Economic Psychology, Consumption Behavior.

Susanne Büchner

Research Fellow (MA, Sociology, Psychology and English, 2000, University of Leipzig): Fairness and Solidarity.

Guido Bünstorf

Research Associate (Dr. rer. pol., Economics, 2002, Friedrich Schiller University, Jena): Industrial Evolution, User innovation, Media Economics, Evolutionary Economics.

Andreas Chai

Research Fellow (B.Econ. (Hons.), University of Queensland/Australia): Evolutionary Consumer Theory, Complex System Dynamics, Developmental Economics, History of Economic Thought.

Christian Cordes

Research Associate (Dr. rer. pol., Economics, 2003, Friedrich Schiller University Jena): The biological and psychological foundations of economic behavior; long-term economic change and its driving forces; an evolutionary perspective on economic policy making.

Dennis Alexis Valin Dittrich

Research Associate (M.A., Economics, 2001, Humboldt University of Berlin): (Evolutionary) Game Theory, Experimental Economics, Emotions, Heuristics and Biases, Principal Agents Relationing, Microeconometrics, Time Series Analysis.

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Research Fellow (MA, Economics, 2001 and MS, Psychology, 2002, both at the University of Vienna): Behavioral Finance, Psychology and Economics, Public Goods and Social Dilemmas.

Sven Fischer

Research Fellow (M.Sc., Economics, 2002, Humboldt University of Berlin): Bargaining Behavior and Theory, Public Choice, (Evolutionary) Game Theory.

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Research Fellow (M.A., Economics and Business Administration, 1999, University of Hannover): (Regional) Entrepreneurship; (Regional) Networks and Cooperation; Institutions and Culture; International environmental policy; Cognitive Economics; Ecological Economics; Social Psychology.

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Research Fellow (M.Sc., Economics & Business Engineering, 2003, University of Karlsruhe): Consumption Theory, Utility Theory, Demand for New Technologies, Diffusion of technological innovations, Technometrics.

Luis G. González-Morales

Research Associate (BA, Economics, 1995 and MS, Applied Statistics, 1999, both at the ITESM/México; Ph.D., 2003, Ruhr-Universität Bochum): Economics of Corruption and Democracy, Game Theory, Bargaining Experiments.

Ben Greiner

Research Fellow (Dipl., 2002, Business Administration, Humboldt University of Berlin, August 2003 research associate, University of Cologne): Game Theory, Experimental Economics, Trust and Reciprocity, Fairness, Rationality, Cooperation, Bargaining.

Werner Güth

Director (Dr. rer. pol., 1972, and habil., Economics, 1976, University of Münster; 1977–1986, University of Cologne, 1986–1994 University of Frankfurt (Main), 1994–2001 Humboldt University of Berlin; since 2001 Director of the Strategic Interaction Group of the Max Planck Institute for Research into Economic Systems in Jena and honorary professor of Economics of Friedrich Schiller University, Jena and a member of the Berlin-Brandenburg Academy of Sciences): Game Theory, Experimental and Micro-economics with strong leanings towards (Social) Psychology, Philosophy, (Evolutionary) Biology and the Political Sciences.

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Research Associate (Dr. rer. nat., 2000, University of Vienna, Humboldt University of Berlin): Behavioral decision making, Psychology, Economics, Behavioral finance.

Andreas Nicklisch

Research Fellow (Dipl., Economics, 2002, Friedrich Schiller University, Jena): Game Theory, Experimental Economics, Economics of Innovation and Cognition Theory.

Uta-Maria Niederle

Research Associate (Dr. rer. pol., Economics, 2000, University of Rostock): Cognitive Models of human economic behavior; Possessive behavior and its relation to the formation of property rights; Concepts and models of evolutionary dynamics; general theory of institutions and institutional change; Economic history.

Axel Ockenfels

Associate Professor (Ph.D., Economics, 1998 and habil. 2002, University of Magdeburg, research stays at Penn State University and Harvard University, July 2003, C4 Professor, University of Cologne): Game Theory, Experimental Economics, Market Design & Auctions, Microeconomics & Industrial Organization, Reciprocity & Fairness, Bounded Rationality.

Katinka Pantz

Research Fellow (Magister Artium in Philosophy, Politics, Economics, 2002, Humboldt University of Berlin): Formation of Social Networks and Groups.

Sven Pinkert

Research Assistant (Dr. rer. pol., Economics, 2002, Friedrich Schiller University, Jena): Environmental and Resource Economics, Economic Policy, Institutional Economics, Order Economics.

Klaus Rathe

Research Fellow (M.A., Economics, 1996, University of St. Gallen/Switzerland): Theory of the Firm; Economics of Organization; Social Psychology and Economics; Institutional Economics; Economic Methodology.

Silke Scheer

Research Fellow (M.A., Psychology, 2002, University of Bamberg): Theory of the Firm; Changing characteristics of leadership in growing firms; Cognition; Developmental Regularities in firm growth.

Carsten Schmidt

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Christian Schubert

Research Associate (Dr. rer. pol., Economics, 2003, Friedrich Schiller University, Jena): Evolution of Institutions, Theory of Economic Policy Making, Law & Economics, Constitutional Economics.

Andreas Stiehler

Research Fellow (Dr. rer. pol., 2003, Humboldt University of Berlin, since June 2003: Berlecon Research GmbH, Berlin): Experimental Economics (esp. Public Goods, Information Cascades), Economic Psychology, Behavioral Economics.

Manfred E. Streit

Professor Emeritus (Dr. rer. pol., Economics, 1966, University of Saarland; habil., Economics, 1971, University of Mannheim; University of Freiburg, 1990; Founding Director of the Max Planck Institute – Institutional Economics Unit 1993-1998, and Professor Emeritus since 2000): Institutional Economics; Theory and Policy of the Economic Order.

Matthias Sutter

Associate Professor (Dr. rer. soc. oec. 1999, habil., Economics, 2002, University of Innsbruck): Experimental Economics, Public Economics, Public Choice, Economics of Economics.

Georg v. Wangenheim

Research Associate (Dr. rer. pol., Economics, 1994, University of Freiburg; habil., 2002, University of Hamburg): Evolution of preferences; Game Theory; Institutional Economics; Law and Economics; Public Choice; Welfare Economics from an evolutionary perspective.

DIRECTORY

Ulrich Witt

Director (Dr. rer. pol. in economics, 1979, University of Göttingen; habil. in economics, 1985, University of Mannheim; 1986-87 Visiting professor (economics) University of Southern California, Los Angeles, 1988-95 Professor University of Freiburg; Director of the Evolutionary Economics Group, Max Planck Institute and honorary professor of economics at the Friedrich Schiller University Jena 1995 - present); Economic behavior and its biological and psychological foundations; Long-term economic change; Social-cognitive theory of institutional change; Methodological and conceptual problems of theories of evolution.

Hagen Worch

Research Fellow (M.A., Economics, 2001, Friedrich Schiller University, Jena); Theory of the Firm; Developmental patterns in firm organizations; Cognitive leadership and motivation.

Christian Zellner

Research Associate (Dr. rer. pol., Economics, 2003, Friedrich Schiller University, Jena): Evolutionary Economics; Development Economics (esp. the evolution of consumption patterns in developing countries); Economics of innovation and technical change (esp. the contribution of basic research to national innovative capacity).

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Research Fellow (B.A., Psychology, 1999, Hebrew University of Jerusalem, October 2003, University of Haifa): Rationality, Decision Making, Experimental Psychology, Foraging Behavior.

Directory

Service Units

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K. Richter, S. Arnold

Administration

A new system of personnel administration was introduced in the entire Max Planck Society including our Institute. In July/August 2003 the Max Planck Society undertook an audit of the Institute's administration. In September 2003 we began introducing Cost & Performance Accounting, which will come into full force on 01.01.2004.

Number of employees at the Institute on 01.11.2003:

Directors	3
Professor Emeritus	1
Research Associates	15
Research Fellows	8
Scholarship holders from abroad	4
Students	9
Secretaries	5
Library	3
Administration	8
Computing Services	3



*front, l.r.: Gisela Bartschat, Angelika Gundermann, Ellen Richter, Manfred Geißler
back, l.r.: Ute Apel, Konstanze Herfurth, Dirk Hornberger, Sylvia Eckardt*

Directory

Library

The Library and Research Information is a special library that primarily provides services to the academics at the Institute. For this purpose it supplies printed and electronic media and information in the scientific fields of Evolutionary Economics, Experimental Economics and Economic Systems. In addition, the library acquires general reference books, dictionaries and literature in adjacent scientific areas.

At present the library owns 24,000 books, 5,600 bound journal volumes and approximately 180 current periodicals.

The MPS Virtual Library is an information portal that offers access to a large number of heterogeneous scientific information resources using one common search interface.

The Electronic Journal Library provides access to full-text articles in all relevant areas.

In addition, the library provides many online information services, for example Web of Knowledge, WISO I, WISO II, Current Contents and EconLit.

Items not held at the Institute Library can be obtained through the Inter Library Loan Service.



Brigitte Hofmann, Jana Wagner, Hella Bruns

Computing Services

The IT department has undertaken a major modernization program and now provides and maintains a modern state-of-the-art communications infrastructure for staff and researchers at reasonable cost and effort.

DIRECTORY

Faced with the challenge of maintaining and supporting the existing infrastructure and in parallel supporting the needs of the growing number of users and departments, the central task of modernization was started stepwise. In 2002 the network was redesigned and modernized. All network components were replaced by modern manageable systems. The old network layout topology was completely changed to a star topology, where each department has its own VLAN connected by redundant layer 3 switches. To overcome the shortage of network IP addresses the whole IP address scheme was redesigned and changed to private IP ranges.



*Jürgen Rosenstengel,
IT Manager*

One central focus has been and continues to be on network security. To ensure a higher degree of network security for the Institute's network, a central firewall was planned, set up and implemented. A common DMZ and a DMZ for scientific web servers



*Thomas Baumann, Head
of IT-Department*

now support the needs of the scientific departments at the Institute.

Fault tolerance of file and print services was improved by setting up a clustered file server, which also holds the central LDAP directory. Email Services have been replaced by a modern IMAP – based Mail System, which also provides basic groupware functionality and web mail access. Mail services were split into internal and external, where the external MTA provides SPAM and virus filtering.

A new internal IT organizational structure provides a dedicated IT helpdesk with a central service phone and service email. Thus the IT group is able to offer fast advice and support on all computer related subjects



*Thomas Brückner,
IT Manager*

The first steps towards a standardized PC and laptop design have been taken, which makes installation more efficient and minimizes the set-up time. The client operating systems were migrated step by step to Windows 2000. Policies and user regulations in accordance to the MPG user regulations were implemented.

The computer laboratory of the Strategic Interaction Unit was completely redesigned and now allows for more varieties of experiment scenarios. A modern and technically sophisticated video laboratory was planned and implemented, which allows preset standardized experiments as well as self programmed experimental setups.

A workshop on procurement and EVB / IT was organized in cooperation with the central procurement group at the GV.



Participants of the EVB IT Workshop, October 2003

Directory

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