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Jahresrückblick und Struktur des KLI
Review 2010 and Structure of the KLI

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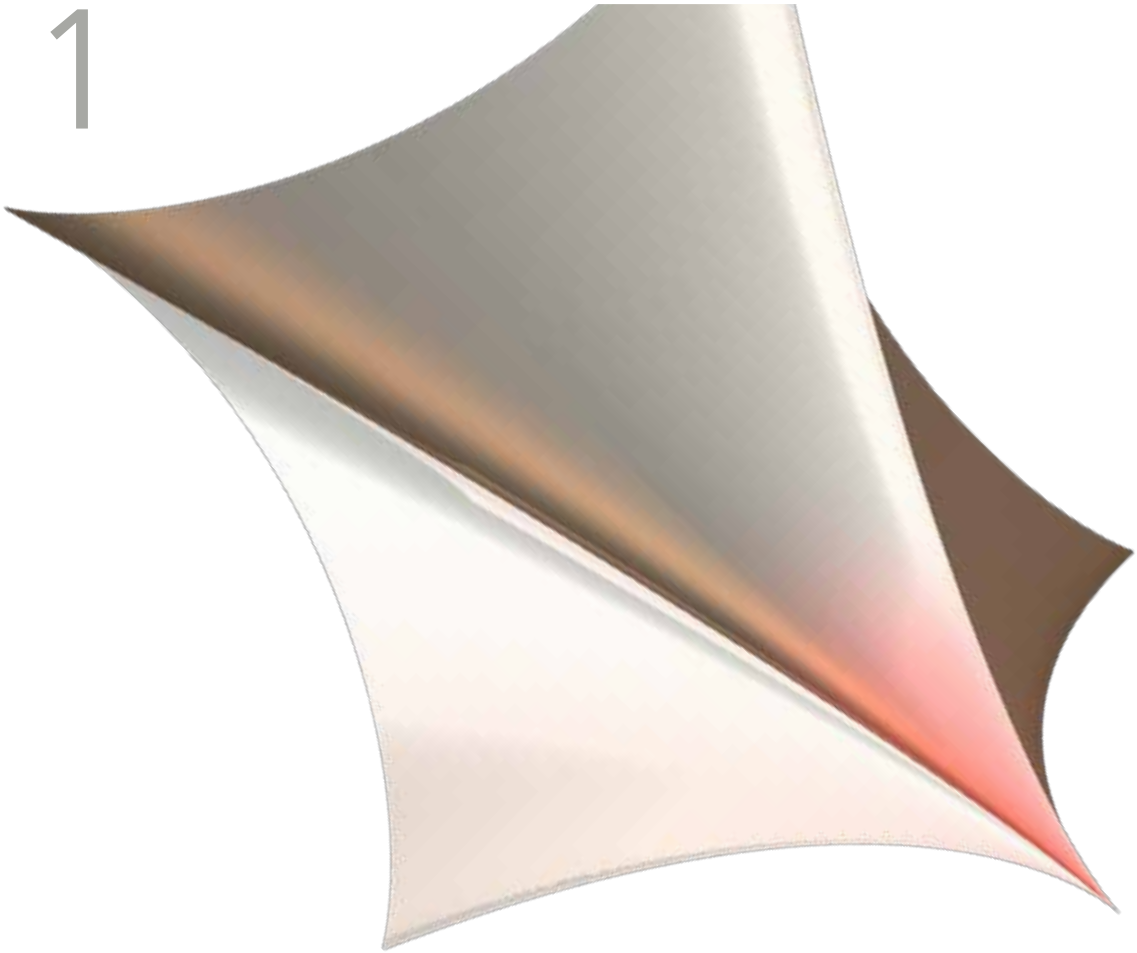

Through its in-house activities and freshly conceived workshops and seminar series the KLI has uniquely provided a context for rethinking major questions in developmental, cognitive, and evolutionary biology.

Stuart Newman,
New York Medical College

1.1 Jahresrückblick 2010 The Year in Review

Der weltweit zu beobachtende Wandel der akademischen Institutionen hat in den letzten Jahren auch Österreich voll erfasst. Das Gespenst der „Nützlichkeit" geht um. Teils erzwungen, teils in vorauseilendem bürokratischen Eifer bemessen die Universitäten ihre eigenen Leistungen immer mehr nach ökonomistischen Managementkriterien. Die eigentlichen Aufgaben der akademischen Einrichtungen – Erkennen, Verstehen, Analyse, Wissen, Kritik, Diskurs, Bildung – die fundamental auf intellektueller Unabhängigkeit beruhen, werden unter dem Gewicht sogenannter Effizienzkriterien zunehmend zurückgedrängt. Dadurch verändert sich auch die Rolle von außeruniversitären Institutionen, wie dem KLI, die zunehmend jene Funktionen der intellektuellen Auseinandersetzung übernehmen, für die an den Universitäten keine Platz bleibt und die weltweit zu einem Aufblühen von Advanced Study Instituten und eigenständigen Forschungseinrichtungen geführt hat. Aber selbst diese Institutionen geraten unter Beschuß. Im Herbst 2010 wurde allen außeruniversitären Wissenschafts- und Forschungseinrichtungen Österreichs seitens des Bundesministeriums für Wissenschaft und Forschung mitgeteilt, dass ihre Basisfinanzierungen in 2011 nicht mehr weitergeführt werden. Abgesehen von der finanziellen Widersinnigkeit dieser Maßnahme (die geförderten Institutionen erwirtschafteten oft ein Vielfaches ihrer Förderung über die Akquirierung von Drittmitteln) zerstört dieser einzigartige Akt österreichischer Wissenschaftspolitik einen ganzen Sektor der unabhängigen Forschung und akademischen Infrastruktur. Obwohl das KLI in der glücklichen Lage ist, von den Streichungen des Ministeriums nur marginal tangiert zu sein, erklären wir uns mit den betroffenen Institutionen solidarisch.

Im 20. Jahr seines Bestehens kann das KLI wieder auf eine schöne Bilanz verweisen. Neben den Einzel-Publikationen (30, sowie 16 im Druck), den Büchern (3) und den Zeitschriftsnummern (4) ist die zunehmend internationale Dimension des KLIs besonders hervorzuheben: Die 18 Fellows des Jahres 2010 kamen aus 10 verschiedenen Ländern (4 Kontinenten), 52 Vorträge/Kongressbeiträge wurden in 17 Ländern (3 Kontinenten) gehalten, 20 „Brown Bag" Redner kamen aus 14 Ländern (4 Kontinenten) und internationale Kooperationen mit Institutionen in Deutschland, der Schweiz, Italien, Frankreich, Großbritannien und den USA führten zur Organisation von 2 Symposien und 3 Workshops. Die Details zu den genannten und zu weiteren Aktivitäten finden Sie auf den nachfolgenden Seiten. Ich danke all jenen, die dies bewerkstelligt haben sehr herzlich für ihren Einsatz. Wie immer gilt mein besonderer Dank den Förderen, dem Vorstand und dem Mitarbeiterstab des KLI.

Univ.Prof. DDr. Gerd Müller
Vorstandsvorsitzender

1.2 Das KLI The KLI

Das KLI ist ein internationales Zentrum für theoretische Biologie. Das Institut fördert die Formulierung, Analyse und Integration biologischer Theorien sowie die Untersuchung ihrer wissenschaftlichen und kulturellen Konsequenzen. Der thematische Schwerpunkt liegt auf den Gebieten der Evolutionstheorie, der Entwicklungstheorie und der Kognitionstheorie. In diesen Bereichen unterstützt das KLI interdisziplinäre Forschungsprojekte, die entweder Modelle lebender Systeme herstellen oder metatheoretische Darstellungen geschichtlicher, philosophischer oder kultureller Aspekte von biologischen Theorien zum Ziel haben. Die wissenschaftlichen Arbeiten werden durch die Vergabe von Stipendien gefördert, die aufgrund eingereichter Projektanträge und internationaler Begutachtung in sieben verschiedenen Kategorien vergeben werden.

Neben den wissenschaftlichen Projekten verfolgt das KLI seine Ziele durch die Organisation von internationalen Workshops, Symposien und Vortragsreihen, sowie durch die Herausgabe einer wissenschaftlichen Zeitschrift und einer Buchreihe, beide in Zusammenarbeit mit MIT Press. Das KLI unterhält weiters eine frei zugängliche Internet-Datenbank, die bio- und bibliographische Informationen zu den für das KLI wichtigen Fachgebieten und angrenzenden Disziplinen zusammenfasst, eine kleine Tierhaltung, in der die Durchführung empirischer Projekte möglich ist, und das Konrad Lorenz Archiv, das Briefkorrespondenz, Photographien, Manuskripte, Tagebücher und Auszeichnungen von Konrad Lorenz umfasst. Mit dem KLI-Gästehaus steht den Visiting Fellows und Gästen auch eine attraktive Wohnmöglichkeit in Institutsnähe zur Verfügung.

1.3 Institutsorganisation Organization of the KLI

Vorstand / Board of Directors

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Department of Cell Biology and Anatomy, New York Medical College, Valhalla, NY, USA

PROF. DR. D. KIMBROUGH OLLER
School of Audiology and Speech-Language Pathology, University of Memphis, TN, USA

Wissenschaftliche Projekte
Scientific Projects

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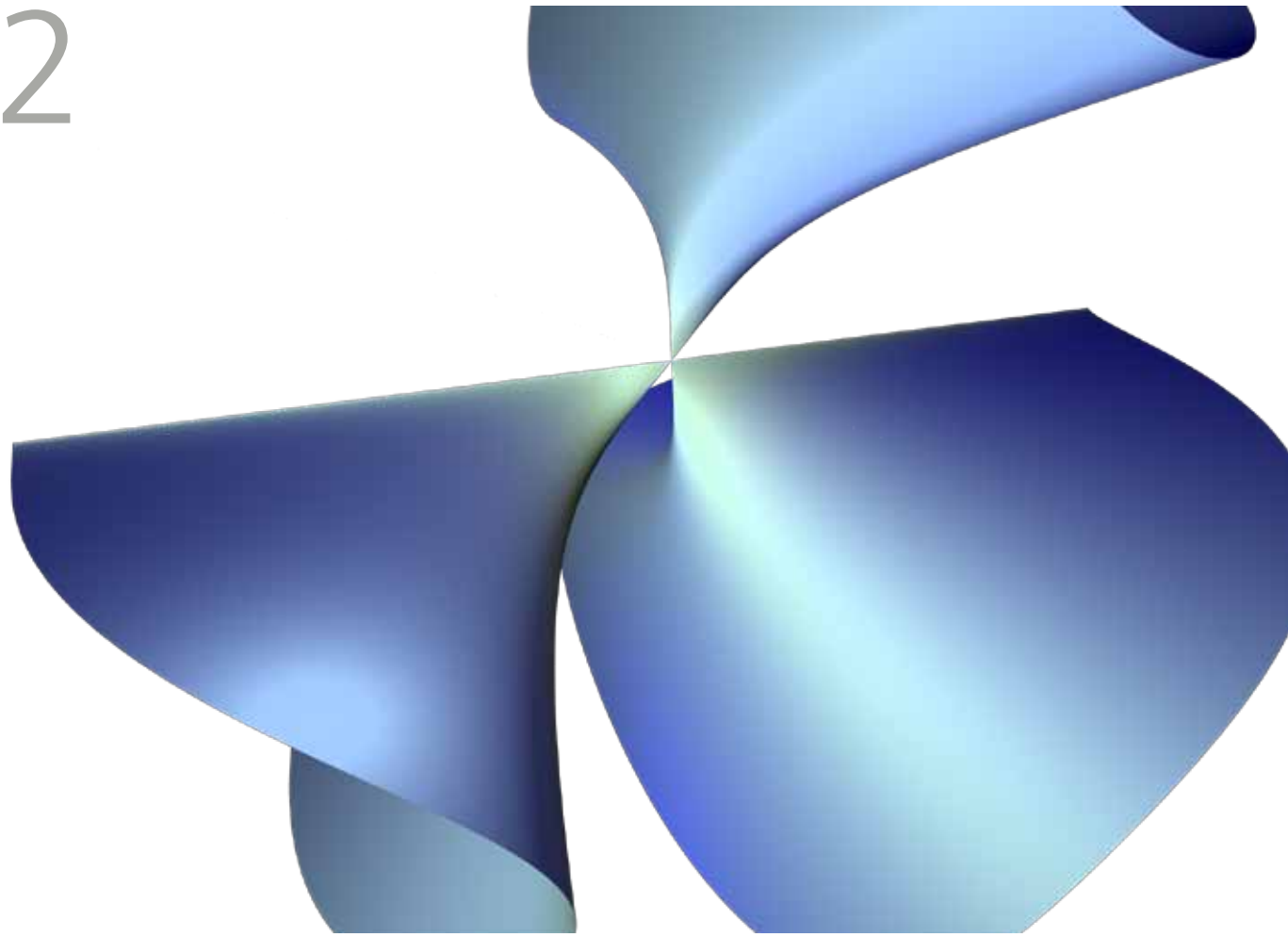


Für Projekte im Bereich der theoretischen Biologie vergibt das KLI sieben verschiedene Arten von Stipendien für Studenten, Postdoktoranden und Gastwissenschaftler für eine Dauer von jeweils einigen Wochen bis zu 3 Jahren. Alle eingereichten Projekte werden einem internationalen Review unterzogen.

2.1 Bewerbungen Applications

Insgesamt erhielt das KLI im Jahr 2010 56 Anfragen für Stipendien und Fellowships, wovon 22 vom Vorstand behandelt, und 18 für das laufende oder kommende Jahr genehmigt wurden.

	beantragt	genehmigt
Austausch-Stipendien	1	1
Writing-up-Stipendien	3	2
Postdoktoranden-Stipendien	6	4
Senior-Stipendien	2	2
Gastwissenschaftler-Stipendien	10	9

2.2 Junior Gastwissenschaftler Junior Visiting Fellowships

Jan VERPOOTEN
(January 2010 – December 2010)

Jan Verpooten obtained his MSc in Biology from the University of Antwerp, Belgium. He studied the social behavior (conflict management) of spider monkeys in the wild in Yucatán, Mexico, as a research assistant of Prof. Filippo Aureli, John Moores University, UK. For some years now he has collaborated with Prof. Mark Nelissen of the University of Antwerp (Behavioral Biology) in developing an evolutionary approach to human artistic behaviors. He is preparing a PhD on this subject.

Sensory Exploitation and Artistic Behavior
Wahrnehmungspräferenzen und Kunst

Aesthetic and artistic behaviors (producing and experiencing paintings, sculptures, dance, music, story-telling, ...) are human universals: they appear stably across human cultures. Evolutionists generally assume that universality of a trait indicates the presence of some underlying evolutionary process that causes its persistence. However, no real agreement exists as to which evolutionary process is actually responsible in this case. Extant hypotheses differ on crucial points. Is art an adaptation or not? On which level (genetic, cultural, …) is it selected for? Which mechanism (mating display, group bond-

ing, ...) is responsible for its evolution? These differences boil down to the problem of the high costs of art (it is a resource-, time-, and energy-consuming behavior). How could such a costly behavior have emerged? Are the costs compensated by benefits (art as an adaptation)? Or are they merely borne by a system that can support a certain amount of suboptimal variants (art as a consequence of non-adaptive evolution)?

To answer these questions we need a framework in which all hypotheses about art can be considered. To this end I have proposed a hypothesis based on sensory exploitation. It basically states that sensory, but also learned biases in the receiver of signals can influence the content and design of these signals through evolution. In a mimicry system, for instance, biases in the receiver are exploited by mimicking adaptive signals. For example, egg spots in male cichlids, which mimic real eggs quite accurately, are believed to have evolved by exploiting female receiver bias for eggs. Egg spots are genetically transmitted, but signals that evolved under the influence of receiver biases can also be culturally transmitted, as we argue is the case with visual art. This view of the evolution of art allows to articulate existing hypotheses. It also allows to make predictions: it explains why iconic representations (e.g., rock art) only emerged some 40,000 years ago. Although we have been able to draw some conclusions from initial investigations, we have only scratched the surface of the possibilities the concept of sensory exploitation offers.

2.3 Postdoktoranden-Stipendien Postdoctoral Fellowships

Naomi BECK
(September 2010 – August 2011)

Naomi Beck's research focuses on the use of of evolutionary concepts in political and economic thought. She obtained her PhD from the University of Paris-1 (Panthéon-Sorbonne) in 2005. Her revised dissertation will be published in 2011 under the title **Les politiques de l'évolution: Spencer et ses lecteurs en France et en**

Italie. ***She was an assistant professor at the University of Chicago (2005-2009) and held research fellowships at the University of Bologna, the Max-Planck-Institut für Wissenschaftsgeschichte in Berlin, and the European University Institute near Florence, Italy. Her current book project on Hayek's evolutionary thinking is titled*** **The Great Economic Miracle: Cultural Evolution and the Free Market.**

Of Unintended Consequences: Evolution and the Free Market in Hayek's Thought

Über unbeabsichtigte Folgen: Evolution und freier Markt im Denken Hayeks

Friedrich August von Hayek (1899-1992) was undoubtedly one of the most consequential political thinkers in the twentieth century. He influenced policy makers such as Margaret Thatcher and Ronald Reagan, as well as leading economists such as Milton Friedman, whose legacy lives on and thrives in the Chicago School of Economics. Recently, Hayek's work has become the object of increased scholarly interest. The University of Chicago Press is publishing an edition of his collected writings, and no less than four biographies have appeared in print since the year 2000, in addition to more specific monographs on Hayek's social, economic, and political philosophy. However, the new wave of studies has paid relatively little attention to the central role of evolutionary considerations in Hayek's thought. It is this lacuna that my book seeks to fill. A close look at Hayek's use of evolutionary ideas is likely to provide new insights concerning the old, so-called "social Darwinist" question, a misnomer for the question of the relationship between evolutionary biology and politics. In my study I propose to investigate Hayek's claims with reference to past developments of a similar vein (e.g., Herbert Spencer), and compare them with those of Karl Popper and Darwin. I intend, in this way, to highlight the problematic aspects of the parallels Hayek drew between economics and evolutionary biology. I will also emphasize Hayek's modernity and the originality of his contributions to the ongoing debate on the meaning of evolution in the social, political, and ethical realms. I will analyze, for instance, his developments in

theoretical psychology, e.g., neural network modeling, and relate them to the work of modern evolutionary psychologists. I will also examine Hayek's theory of group selection, the cornerstone in his project to give an evolutionary interpretation of the growth of human civilization, and the object of heated controversies in sociobiology today. Finally, I will examine Hayek's attempt to assign normative content to the outcome of social evolution and explore his extensive use of biological analogies in support of what he termed "the liberal society." I will challenge Hayek's interpretation of natural development to see whether it bears out the weight of his staunch attack on socialist reforms and is able to buttress his free market politics.

Ellen CLARKE
(December 2010 – November 2011)

Ellen Clarke's PhD thesis* Biological Individuality and the Levels of Selection *and was supervised by Professor Samir Okasha at the University of Bristol.

Generating Biological Individuality
Das Entstehen biologischer Individualität

I argue for a science-driven understanding of biological individuals as products of a dynamic evolutionary process. My very recent work has involved undertaking a detailed investigation of the idiosyncrasies of the biological individuality problem with respect to plants. I started to uncover crucial ways in which definitions of the individual that hold for unitary organisms – and which underpin most abstract theoretical models on which scientific definitions of the individual have recently been based—are not generalizable: they cannot be carried over to other, less paradigmatic organisms and still play the role demanded of them. It has given me insights into the extent to which central concepts in the theory of natural selection are biased towards higher metazoans. Once you move away from that group, totally different phenomena become central. For example, with respect to unitary organisms germ-soma separation and bottleneck life cycles are cornerstones of

individuality, but once you look at organisms with a modular organization in which the body is constructed out of a series of repeating parts, as in plants and many marine invertebrates, germ separation and bottlenecks just lose all relevance for the problem of individuality. I carry out an in-depth analysis of the way in which modularity thus constitutes a unique domain for the individuality problem, as well as for evolvability, major transitions, and the evolution of complexity. For example, in a forthcoming publication for Sterelny and Calcott's edited collection, *The Major Transitions in Evolution Revisited*, I argue that the modular organization of clonal plants makes them subject to an idiosyncratic kind of selection, in which the entity that we commonly refer to as 'the individual' actually evolves within a generation.

What I want to do next is push this idea further and try to develop a truly general thesis that succeeds in unifying the notion of biological individuality across all corners of the tree of life. Ultimately I want to generate a definition that is informed by detailed consideration of the particularities of as many different major groups of organisms as possible, including symbiotic unions, social insect colonies, and bacteria.

Miles MACLEOD
(November 2009 – October 2011)

Miles MacLeod defended his PhD dissertation on the historical epistemic roles of theoretical entity concepts at the University of Vienna with the Initiativkolleg „Naturwissenschaften im historischen Kontext." He completed his Masters of HPS at the University of Utrecht in 2006.

The Epistemic-Only View of Natural Kinds

Eine rein epistemische Betrachtung natürlicher Arten

My project concerns the relevance of the concept of natural kind to our understanding of scientific practice, particularly within the life sciences.

Most discussion of natural kinds these days does in fact occur with respect to the life sciences, where the concept

seems central to claims of these fields but is at the same time deeply problematic. It has been difficult to say what natural kinds are in this context, when many examples such as 'species' do not seem to be reducible to a precise set of essential properties, but admit exceptions, historical changes in their descriptions, or multiple realizability. This failure has prompted the question whether there is in fact any value in a 'natural kind' concept at all.

I believe, however, that this conclusion is premature, as it fails to appreciate the deep conceptual and investigative roles that concepts considered 'natural kinds' play in the life sciences as often the very basis around which these fields are organized. It is thus in the context of elaborating and accounting for practice that the concept of natural kind is required.

My project sets out to argue that philosophers should take an 'epistemic-only' view of natural kinds, whereby our task is to understand their epistemic contributions to scientific practice (as bases of categorization, inductive generalization, and explanation), and the way in which research processes conceptually depend upon them. With this perspective, the sense of 'natural' of the concept is not interpreted ontologically, but is rather cashed out in terms of the beliefs scientists have towards the concept and how this affects their use of it. The project will develop this viewpoint with respect to case studies from the life sciences, where the aim is to investigate how the 'natural kind' concept is epistemically central to research practices. I will argue that with this approach to natural kinds we stand to have a better understanding of the basis upon which research processes, and in turn conceptual frameworks, evolve.

Matthias SAMWALD

(January 2009 – November 2010)

Matthias Samwald is a postdoctoral researcher at DERI Galway (Galway, Ireland), and a member of the World Wide Web Consortium (W3C). He studied experimental neurobiology at the University of Vienna and the Medical University of Vienna. His doctoral thesis focused on

employing Semantic Web technologies in neuroscience and biomedicine. He worked for the Yale Center for Medical Informatics (US), the Yale Department of Neurobiology (US), Science Commons (US), and the Semantic Web Company (Austria). The major aim of his work is the transdisciplinary synthesis of biology, medicine, informatics, and philosophy, as well as bridging the gap between fundamental academic research and practical industrial applications.

An Integrated Knowledge Base of Vertebrate Cognition

Eine integrierte Wissensbasis zur Kognition bei Wirbeltieren

Modern neurocognitive research produces vast amounts of data and hypotheses. A thorough understanding of the brain and cognitive processes requires the integration of data from many different types of organisms, experiments, research groups, disciplines, publications, and databases into a coherent view of biological reality.

This project will harness new, powerful information technologies (Semantic Web technologies, ontologies) to provide such an integrated view. The project will consist of the following work packages:

1) Creating a machine-processable ontology for the representation of vertebrate cognition and behavior based on a thorough analysis of relevant literature.

2) Interlinking the ontology of vertebrate cognition with a wide variety of existing ontologies, data repositories, and publications, thereby creating a large knowledge base about cognition and neurobiology.

3) Creating an interactive knowledge base on the KLI website, based on the resources developed in tasks 1 and 2. This knowledge base will build on the established KLI Theory Lab, forming one of the first sophisticated online databases about cognition and biological theory. The knowledge base will be hosted on the KLI website and will eventually replace the existing version of the KLI Theory Lab.

4) Evaluating the practical value of the knowledge base by

answering biomedical questions. The knowledge base will be used to elucidate relevant biomedical problems, such as the cognitive aspects of neurodegenerative diseases.

5) Disseminating project outcomes, international networking, and ensuring long-term sustainability. The extended version of the KLI Theory Lab will be actively disseminated to expert communities, media, and the wider public. Successful dissemination will ensure the participation of others in the further extension and refinement of the knowledge base after this project has ended.

Christine SCHWAB

(December 2009 – November 2011)

Christine Schwab studied cultural anthropology and sociology at the University of Vienna and received her master`s degree, supervised by Prof. Andre Gingrich, working on the identity process of the Hungarian ethnic minority in Austria (for which she was awarded an academic prize). She then studied zoology at the University of Vienna, completing her MSc under the supervision of Prof. Ludwig Huber, investigating the ability of dogs to differen-tiate degrees of attention of their owners. She held a PhD position in an FWF project for studying the influence of social relations on social learning in corvids, and was responsible for establishing jackdaws as a new research species at the KLF (Konrad Lorenz Research Station) in Grünau, Upper Austria. In Spring 2009 she collaborated with Prof. Ronald Noë at the CNRS in Strasbourg, France, on biological markets. She was awarded the Laudimaxima Prize from the University of Vienna for promoting women in the natural sciences and mathematics.

Social Networks in Corvids

Soziale Netzwerke bei Krähenvögeln

My interest concentrates on the evolution of social behavior by investigating structural and functional aspects of jackdaw, *Corvus monedula*, and raven, *Corvus corax*, social systems. I will employ a theoretical approach and methods that

originated in mathematical graph theory and are new and innovative in animal behavior research: social network theory and social network analysis (SNA). The project comprises two objectives: first, to generate and analyze networks in these two species and to investigate their comparability and changes over time; second, to experimentally address the question which social networks influence transmission of information and access to resources within the group. Data on social interactions already exist. They consist of two years of observations on one captive colony each, one year on a wild jackdaw colony; data on wild ravens are currently collected.

SNA has several important advantages:

1) It provides mathematical evidence for the composition of networks, contrasting with former a priori classifications by the human observer. 2) It allows a more detailed analysis of the social fine structure of groups by going beyond categorization (by sex, age, kinship, mating system, etc.). 3) It provides several analytical measures to allocate subjects certain structural positions within the group, such as centered, marginal, or bridging positions. 4) Results of SNA yield nondimensional values that allow comparisons between groups, populations, or species.

Objective 1: Analysis of social interactions is expected to result in 4 networks (sociopositive, spatial association, agonistic, defensive) that differ distinctively with regard to several SNA measures. Each of these networks will be analyzed in three time periods, reflecting different periods in the birds` annual cycle. Comparisons of networks between periods, contexts (in the wild and in captivity), and species will show how networks change over time, and will provide better insight into the social structure of jackdaw and raven colonies.

Objective 2: Investigating the functional value individuals can draw from their social networks in two different contexts. First, two antithetic hypotheses will be tested regarding propagation of information within a group. Hypothesis A is commonly found in the literature: spatial proximity/affiliation between individuals enhances social learning and, therefore, information transmission within groups should follow affiliation patterns between group members. Hypothesis B stems from human sociology: weak ties are important for

information transmission (tie = sociopositive and symmetric). Therefore, information transmission should follow agonistic patterns between group members. In two experiments 18 jackdaws will be tested in a group setting. Determination of the order of individuals succesfully manipulating a testing apparatus and getting access to the testing apparatus will then be compared with the structure of the birds` networks to assess which networks influence the pattern of information transmission and which regulate access to limited resources. The results should show how individuals benefit from these respective networks.

Andreas WILKE

(January 2009 – January 2010)

Andreas Wilke is currently a research fellow in the Department of Psychological and Brain Sciences, Indiana University, Bloomington. He studied psychology at the Free University of Berlin (Diplom, 2002; Dr. phil., 2006) and was a postdoctoral researcher at the Center for Adaptive Behavior and Cognition (ABC), Max Planck Institute for Human Development, Berlin (2005-06 and 2008), and at the Center for Behavior, Evolution and Culture (BEC), Department of Anthropology, University of California, Los Angeles (2006-08). He has also been a visiting research scholar in the School of Natural Resources and Environment and at the Institute for Social Research and School of Public Health, both at the University of Michigan, Ann Arbor. His research interests are in cognitive and evolutionary psychology, evolutionary and behavioral ecology, and biological anthropology. He is publishing extensively in all these areas.

Human Foraging Cognition

Kognitionsprozesse menschlicher Nahrungssuche

My research focuses on the cognitive adaptations underlying decision making under uncertainty in foraging. I investigate whether the same mechanisms animals use in foraging for patchy resources are also shared by humans and used in

novel tasks such as searching for physical resources or information on the Internet. Currently, I look at whether people's assumptions about the patchiness of resources underlie well-known phenomena of human judgment, such as the "hot hand" or the „gambler's" fallacy. For this purpose I study people in controlled laboratory settings and conduct field studies in a traditional foraging society in Amazonian Ecuador.

2.4 Senior-Stipendiat Senior Felllow

Wayne CHRISTENSEN
(February 2010 – January 2011)

Wayne Christensen studied philosophy at the University of Newcastle, Australia (PhD, 2000), and worked as a postdoctoral research associate with the Complex Adaptive Systems Group there in 2000-2001. He was a postdoctoral fellow at the KLI (2002-2004) and in the Philosophy Department at the University of Kwazulu-Natal, South Africa (2004-2006). More recently (2007-2009) he has been a research fellow in Philosophy and Cognitive Science at Macquarie University, Australia. Dr. Christensen is currently working on a book that investigates the cognitive and biological foundations of personal agency. The objective is to promote a broad-based engagement between philosophical agency theory and empirical cognitive research. Within this larger project he is currently developing an account of the respective roles of automatic and higher cognitive processes in skilled action, and a naturalist approach to the foundations of normativity. In recent work he has proposed a theory of the role of hierarchically structured control and model-based representation in the evolution of cognition.

A Naturalist Theory of Agency: Biological and Cognitive Groundings

Eine naturalistische Theorie von „Agency": Biologische und kognitive Grundlagen

The goal of this project is to complete a book project, which will be submitted to the Cognition, Brain, and Behavior

series of MIT Press. The book will develop a theory of the cognitive and biological grounding of personal agency. Agency is a central topic of research in philosophy with fundamental and wide-ranging significance. Reflective agency is commonly regarded as central to personhood, autonomy, and moral normativity. As such it has great practical significance. Most philosophers take the cognitive basis for reflective agency to be more or less self-evident and unproblematic. However, some influential strands of empirical and philosophical research have challenged the causal role of introspective awareness in cognition. In philosophy of cognitive science Dennett (1991) has influentially criticized "Cartesian theatre" views that posit a central locus for conscious awareness and control. There have been numerous philosophical responses to the more influential challenges. But given the breadth of the empirical and conceptual issues, what is needed is not a piecemeal response to specific experiments, but rather a broad-based engagement between agency theory and empirical cognitive research. The book will develop such an engagement, and will have four main theoretical components: (1) an account of the integrated operation of automatic and controlled processes in voluntary action control, (2) a theory positing a common basis in hierarchical control for goal-directed and reflective agency, (3) a theory of agent individuation that takes biological individuality as a template, and (4) a theory of the naturalist grounding of agency norms.

István SCHEURING
(September 2009 – April 2010)

István Scheuring is a senior research fellow at Loránd Eötvös University, Budapest, and at the Hungarian Academy of Sciences. He studied physics and biology at Loránd Eötvös University (PhD in theoretical biology, 1994). His interests cover many different areas of theoretical biology, including ecology, the origins of life, and the evolution of cooperation and mutualism. He has been a visiting fellow at the Collegium Budapest in 1995 and at the Max Planck Institute of Complex Systems in Dresden in 2006.

Social Noise and the Evolution of Human Cooperation

Der Effekt von sozialem „Rauschen" in der Evolution menschlicher Kooperation

Altruism and cooperation, which impregnate human behavior, are usually explained by either kin or group selection mechanisms or by direct and indirect reciprocity. Direct reciprocity can be explained by the existence of some memory device capable of storing previous actions or by limited dispersal. However, the evolutionary origin and stability of indirect reciprocity can be explained only when the actions are observed and classified by the members of society with the help of a social norm. Knowing the actual score (reputation) of a potential recipient (and of the donor) and the norm followed by the potential donor, she can decide whether its recipient is worth of donation or not. If freeriders are excluded effectively from the interaction by this norm, indirect reciprocity can be maintained.

My project presents two problems connected with the evolution of cooperative social norms and the effectiveness of altruistic punishment based on strong reciprocity. Indirect reciprocity and systems of norms in general are based on information about the social status of the potential partner in the population. Most models assume that individuals are well informed about the reputation of their partners due to direct perception or reliable information transfer among individuals. Although different algorithms are applied for the information transfer in the theoretical papers, they have a common nature, viz., they assume that communication is honest, and, hence, information is reliable. Similarly, there is no incentive to cheat in the experimental settings. However, this is not sufficiently the case in the real world: in addition to information transfer, communication also enables manipulation, mainly by the social denigration of others.

I am interested in the question whether reliable information transfer can co-evolve with a cooperative system of norms in a population structure characteristic of ancient humans. I use the general framework of the indirect reciprocity game, and I assume that individuals follow second-order norms and that cooperative or defective actions are classified as "good" or

"bad" according to their norm. In this new model, the behavior of the potential receiver is estimated by the information from the observers of the previous action of the receiver.

The questions are: Is it possible that cultural selection maintains honest communication? If honest communication is possible, what are the main factors responsible for it? Are there polymorphisms in gossip rules in the evolutionary equilibrium?

In the second part of the project I study how social and environmental circumstances impinge on the success of egalitarian and strong reciprocity strategies. It is generally accepted that humans follow "strong reciprocity" in social dilemmas, i.e., that they obey cooperative norms and (altruistically) punish its violators. The role of strong reciprocity in maintaining cooperation among unrelated human individuals is questioned by some recent experiments, which highlight that there is an alternative explanation for the punishment of norm violators.

Social norms can be effective only if participants analyze situations correctly. Moreover, social norms maintain cooperation among unrelated individuals only if the information transfer among individuals is widespread and reliable. Thus we have the following hypotheses: If "social noise" is high in the population, it is much easier to evaluate individuals according to their income rather than their behavior, i.e., the egalitarian strategy is more effective than cooperative norms.

To study this hypothesis, I work out a model that follows up on Fehr and Gachter's (2002) experimental set-up.

2.5 Austausch-Stipendien Exchange Felllowships

Stephan HANDSCHUH
(September 2010 – August 2011)

Stephan Handschuh studied zoology at the University of Vienna, focusing on theoretical evolutionary biology, morphology, and imaging methods. He currently works on his doctoral thesis at the University of Vienna, where he also lectures on 3D imaging and visualization methods and histology.

Sexual Selection and Assortative Mating: Key Factors in the Evolution of Crustacean Bodyplans?

Sexuelle Selektion und assortative Paarung: Schlüsselfaktoren in der Evolution der Baupläne von Crustacäen

Population and developmental genetics represent two prominent approaches of modern evolutionary research. Within the field of evolutionary developmental biology (EvoDevo), the evolutionary developmental genetics approach gained importance due to progress in the cloning and visualization techniques. Today a fusion of classical population genetics and developmental genetic data seems both challenging and necessary. On the way towards synthetic interpretations and evaluations of evolutionary scenarios there is a need for model systems that are well investigated both regards. The bodyplans of higher Crustacea (Malacostraca) may present such a model system.

I introduce a number of hypotheses that implicate complex mating systems and their population genetic consequences, as key factors in the evolution of Malacostracan bodyplans. Sexual selection in particular is assumed to act directly on the expression patterns of developmental regulatory genes underlying the morphology of structures that are crucial for mating behavior. The main part of this work is the detailed investigation of the complex mating system of *Dikerogammarus villosus* (Amphipoda), using modern and innovative techniques like x-ray microCT for acquiring morphometric data. Based on the combination of morphometric and regulatory gene expression data, this study may yield new insights into the mechanisms of Malacostracan bodyplan and appendage evolution.

Sebastian VOIGT
(August 2008 – July 2010)

Sebastian Voigt studied biology in Hamburg and Innsbruck, where he specialized in physiology and embryology. He also attended courses in protein biochemistry and cell biology and carried out work on neotenic hemoglobin

expression patterns in pupfish (Cyprinodon) in Umeå, Sweden, in 2001. He obtained his MA in zoology on physiological maternal effects in zebrafish* (Danio rerio) *in Innsbruck in 2003. Until 2006 he studied veterinary medicine in Vienna. He currently attends biology courses at the University of Vienna.

DevoEvo of the Pupfish Genus Cyprinodon: A Phenotypic Engineering Approach

DevoEvo von Kärpflingen: Ein phenotypischer Entwicklungszugang

The traditional gene-centered view of the Modern Synthesis is loosing ground against a perspective that focuses on development as the pacemaker of evolutionary innovation (DevoEvo). These rising theories, arranged around the phenomenon of phenotypic plasticity, are much in need of further experimental grounding. The proposed work on pupfish of the genus Cyprinodon is an effort to fill this gap. These tiny fish have been described as beeing able to survive almost every calamity and react with a high degree of phenotypic plasticty towards changing ecological conditions. Environmental induction, epigenetic origination, and neophenogenesis are potential mechanisms thought to underlie the origin of phenotypic novelty in changing environmental conditions. These concepts will be tested using closely related species of pupfish adapted to various kinds of extreme conditions. The empirical and experimental work of this project will focus on the "making of new species" under artificial conditions (phenotypic engineering) and on fast evolving species in the laboratory of nature. The comparative physiological and morphological approach will include the use of advanced quantitative tools such as Micro-CT and Digital Motion Imaging.

2.5 Gastwissenschaftler Visiting Scientists

Sabine BRAUCKMANN
(November 2010 – March 2011)

Sabine Brauckmann studied philosophy, mathematics, and Slavic literature and languages at the University of Münster. She finished her PhD work in 1997 with a thesis on the organismic systems theory of Ludwig von Bertalanffy. Until 2000 she was a research associate of the Institute of Philosophy, University of Münster. Meanwhile she also conducted projects on the history of theoretical morphogenesis and the scientific life of Paul A. Weiss as a visiting scholar of the MPI for Neurobiology, the Rockefeller Archive Center, and the Department of Medical Genetics, University of Utah. The German Research Foundation awarded her a Research Fellowship to continue her biographical project on Paul A. Weiss at Dartmouth College and Johns Hopkins University until early 2003. She was a post-doctoral fellow at the KLI in 2003-2005.

A Laboratory in the Prater: The Biologische Versuchsanstalt in Vienna

Ein Labor im Prater: Die biologische Versuchsanstalt in Wien

The book project "Vivarium" will publish a detailed study of the research program of the Biologische Versuchsanstalt in Vienna (1902-1945). The objective is to locate the Vivarium inside the context of experimental and theoretical biology from 1900 to 1940, to map its networking grid that connected it to other Austrian and international research institutes, and to trace its diverse tie-ins to fin-de-siècle Vienna. The first part of the edited volume will introduce the Vivarium as a new research institution in Austria, delineate the Jewish topography of the families of Przibram, Portheim, and Figdor (among some others), positioning them inside the Viennese culture and bourgeoisie, and trace how the scientific community of the university and the academy acted towards them. The following main part, elaborating Vivarium's research pro-

gram of experimental and theoretical biology, will display the experimental work of the departments dealing with developmental physiology, classical genetics/heredity, botany and plant physiology, and medical physiology/endocrinology, without neglecting the role of the women scientists and including also a chapter on the impact theoretical biology had on the experimental research at the Vivarium. The third part presents the architecture of the building and its equipment, followed by a chapter discussing the collections, the library, and the museum. The final part will discuss the international exchange programs, will compare the Vivarium with international research institutes (e.g., Cambridge, Agram, Lunz, Monaco, Moscow, Philadelphia, Rome), and university institutes working on similar problems.

George MCGHEE
(June – August 2010)

George McGhee is currently Distinguished Professor of Paleobiology at Rutgers University, New Brunswick, NJ, USA), where he is a member of the Earth & Planetary Sciences, Ecology & Evolution, and Oceanography graduate faculties. McGhee completed his Master's degree in paleontology at the University of North Carolina at Chapel Hill, and his PhD at the University of Rochester, working under the direction of Professor David M. Raup. He conducted pre-doctoral research with Professor Adolf Seilacher's **Konstruktionsmorphologie** ***research group at the University of Tübingen, and following his doctoral work he was Visiting Scientist at the Field Museum of Natural History (Chicago), Research Associate at the American Museum of Natural History (New York), Visiting Professor at the University of Tübingen (Germany), a Fellow and now Member of the Konrad Lorenz Institute for Evolution and Cognition Research. Dr. McGhee is the author of over 120 research publications, and of the research books*** **The Late Devonian Mass Extinction** ***and*** **Theoretical Morphology: The Concept and Its Applications***, both published by Columbia University Press, and of* **The Geometry of Evolution: Adaptive Landscapes and Theoretical Morphospaces***, published by Cambridge University Press.*

Predictability and the Evolutionary Process
Vorhersagbarkeit und der Evolutionsprozess

How predictable is evolution? The complete spectrum of disagreement exists at present among evolutionary biologists with regard to this seemingly simple question. One extreme argues that biological evolution is totally and completely unpredictable (Gould). The other extreme argues that biological evolution not only has a predictable direction, it also has an inevitable destination (Conway Morris).

The proposed research seeks to consider the implications of the pattern of convergent evolution in nature for the question of the predictability of evolution, using the analytical techniques of theoretical morphology. Evolutionary constraint is a key phenomenon that underlies much of the convergent evolution that we see in nature and is thus a key to understanding the potential predictability of evolution. Theoretical morphospaces are particularly useful in exploring the limits of constraint on the evolutionary process. For any group of organisms, can we conceptually map the distribution and boundaries of developmental, phylogenetic, functional, and geometric constraints within theoretical morphospace? If we could accomplish this, we would be well on the way to understanding the reason that certain morphological solutions are repeatedly evolved in life, convergent evolution, as a function of the vastly larger areas of morphospace into which life cannot venture. At the KLI, I would like to apply the techniques of theoretical morphospace analysis to the phenomenon of convergent evolution, and to the question of the predictability of evolution.

Alvaro MORENO
(September 2010)

Alvaro Moreno is full Professor of Philosophy of Science at the University of the Basque Country (UPV/EHU) in San Sebastian/Donostia, Spain. Founder of the Philosophy of Biology Group at the UPV/EHU 20 years ago, he is an internationally renowned specialist in the areas of the philosophy of biology, artificial life, complex systems,

and cognitive science. Dr. Moreno has authored more than 100 scientific publications (including 2 monographs and 4 edited volumes) and almost as many papers in national and international conferences. He has been the principal investigator in more than twelve funded projects (funding institutions include the Spanish Ministry of Education and Science, the Basque Government, the University of the Basque Country) and is Review Expert in the evaluation of RTD proposals submitted to the European Commission for the funding of projects in the area of Cognitive Science. He has been a member of the organizational and/or program committee of more than 20 international conferences, and he is since many years a regular member of the program committee of the Artificial Life conferences (ALIFE) and the European Conferences on Artificial Life (ECAL). He supervised six PhD theses, all of them having obtained the highest marks. His work has received a wide and growing international recognition. Dr. Moreno is also actively involved in the dissemination of science, and he led the project for the creation of the Museum of Science in San Sebastian.

The Nature of Complex Biological Autonomy

Das Wesen komplexer biologischer Autonomie

In this project I will analyze how evolution can be seen as a process in which, starting from basic autonomous systems as the main building blocks, reorganization processes (in the spheres of both internal-metabolic cycles and interactive loops with the environment) allow for strong cooperative types of behavior; and some of these new types of behavior, provided that differentiation and coordination of the building blocks are developed in a balanced and robust way, can lead to a novel, globally integrated form of autonomous systems. By incorporating new hierarchies of dynamically detached domains and regulatory controls this trend can proceed even further, producing new forms of autonomy capable of creating or taking over more complex, flexible, and diversified functional interactions with the environment. This is what makes a big difference with respect to colonies, societies, and even primitive multicellular organisms, whose cohesion relies more on

self-organization than on specific regulatory control mechanisms. Whereas the increase in complexity of associations of self-organized, distributed systems hits apparent ceilings or bottlenecks, regulatory control development allows for an open-ended increase in the complexity of autonomous organizations. Starting from forms of collective associations where the constitutive, autonomous units are more integrated and cohesive than the collectivity, evolutionary transitions show the appearance of increasingly integrated systems, leading to new forms of autonomous agents. The organization of those agents, then, becomes much more complex, functionally diversified and cohesive than that of their constitutive units. This evolutionary trend has two types of important consequences: one is related to the way constitutive processes of complex organisms become progressively autonomous from environmental conditions; the other concerns the interactive processes, opening new domains of autonomous identity.

In sum, this analysis of several of the major evolutionary transitions in the history of life on Earth tries to show not only the key role that the concept of autonomy must play in the characterization of the living, but also how new forms of "composite" autonomy are organized. Thus, if any general theory of biological systems ever gets developed, according to my view, autonomy ought to be one of its central axes, if not the central one.

Marcos NADAL
(December 2010)

Marcos Nadal holds a PhD in Human Cognition and Evolution from the University of the Balearic Islands. His doctoral thesis, defended in 2007, explored the effects of different kinds of visual complexity on aesthetic valuation of artistic and non-artistic visual stimuli. Since then he has been involved in neuroscientific and evolutionary studies of human cognition, especially aesthetic valuation. His current research aims to understand the relations between the cognitive processes, neural mechanisms, and evolutionary events that have endowed humans with the capacity for aesthetic valuation.

Evolution of Aesthetic Appreciations
Evolution ästhetischer Wertschätzungen

Evolutionary psychology has provided a fruitful framework for the development of several hypotheses regarding the evolution of aesthetic appreciation. These accounts generally assume that aesthetic appreciation is the product of content-specific information-processing mechanisms that evolved in a certain environment to solve particular adaptive problems. I will investigate results from the fields of empirical aesthetics, neuroimaging, and comparative neuroscience, and their implications for approaches to the evolution of aesthetic appreciation. I hypothesize that aesthetic appreciation is the result of several cognitive and affective processes associated with activity in diverse brain regions, none of which seems to play an exclusive role in the aesthetic experience. Furthermore, I hypothesize that aesthetic appreciation is the result of a kind of mosaic evolution. Whereas some of these underlying processes and their neural correlates must have appeared at some point in the human lineage, others seem to have been inherited from earlier primate ancestors.

Lennart OLSSON
(September – October 2010)

Lennart Olsson is a Professor of Comparative Zoology at the Friedrich-Schiller-Universität in Jena, Germany, where he has had tenure since 2000. He grew up in Sweden and first trained as a dental technician in Umeå. He has a MSc in biology from Stockholm University and a PhD in Zoology from Uppsala University (1993), where he was a Lecturer before moving to Jena. He was a postdoctoral fellow with Prof. James Hanken and has been a visiting researcher in Sydney, Australia, at the KLI, and with Prof. Hanken at Harvard University. He recently spent part of a sabbatical at NESCent at Duke University, writing about evolutionary innovations, his main focus of research. Olsson uses head development in amphibians and lungfishes for his empirical research, and also has an interest in the history and philosophy of zoology.

The origin of evolutionary novelties in amphibian head development

Der Ursprung von evolutionären Neuheiten in der Kopfentwicklung von Amphibien

The origin of evolutionary novelties is a long-standing issue in evolutionary biology. Changes in developmental processes and mechanisms must underlie novel anatomical structures, but exactly how this works is a much more difficult question.

I propose to investigate this, based on a literature survey and data from two research projects presently conducted in my lab, the possible re-evolution of an aquatic larval stage in lungless salamanders, and (in particular) the role of *FoxN3* for the development of unique larval head skeletal structures in frog tadpoles. For example, knock-down of *FoxN3* function has been shown to remove several unique larval structures only found in frog tadpoles, such as the elaborate, filigreed structure of the gill basket necessary for filter feeding, and the extra mouth structures present as unique novelties in frog tadpoles and especially well developed in tadpoles grazing algae. How did *FoxN3*, or the genetic network that is it part of, gain this new function? Based on such detailed empirical data, it should be possible to develop a general model for the evolution of anatomical novelties. During my visit, I will write a synthetic review paper that tries to deepen and sharpen our understanding of the origin of evolutionary novelties.

Jeffrey SCHWARTZ
(July 2010)

Jeffrey Schwartz is a professor in the Departments of Anthropology and History and Philosophy of Science at the University of Pittsburgh. He received his PhD from Columbia University in 1974. He is a physical anthropologist whose research areas include the evolutionary relationships and systematics of fossil and living primates, including humans, and aspects of evolutionary theory, especially phylogenetic reconstruction and models of change. Most recently he has been involved in the first study of virtually the entire human fossil record (which is being published

as a series) and has also collaborated on a project that seeks to meld mechanisms of cell biology, the regulation of organismal development, and the pattern of the fossil record with evolutionary theory. Dr. Schwartz has done fieldwork in the United States, England, Israel, Cyprus, and Tunisia and museum research in the mammal and vertebrate paleontology collections of major museums.

Ontogeny and Phylogeny
Ontogenie und Phylogenie

The first application of von Baer's Laws in an evolutionary context was T. H. Huxley's 1863 case for human relationships lying well within the Order Primates. In spite of the logic of his approach – distinguishing between different levels of taxic inclusivity vis-à-vis commonality in the development and characteristics of emergent features – Haeckel's Biogenetic Law, in which ontogeny reflects a phylogenetic sequence of adult ancestors, has largely informed zoo-paleontological (and even neontological) practice. We must situate developmental/ontogenetic information not only in conceiving evolutionary models of species formation (tempo/mode) but also in the methodology of phylogenetic reconstruction with the understanding that while methodologically rigorous because of its hypothetico-deductive underpinnings, a cladistic approach to determining relationships via a hierarchical analysis of character state polarity conflates two different developmental phenomena: the emergence of novel features and their subsequent modification.

Peter TAYLOR
(October 2010)

Peter Taylor is a Professor at the University of Massachusetts, Boston, where he teaches and directs undergraduate and graduate programs on critical thinking, reflective practice, and science in society. His work focuses on the complexity of environmental and health sciences in their social context; see* Unruly Complexity: Ecology, Interpretation, Engagement *(University of Chicago Press, 2005) and http://www.faculty.umb.edu/pjt.

Heterogeneity and the Quantitative Analysis of Heredity, Disease, and Development

Heterogenität und die quantitative Analyse von Erblichkeit, Krankheit und Entwicklung

My fellowship will support discussion, research, and writing on the proposition that research and policy concerning heredity, disease, and development over the life course in the agricultural and social spheres is untroubled by heterogeneity to the extent that populations are well controlled. Such control can be established and maintained, however, only with considerable effort, which invites more attention to possibilities for participation instead of control of human subjects.

The collegial discussions, research, and writing focus on exploring "heterogeneity" in the life and social sciences:

• What meanings are given to the term "Heterogeneity"; what methods are used to analyze it; what practices and policies address – or suppress – it?

• How do these meanings, methods, practices, and policies change and vary across historical and social contexts?

In particular, building on several recent publications of mine on heterogeneity and heritability, I will examine why underlying heterogeneity has not been recognized as a significant issue, either by quantitative geneticists or by critical commentators on heritability research. Although my focus at this point is primarily on genetics and heredity, I also hope to stimulate others to explore the implications of heterogeneity and control for thinking about evolutionary theorizing – past and present.

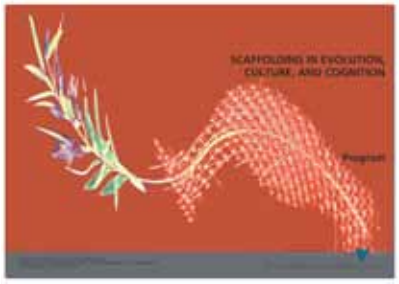
Wissenschaftliche Veranstaltungen
Meetings and Lectures

3

Das KLI fördert internationale Workshops, Symposien, Vortragsreihen und Einzelvorträge, die entweder vom KLI organisiert werden oder in Kooperation mit anderen Institutionen stattfinden.

3.1 Altenberg Workshops in Theoretical Biology

Die „Altenberg Workshops" befassen sich jeweils mit einer Schlüsselfrage der biologischen Theorie. Jeder Workshop wird von führenden Fachleuten auf dem jeweiligen Gebiet organisiert, die eine Gruppe internationaler Experten als Teilnehmer an das KLI einladen. Die daraus resultierenden Bücher werden von MIT Press im Rahmen der „Vienna Series in Theoretical Biology" herausgegeben. Die Altenberg Workshops haben das Ziel, konzeptionelle Fortschritte und Forschungs-Initiativen mit deutlich interdisziplinärem Charakter zu generieren. Weitere Informationen zu den Teilnehmern und ihren Vorträgen stehen auf der KLI Website zur Verfügung.



23rd Altenberg Workshop in Theoretical Biology 8–11 July 2010

Scaffolding in Evolution, Culture, and Cognition

Organization: Linnda Caporael, James Griesemer, and William Wimsatt

Topic and aims

Traditionally, scaffolding refers to the temporary system of platforms and poles erected for workmen to build or renovate buildings. It has also been used by educators and child psychologists to refer to the assistance that a more experienced person offers to a novice acquiring a new skill or performing a new task. The goal of this workshop is to examine examples of scaffolding to further expand the concept so as to shed light on institutions, face-to-face groups, and individuals connecting generations in evolutionary, cognitive, and cultural domains. Participants from diverse specialties will present and discuss their research on science, technology, and infrastructure, individual and group cognition, identity, skill development, practice, embodiment, group formation, reproduction, and ecological affordances. We seek phenomena and perspectives that integrate evolution, cognition, and culture across generations, ontogenies, intellectual histories, and wherever scaffolding is essential to the production of structures and processes, including those that themselves serve to scaffold. We begin with three interlocking perspectives – scaffolding to provide initial structure for the broad reach of this interdisciplinary workshop. The first perspective concerns reproductive and developmental systems (whether they are genes, bodies, or institutions) that are constituted by the material overlap of physical parts that create the phenomena

of inheritance between generations. The second concerns face-to-face group structures, co-constituted by group size and task, which inform the evolution, development, and operation of uniquely human social-cognitive systems. The third is the evolutionary accumulation, or generative entrenchment, of downstream events and processes – complexes of biology, cognition, culture, and institutions generating differential rates of stasis and change at each of the genetic, developmental, and cultural levels.

JAMES R. GRIESEMER
Philosophy, University of California, Davis, USA
Scaffolding Cultural Reproducers

WILLIAM WIMSATT
Department of Philosophy and Committee on Evolutionary Biology,
University of Chicago
Generative Entrenchment in Complex Adaptive Structures

JAMES A. EVANS
Department of Sociology, University of Chicago, USA
Communication and the Evolution of Cognition

STUART A. NEWMAN
New York Medical College, Valhalla, New York, USA
Mesoscale Physics as a Scaffold for Metazoan Development and Evolution

PAMELA LYON
Discipline of Philosophy, University of Adelaide, Australia
Stress in Mind: Response to Homeostatic Challenge as a Scaffold for the Evolution and Development of Cognition

GEORG THEINER
Department of Philosophy, University of Alberta, Canada
Thinking at the Cusp of Unity: From Extended to Group Cognition

CHRISTOPHE HEINTZ
Department of Philosophy, Central European University, Budapest, Hungary
The Generative Entrenchment of Conceptual Change

COLIN ALLEN
History and Philosophy of Science, Indiana University, USA
Symbolic Reasoning as Scaffolded Perception and Manipulation

SERGIO F. MARTÍNEZ
Instituto de Investigaciones Filosóficas,
Universidad Nacional Autónoma de México
The Co-evolution of Cognition and Culture: The Scaffolding Role of Artefacts

ELIHU M. GERSON
Tremont Research Institute, San Francisco, USA
Some Problems of Analyzing Cultural Evolution

RICHARD MCELREATH
Department of Anthropology, University of California, Davis, USA
The Co-evolution of Learning and Parasitic Ideas

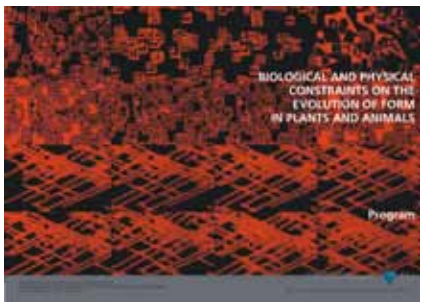
IDDO TAVORY, New School for Social Research, USA
EVA JABLONKA, Tel Aviv University, Israel
SIMONA GINSBURG, Open University, Israel
The Reproduction of the Social: A Waddingtonian View

SHU-CHEN LI
Max Planck Institute for Human Development, Berlin, Germany
Brain Is also a Dependent Variable: Biocultural Co-construction of Developmental Plasticity across the Lifespan

JEFFREY SCHANK
Department of Psychology, University of California, Davis, USA
Models as Scaffolds to Insight and Understanding

JOHANN PETER MURMANN
Australian School of Business, University of New South Wales, Australia
Scaffolding in Economics, Management, and the Design of Technologies

LINNDA R. CAPORAEL
Department of Science & Technology Studies, Rensselaer, USA
Of Groups and Goals



24th Altenberg Workshop in Theoretical Biology 23-26 September 2010

Biological and Physical Constraints on the Evolution of Form in Plants and Animals

Organization: Jeffrey H. Schwartz and Bruno Maresca

Topic and aims

Although the comparative study of morphology has for centuries been a viable intellectual pursuit, inquiry into the emergence of the form or shape of structures under scrutiny still often remains a disconnected endeavor. For example, during the 1970s and especially 1980s the guiding principle was Lewis Wolpert's "pattern formation" model, in which the focus was on positional information and variation in what William Bateson referred to as "repeated parts." For developmental biology, the notion of naïve cells being imbued with the potential to generate structure and form from an extrinsic morphogenetic source was challenged by the perspective that the emergence of structure and form was at least as much due to properties intrinsic to cells and between cells in time and space.

Later in the 1980s and into the 1990s, the discovery in animals and then plants of homeobox genes and their roles in both generating positional information and affecting the development of repeated parts seemingly opened up new vistas for understanding morphology and its use in systematics and phylogenetic reconstruction. For example, with the identification of the gene *Antennapedia* in insects (Drosophila) and its orthologue, the HOX-gene family, in vertebrates, comparative morphologists and developmental geneticists rushed to generate diagrams of nested sets of clades on which ancestors with hypothesized regulatory gene activity producing different types of appendages could be represented. Continued identification of regulatory genes and gene products seemed to add refinement to scenarios regarding the emergence of morphological novelty, in terms of the structure or form itself as well as in terms of when in phylogeny these structures first appeared.

Today, the belief persists that one can understand the emergence of structural and organismal shape from increasingly more detailed comparisons of entire genomes of different individuals of the same species and different but presumably very closely related species. This, we suggest, is a false impression

that is reminiscent of the lack and even dismissal by early 20th-century population geneticists of developmental understanding, viz., that it was sufficient to infer genetic factors at the beginning of development from the phenotypes of the adult. Yet we are reminded of Gavin de Beer's criticism of this notion in *Embryology and Evolution* (1930). To paraphrase de Beer, while population genetics focuses on only two cell divisions, what is more important is the sequence of events that leads to the final form. We believe that de Beer's sentiment is in general still valid. Just because one can identify genes or molecular sequences because of advances in technology, this can no longer by embraced as sufficient to understand the emergence of three-dimensional structure. This myopia also overlooks entirely myriad aspects of, and constraints imposed by, the physical world that not only can have affect, but can also profoundly impact development.

In this regard, we can turn, for example, to D'Arcy Thompson's suggestion in *On Growth and Form* (1917) that not only cell symmetry versus asymmetry but also physical forces such as gravity might play crucial roles in shaping structure. To Conrad Waddington's hint in *Organisers and Genes* (1940) and then to Søren Løvtrup's recognition in *Epigenetics: A Treatise on Theoretical Biology* (1974) that breaking cell-symmetry coincident with gastrulation can lead to a diversity of three-dimensional adult shapes. To George Oster and Pere Alberch's 1982 argument in the journal *Evolution* that differential effects of hydration on cells in conjunction with cell shape can profoundly alter developmental topographies and ultimately structure. And to various contributions, including those of the editors Gerd Müller and Stuart Newman, in *Origination of Organismal Form: Beyond the Gene in Developmental and Evolutionary Biology* (2003), in which physical factors such as cell packing, adhesive interactions, and self-organization are centrally situated in theories of development.

It is in the spirit of these precedent-setting works that we convened this international workshop on the "Biological and Physical Constraints on the Evolution of Form in Plants and Animals." But even more so, we envision this workshop as the one that could have happened in the 1940s but, as the vertebrate paleontologist G. L. Jepsen (1963) bemoaned, never did. Indeed, a gathering of international scholars that, through presentation and discussion, might ultimately collaborate on theoretical issues that reflect not only evolutionary matters specific to plants or animals, but also the spheres of development (and thus evolution) that are common to plants and animals. In a first, perhaps tentative step, we hope with this workshop to go beyond the singularly animal-focused "Modern Evolutionary Synthesis" that came to dominate evolutionary biology for more than six decades and consequently overwhelm the few attempts to be taxically if not theoretically encompassing [see J. Huxley (1940), *The New Systematics*].

GERD B. MÜLLER
Department of Theoretical Biology, University of Vienna, Austria
Organismal Form in Evolutionary Theory

FRANCISCO VERGARA-SILVA
Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico
Abduction, Deduction, and Induction in EvoDevo

MICHAEL HABIB
Department of Biology, Chatham University, Pittsburgh, PA, USA
Emergence of Convergent Forms under Fluid Load in Plants and Animals

STUART A. NEWMAN
Department of Cell Biology and Anatomy, New York Medical College,
Valhalla, NY, USA
Physical Determinants in the Emergence and Inheritance of Multicellular Form

EMMANUEL FARGE
Mechanics and Genetics of Embryonic and Tumoral Development Group,
Institut Curie, Paris, France
Mechano-sensing in Embryonic Biochemical and Morphologic Design and Evolutionary Perspectives in Primary Organisms Emergence

BRUNO MARESCA
Division of BioMedicine, University of Salerno, Italy
Breaking of Symmetry and Development

ARMAND M. LEROI
Department of Biological Science, Imperial College, London, UK
The Matter With Growth and Form

MARK Q. MARTINDALE
Kewalo Marine Laboratory, Pacific Biosciences Research Center, Honolulu, HI, USA
Changes in the Spatial Position of Gastrulation During Embryogenesis Drive the Rapid Evolutionary Diversification of Bilaterian Body Plans

TAKASHI MIURA
Department of Anatomy and Developmental Biology,
Kyoto University Graduate School of Medicine, Japan
Mechanism of Lung Branching Morphogenesis

JUKKA JERNVAL and ISAAC SALAZAR-CIUDAD
Institute of Biotechnology, University of Helsinki, Finland, and Facultat de Biociencies,
Universitat Autonoma de Barcelona, Spain
Staring into the Causality Horizon of the Phenotype

PAMELA DIGGLE
Department of Ecology and Evolutionary Biology,
University of Colorado, Boulder, CO, USA
Metameric Development and the Emergence of Plant Form

DENIS DUBOULE and JOOST WOLTERING
National Research Centre 'Frontiers in Genetics', University of Geneva, and School of Life Sciences, Federal Institute of Technology (EPFL), Lausanne, Switzerland
The Origin of Digits: Patterns vs. Regulations

CATHERINE ANNE BOISVERT
Australian Regenerative Medicine Institute, Monash University, Melbourne, Australia
From Cells to Structures to Evolutionary Novelties: Creating a Continuum

MARCELO R. SÁNCHEZ-VILLAGRA
Paläontologisches Institut und Museum der Universität Zürich, Switzerland
The Evolution of Form: The Contribution of Palaeontology to Our Understanding of Developmental Patterns, as Determined by the Principle of the Conditions of Existence

JEFFREY H. SCHWARTZ
Departments of Anthropology and History and Philosophy of Science,
University of Pittsburgh, PA, USA
Ontogeny and Phylogeny

3.2 Symposia
Symposia organized and co-organized by the KLI

Focal Symposium, Summer Semester
29 April 2010

Limits of Adaptation

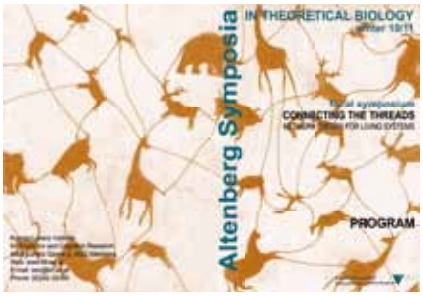
Biozentrum, Universität Wien
Organization: Werner Callebaut

GREGORY RADICK
Department of Philosophy, University of Leeds
Lorenz, Darwin, and Limits of Adaptation

TIM LEWENS
Department of History and Philosophy of Science, University of Cambridge
Justifying Adaptationism: The Case of EvoDevo

RUSSELL POWELL
Faculty of Philosophy, University of Oxford
Convergent Evolution and the Limits of Natural Selection

NICHOLAS BARTON
Institute of Science and Technology (IST) Austria, Klosterneuburg
Genetic Limits to Adaptation



Focal Symposium, Winter Semester
11 November 2010

Connecting the Threads: Network Theory for Living Systems

Biozentrum, Universität Wien

Organization:
Christine Schwab (KLI) and Bernhard Voelkl (Humboldt-Universität zu Berlin)

DANIEL RUBENSTEIN
Department of Evolutionary Biology, Princeton University
Social Networks: Linking Form with Function in Animal Societies

DAVID MCDONALD
Department of Zoology and Physiology, University of Wyoming
Social Networks in a Lek: Viscosity, Reputation, and Male-Male Cooperation

STEVE PHELPS
Centre for Computational Finance and Economic Agents, University of Essex
Emergence of Social Networks from Cooperative Interactions

MICHELLE GIRVAN
Department of Physics, University of Maryland
Modeling the Dynamics of Gene Networks

RICARD SOLÉ
Department of Biology, Universitat Pompeu Fabra, Spain
Evolvability, Tinkering, and Causality in Biological Networks

KLI-IIASA Workshop

The Human Brain and the Social Bond: Exploring the Notion of Constrained Relativism

Organization: Michael Thompson, Robert Turner, and Marco Verweij

ROBERT TURNER
Director of the Max Planck Institute for Human Cognitive and Brain Sciences, Department of Neuro-physics, Leipzig
MARCO VERWEIJ
Professor of Political Science, Jacobs University, Bremen
The Need for Constrained Relativism: Introduction to the Workshop

ALAN PAGE FISKE
Professor of Anthropology, UCLA
Relational Models: Elementary? Fundamental? Universal? Innate? Just Four?

DAVID INGRAM
Senior Vice President, Willis Re, New York City
PAUL TAYLER
Strategic Programme Lead, National Health Service, UK
MICHAEL THOMPSON
Institute Scholar, IIASA, Austria
Surprise, Surprise: From Neo-classical Economics to E-life

WOLFGANG PRINZ
Director, Max Planck Institute for Human Cognitive and Brain Sciences, Department of Psychology, Leipzig
Mirrors and Mirror Games:
A Framework for the Social Making of Human Minds

MARY HELEN IMMORDINO-YANG
Assistant Professor, Brain and Creativity Institute & Rossier School of Education, University of Southern California
Feeling Admiration and Compassion:
Implications for the Neurobiology of Self

JUAN F. DOMÍNGUEZ D.
The Howard Florey Institute, Melbourne
The Bonds that Bound:
Relational Thinking, Bounded Rationality, and the Prefrontal Cortex

JOAN Y. CHIAO
Assistant Professor of Psychology, Northwestern University
From Social Bonds to Sustainable Environments:
A Perspective from Cultural Neuroscience

JOSEP CALL
Director, Wolfgang Köhler Primate Research Center
Max Planck Institute for Evolutionary Anthropology, Leipzig
Social Roles, Group Living, and Cooperation Among Primates

KARL SIGMUND
Professor of Mathematics at the University Vienna
Social Control and the Social Contract:
The Emergence of Sanctioning Systems for Collective Action

THOMAS SCHUBERT
Researcher, Instituto Superior de Ciências do Trabalho e da Empresa,
Lisbon University Institute
BEATE SEIBT
Researcher, Centro de Investigação e Intervenção Social, Lisbon University Institute
SVEN WALDZUS
Assistant Professor of Psychology, Lisbon University Institute
The Embodiment of Social Relations and Relational Models:
Touch and Verticality

MARK NOWACKI
Assistant Professor of Philosophy, Singapore Management University
I Disagree, therefore I Am: Moral Discord Among Children

LOTTE THOMSEN
Assistant Professor of Psychology, University of Copenhagen
Seeing Social Relations: Image-Schematically Represented Relational Core Concepts, Combinatorial Properties, and Social Psychological Effects of Relational Preferences

Conceptual Change in Biological Science: Evolutionary Developmental Biology, 1981-2011
15-18 July 2010

Workshop co-organized with the Minnesota Center for Philosophy of Science and the Max Planck Institute for History of Science, Berlin
Organization:
Alan Love (University of Minnesota)
Steering Committee: Gerd Müller (KLI), Rudolf Raff (Indiana University), David Wake (University of California Berkeley), Hans-Jörg Rheinberger (MPIWG)

RON AMUNDSON
University of Hawaii
Constrained to Constraint:
How Epistemic Environments Shape the Phenotypes of Theories

WALLACE ARTHUR
NUI Galway
Internal Factors in Evolution:
Developmental Bias, and Selection for Organismic Integration

INGO BRIGANDT
University of Alberta
From Developmental Constraint to Evolvability:
How Concepts Figure in Explanation and Disciplinary Identity

RICHARD BURIAN
Virginia Tech
Phenotypic Plasticity and Epigenetics: What's Old and what's New?

ERIC DAVIDSON
Caltech
Evolution and Development: How Systems-Level Regulation Molecular Biology Transformed a Logic-based Theory into an Experimentally Backed Scientific Paradigm

ARMAND DE RICQLÈS
University of Paris
Form, Function, Evolution and Time: Bone Tissue as an Epitome

GARY FREEMAN
University of Texas Austin
The Phylum Concept

JOHN GERHART
University of California Berkeley
The Cellular Basis of Morphogenetic Change: A Retrospective

ELIHU GERSON
Tremont Research Institute
The Organization of Specialties in the EvoDevo Juncture

JAMES GRIESEMER
University of California Davis
'Salamanders Teaching Evolution': Taxon-focused Research in EvoDevo

JAMES HANKEN
Harvard University
Is Heterochrony Still an Effective Paradigm for Contemporary Studies of EvoDevo?

MARC KIRSCHNER
Harvard Medical School
Facilitated Variation

MANFRED LAUBICHLER
Arizona State University
Gene Regulatory Networks and the Conceptual Foundations of Developmental Evolution: A Brief History

ALAN LOVE
University of Minnesota
Evolutionary Innovation and Novelty: Conceptual Developments since Dahlem

GERD MÜLLER
University of Vienna and KLI
Beyond Variation: The EvoDevo of Phenotypic Novelty

STUART NEWMAN
New York Medical College
"Generic" Physical Mechanisms, Dynamical Patterning Modules, and the Role of Development in Evolution

H. FREDERIK NIJHOUT
Duke University
The Role of Phenotypic Plasticity in Evolution

KARL NIKLAS
Cornell University
The Role of Development in the Evolution of Plant Body Plans and Life Cycles

RUDOLF RAFF
Indiana University
Larval Evolution: Homology, Novelty, and the Underlying Bases of EvoDevo

STEPHEN STEARNS
Yale University
The Conceptualization of Phenotypic Plasticity and the Consequences of Phenotypic Plasticity in Life History Traits

RICHARD STRATHMANN
Friday Harbor Laboratories
Explaining the Forms of Embryos and Larvae

GÜNTER WAGNER
Yale University
Reinventing the Organism:
Homology, Novelty, and Evolvability in Post-Dahlem Evolutionary Biology

DAVID WAKE
University of California Berkeley
Homoplasy, a Moving Target (with Reflections on the Organization and Operation of the 1981 Dahlem Conference)

MARVALEE WAKE
University of California Berkeley
Hierarchies and Integration in Evolution and Development

WILLIAM WIMSATT
University of Chicago
Relative Fixity and Entrenchment in Assessing Developmental Architecture

RASMUS WINTHER
University of California Santa Cruz
Networks: Ontologies, Modeling, and Ethics

3.3 Rupert Riedl Lecture in Science and Society 2010

RAE SILVER
Kaplan Professor of Natural and Physical Sciences, Columbia University, New York
Obsessions with Time in the Body and Time in the World

3.4 Mittagsdiskussionen Brown Bag Discussions

„Brown bag" bezieht sich auf das informelle Format dieser öffentlichen Vorträge: bringen Sie Ihr Mittagessen mit, lehnen Sie sich zurück, genießen Sie den Vortrag und nehmen Sie an der Diskussion teil! Die „Brown Bag Discussions" finden mittags in der Bibliothek des KLI in Altenberg statt. Die Abstracts zu den Vorträgen und Informationen zu den Vortragenden stehen auf der Instituts-Website zur Verfügung.

RAE SILVER
Barnard College, Columbia University, and Columbia College of Physicians and Surgeons, New York
A Brain Clock Reveals How Neuronal Activity Translates to Behavior

WAYNE CHRISTENSEN
KLI
Natural Sources of Normativity

JOHN MICHAEL
Aarhus University, Copenhagen
Simulation, Introspection, and Mental Concepts

FLAVIO D'ABRAMO
University of Rome "La Sapienza, Italy"
Philosophical Insights into Epigenetics

RICHARD DAWID
University of Vienna
Assessments of Underdetermination as an Element of Scientific Reasoning

ISTVÁN SCHEURING
Loránd Eötvös University, Budapest, and Hungarian Academy of Sciences
Coexistence of Cooperation and Defection in Public Goods Games, from the Prisoner's Dilemma to the Volunteer's Dilemma

ALEJANDRO ROSAS LÓPEZ
KLI and Philosophy Department, Universidad Nacional de Colombia
How Altruistic is Altruistic Punishment?

KIM STERELNY
Australian National University, Canberra, and Victoria University of Wellington
My Nipples Explode With Delight: Information Pooling and Its Evolution

ERAN SHIFFERMAN
Tel Aviv University
What Number Does a Diving Cormorant Think of? An Eco-Evolutionary Model of Quantity Estimation in Nonverbal Animals

STEPHAN HANDSCHUH
KLI
Sexual Selection and Assortative Mating: Key Factors in the Evolution of Crustacean Bodyplans?

MILES MACLEOD
KLI
Making Natural Kinds Useful for Hacking! Ideas on an Epistemic Criterion and What You Get with It

MARION VORMS
Institut d'Histoire et de Philosophie des Sciences et des Techniques, Paris
A Cognitive Approach to Theorizing in the Empirical Sciences

ANDREAS WILKE
Clarkson University, USA
Past and Present Environments: The Evolution of Decision Making

ALVARO MORENO
University of the Basque Country in San Sebastian, Spain
The Nature of Complex Biological Autonomy:
The Open-ended Redefinition of Autonomy of Organisms through Evolution

ELISA FRASNELLI
University of Trento, Italy
Lateralization in Insects: Theoretical and Experimental Approaches

ELLEN CLARKE
University of Bristol
Individuality in Plants and Beyond

48 PETER TAYLOR
University of Massachusetts Boston, USA
Troubled by Heterogeneity? Opportunities for Fresh Views on Long-standing and Recent Issues in Biology and Biomedicine

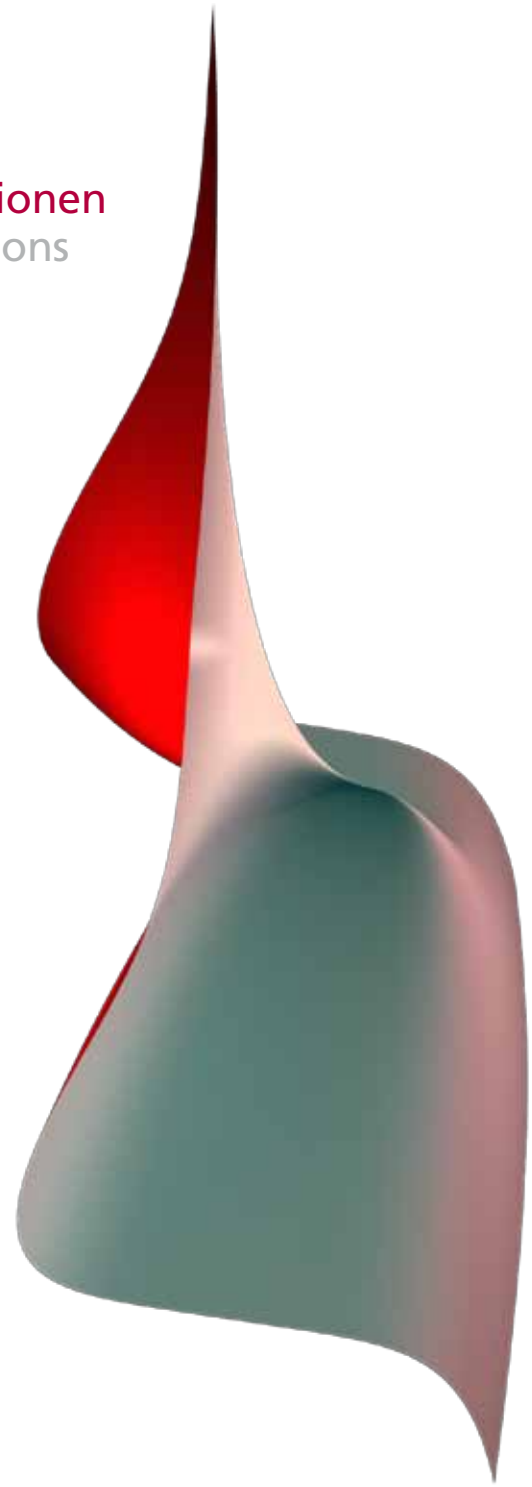
DAN NICHOLSON
University of Exeter
The Concept of Mechanism in Biology

KONRAD TALMONT-KAMINSKI
Marie Curie-Sklodowska University in Lublin, Poland
Co-evolutionary Cognitive/Cultural Explanation of Supernatural Beliefs and Practices

MARCOS NADAL
University of the Balearic Islands
Evolution of Aesthetic Appreciations

Publikationen
Publications

4



Wissenschaftliche Publikationen und Vorträge von Fellows und permanenten Mitarbeitern des KLI, sowie Artikel in Biological Theory, die im Jahr 2010 erschienen sind.

4.1 Vienna Series in Theoretical Biology

Die „Vienna Series“ wird von MIT Press als Buchreihe des KLI herausgegeben. Die Bücher beruhen großteils auf den Altenberger Workshops und den sich daraus ergebenden Beiträgen und neuen Synthesen. Die jeweiligen Buchprojekte werden von MIT Press einem Review unterzogen.

Volume 12:

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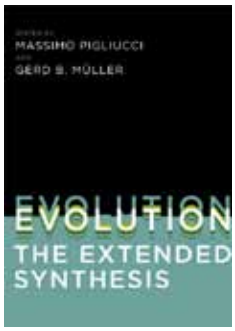
4.2 Sammelbände und Bücher Edited Volumes and Books



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4.3 Fachartikel Professional Papers

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Contingency and Inherency in Evolutionary Developmental Biology.
In: EPSA Philosophical Issues in the Science (Suárez M, Dorato M, Rédei M, eds), 1-7. Berlin: Springer.

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The Dialectics of Dis/Unity in the Evolutionary Synthesis and Its Extensions.
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Biological Theory 5: 101.

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CHEUNG K-H, SAMWALD M, AUERBACH RK, GERSTEIN MB.
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JOYE Y, VERPOOTEN J.
Architectuur als spiegel van de menselijke natuur: het verklarende en creatieve potentieel van de evolutietheorie voor architectuur.
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Biological Theory 5: 53-66.

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The Bayesian Fallacy: Distinguishing Internal Motivations and Religious Beliefs from Other Beliefs.
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The Embryo Project: An Integrated Approach to History, Practices, and Social Contexts of Embryo Research.
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54 MÉTHOT P-O, MACLEOD M, BAUER S, GROSS F, NICOGLOU A.
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4.4 Artikel im Druck Papers in Press

BRAUCKMANN S.
Axes, Planes and Tubes, or the Geometry of Embryogenesis.
Studies in History and Philosophy of Biological and Biomedical Sciences.

BRAUCKMANN S.
Cultures of Seeing Embryos, Cells and Genes in 3D and Beyond.
Studies in History and Philosophy of Biological and Biomedical Sciences.

56 CALLEBAUT W.
Engineering Life: Changing the Living World without Trying to Understand It.
Studies in History and Philosophy of Biological and Biomedical Sciences.

CHRISTENSEN WD.
Natural Sources of Normativity.
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CHRISTENSEN WD, SUTTON J.
Reflections on Emotion, Imagination and Moral Reasoning: Towards an Integrated, Multidisciplinary Approach to Moral Cognition.
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London: Psychology Press.

CLARKE E.
Plant Individuality and Multilevel Selection Theory.
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Expectations of Clumpy Resources Influence Predictions of Sequential Events.
Evolution and Human Behavior.

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Wilhelm Roux's Archives of Developmental Biology 1894-2004.
An Author Index, Introductory Essays and Classical Papers.
Studies in the History of Sciences and Humanities 24.

TAYLOR P.
Rehabilitating a Biological Notion of Race? A Response to Sesardic.
Biology and Philosophy.

VERPOOTEN J.
Why Art Is Not an Adaptation but Nonetheless a Necessary Outcome of Evolution.
In: The Cover Mountain (Crouwers A, ed). Antwerpen: Demian Press.

VERPOOTEN J, NELISSEN M.
Senory Exploitation: Underestimated in the Evolution of Art as Once in Sexual Selection?
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4.5 Zeitschrift Biological Theory Journal

Volume 4(2009), Issue 3:

BOOKSTEIN FL.
Was There Information in My Data? Really?

BOUCHARD F.
Understanding Colonial Traits Using Symbiosis Research and Ecosystem Ecology.

DELORD J.
The Perfect Way to Write a Truly Disappointing Book.

ERESHEFSKY M.
Homology: Integrating Phylogeny and Development.

GERSON EM.
Specialty Boundaries, Compound Problems, and Collaborative Complexity.

GHISELIN MT.
Metaphysics and Classification: Update and Overview.

HABER MH, ODENBAUGH J.
The Edges and Boundaries of Biological Objects.

HARRIS ESJ, MISHLER BD.
The Delimitation of Phylogenetic Characters.

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On Systematists' Single Objective Tree of Ancestors and Descendants.

MILLSTEIN RL.
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NACHTOMY O, RAMATI Y, SHAVIT A, YAKHINI Z.
It Takes Two to Tango: Genotyping and Phenotyping in Genome-wide Association Studies.

PECK SL.
Whose Boundary? An Individual Species Perspectival Approach to Borders.

PIOTROWSKA M.
The Theoretical Costs of DNA Barcoding.

STERNER B.
Object Spaces: An Organizing Strategy for Biological Theorizing.

TUMA JR.
Biological Boundaries and the Vertebrate Immune System.

Volume 4(2009), Issue 4: 59

BENSAUDE-VINCENT B.
Synthetic Biology As a Replica of Synthetic Chemistry? Uses and Misuses of History.

DEICHMANN U.
Chemistry and the Engineering of Life Around 1900: Research and Reflections by Jacques Loeb.

GORDON R.
Google Embryo for Building Quantitative Understanding of an Embryo as it Builds Itself. I. Lessons from Ganymede and Google Earth.

GORDON R.
Google Embryo for Building Quantitative Understanding of an Embryo as it Builds Itself. II. Progress Toward an Embryo Surface Microscope.

KELLER EF.
Knowing As Making, Making As Knowing: The Many Lives of Synthetic Biology.

LOETTGERS A.
Synthetic Biology and the Emergence of a Dual Meaning of Noise.

MALATERRE C.
Can Synthetic Biology Shed Light on the Origins of Life?

MORANGE M.
Historical and Philosophical Foundations of Synthetic Biology.

MORANGE M.
Synthetic Biology: A Bridge Between Functional and Evolutionary Biology.

MOYA A.
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O'MALLEY MA.
Making Knowledge in Synthetic Biology: Design Meets Kludge.

60 Volume 5(2010), Issue 1:

ATRAN S, HENRICH J.
The Evolution of Religion: How Cognitive By-Products, Adaptive Learning Heuristics, Ritual Displays, and Group Competition Generate Deep Commitments to Prosocial Religions.

EBERHARDT N.
Cybernetic Determinants in the Evolution of Brain and Culture.

HUANG S.
The Overlap Feature of the Genetic Equidistance Result – A Fundamental Biological Phenomenon Overlooked for Nearly Half of a Century.

KHALIL EL.
Are Plants Rational?

KILLINGBACK T, DOEBELI M, HAUERT C.
Diversity of Cooperation in the Tragedy of the Commons.

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The Diffuse Organism as the First Biological System.

LAUBICHLER MD, CALLEBAUT W.
The Moody's Virus Attacks the U.S. National Science Board.

LINDE MEDINA M.
Two "EvoDevos".

MOOSA MM, UD-DEAN SMM.
Danger Avoidance: An Evolutionary Explanation of Uncanny Valley.

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SMIT H.
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BLUTE M.
Evolution's First Law?

CALABRETTA R.
A Hypertextual Novel That Dramatizes the Process of Its Creation and Proposes Techniques to Increase Creativity.

CALLEBAUT W.
Risky Business….

CRAIG LR.
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FAUNDES V, PARDO A.
Biological Basis of Human Mate Choice: The Triple A Theory.

GARCÍA CL.
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GUEZ D.
From Cognition to Consciousness: A Discussion About Learning, Reality Representation, and Decision Making.

HARDISTY BE, CASSILL DL.
Memes and the Ecological Niche.

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Interpretation and the Origin of Life.

O'MALLEY MA.
What Microbes Can Do: A Sensory Guide to Microbiology.

ROSSANO MJ.
How Our Ancestors Raised Children to Think as Modern Humans.

STEGENGA J.
"Population" Is Not a Natural Kind of Kinds.

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Memory, Sign Systems, and Self-Reproductive Processes.

SWENSON R.
Selection Is Entailed by Self-Organization and Natural Selection is a Special Case.

VECCHI D.
Risky Business.

4.6 Vorträge und Kongressbeiträge Scientific Presentations

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Congreso Interamericano de Filosofía „Diálogo de Lenguas y Culturas", Mazatlán, Sinaloa, Mexico.

CALLEBAUT W.
Changing Views of Biological Information.
Third Workshop in the Philosophy of Information, Brussels, Belgium.

CALLEBAUT W.
Data-driven Research in the Biological and Biomedical Sciences.
Egenis, Exeter, UK.

CALLEBAUT W.
Engineering Life: Changing the Living World Without Trying to Understand It.
Science Studies Colloquium, University of California San Diego, CA, USA.

CALLEBAUT W.
Engineering Life: Changing the Living World Without Trying to Understand It.
Science, Technology & Society Center, University of California Berkeley, CA, USA.

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Extending the Modern Synthesis or Moving Beyond? On the Dialectics of Dis/Unity.
Institut Cavanilles de Biodiversitat i Biologia Evolutiva, Universitat de València, Spain.

CALLEBAUT W.
Four Dimensions of Naturalism.
Kolloquium Wissenschaftstheorie, University of Vienna, Austria.

CALLEBAUT W.
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First European Advanced Seminar in the Philosophy of the Life Sciences, Hernance, Switzerland.

CALLEBAUT W.
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CALLEBAUT W, BELINCHÓN M, DE RENZI M, PERETÓ J, RASSKIN-GUTMAN D.
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Department of Logic and Philosophy of Science, University of the Basque Country, San Sebastian, Spain.

HANDSCHUH S, METSCHER BD, MITTERÖCKER P, NEMESCHKAL HL, MÜLLER GB.
Exploring the Potentials of microCT for High-resolution 3D Imaging in Comparative Biology: Methodological Overview and Quantitative Tools.
Rank Prize Funds Symposium on High Resolution X-Ray Imaging, Manchester, UK.

HANDSCHUH S, METSCHER BD, SCHWAHA T.
Volume-Visualisierungen basierend auf histologischen Schnitten: Ein Zugang zu einer drei-dimensionalen Histologie.
3. Graduiertenforum der Fachgruppe Morphologie der DZG, Vienna, Austria.

HANDSCHUH S, METSCHER BD, SCHWAHA T.
Volume-Visualisierungen basierend auf histologischen Schnitten: Ein Zugang zu einer drei-dimensionalen Histologie.
9. Tagung: Zellbiologie, Histologie und Embryologie, Vienna, Austria.

MACLEOD M.
Distinguishing Enhancement from Treatment: The Ethical Value of a Natural versus Artificial Enhancement Distinction.
First European Advanced Seminar in the Philosophy of the Life Sciences: Causation and Disease in the Postgenomic Era, Geneva, Switzerland.

MACLEOD M.
Epistemic Natural Kinds: Discovering a More Useful Conception of Natural Kinds in Scientific Practice.
Colloquium of the Institute for History and Philosophy of Science, University of Athens, Greece.

MACLEOD M.
Inspired by Mill: An Epistemic Conception of Natural Kinds for the Life Sciences.
Italian Society for Logic and Philosophy of Science International Conference (SILFS), Bergamo, Italy.

METSCHER BD, MÜLLER GB.
Microtomography for Developmental and Evolutionary Biology.
Rank Prize Funds Symposium on High Resolution X-Ray Imaging, Manchester, UK.

MÜLLER GB.
Beyond Variation: The EvoDevo of Phenotypic Novelty.
Workshop Conceptual Change in Biological Science, Max Planck Institute for the History of Science, Berlin, Germany.

MÜLLER GB.
Eco-Evo-Devo at the Vienna Vivarium.
University of Vienna, Austria.

MÜLLER GB.
Elements of an Extended Synthesis in Evolutionary Theory.
Workshop Perspectives on the Evolution of Evolutionary Theory, University of Milano Bicocca, Milano, Italy.

MÜLLER GB.
Emergence in Evolutionary Innovation.
Conference Genomes and the Synthesis of Life, Niels Bohr Institute, Copenhagen, Denmark.

MÜLLER GB.
Evolving Evolutionary Theory.
Congress Evolutionstheorie und Schöpfungsglaube - neue Perspektiven nach dem Darwinjahr, University of Vienna, Austria.

MÜLLER GB.
Organismal Form in Evolutionary Theory.
24th Altenberg Workshop in Theoretical Biology: Biological and Physical Constraints on the Evolution of Form in Plants and Animals, KLI, Altenberg, Austria.

MÜLLER GB, METSCHER BD.
MicroCT Imaging for Comparative Embryology:
Methods, Applications, and Prospects.
Establishing New Model Systems in Evo-Devo: Meeting of the European Society of Evolutionary Developmental Biology, Paris, France.

ROSAS LÓPEZ A.
La Hipótesis del Chimpancé Competitivo.
EvoCog Seminar, University of the Balearic Islands, Palma de Mallorca, Spain.

ROSAS LÓPEZ A.
The Phylogeny of Altruistic Punishment.
EvoCog Seminar, University of the Balearic Islands, Palma de Mallorca, Spain.

SAMWALD M.
High-level Knowledge Representation on the Semantic Web:
The Concept Web Alliance and Related Efforts.
BioHackathon Symposium 2010, Tokyo, Japan.

SCHWAB C.
Sociality in Corvids: Networks, Relations, and Social Learning.
KLF Anniversary Symposium: Frontiers in Behavioural Biology, Vienna, Austria.

SCHWAB C, BUGNYAR T, KOTRSCHAL K.
Exceeding the Pair Bond: Social Structure of Jackdaw Networks.
5th European Conference on Behavioural Biology, ECBB, Ferrara, Italy.

SCHWAB C, BUGNYAR T, KOTRSCHAL K.
Socio-positive Interactions in Juvenile Jackdaws, *Corvus monedula*: Structure, Reciprocity, and Preference.
5th Topical Meeting of the Ethologische Gesellschaft: Animal Communication, Berlin, Germany.

SCHWAB C, KUBITZA R, KOTRSCHAL K.
Social Network Analysis of Pair Bond Relationships in Free-flying Jackdaws, *Corvus monedula*.
5th topical meeting of the Ethologische Gesellschaft: Animal Communication, Berlin, Germany.

SCHWAB C, SZIPL G, KOTRSCHAL K, WANKER R.
Complexity and individuality in the contact calls of jackdaws.
5th European Conference on Behavioural Biology, ECBB, Ferrara, Italy.

SCHWAB C, SZIPL G, KOTRSCHAL K, WANKER R.
Individual Information in Jackdaw Vocalizations.
5th topical meeting of the Ethologische Gesellschaft: Animal Communication, Berlin, Germany.

TAYLOR P.
Troubled by Heterogeneity? Opportunities for Fresh Views on Long-standing and Recent Issues in Biology and Biomedicine.
Department of Theoretical Biology, University of Vienna, Austria.

VERPOOTEN J.
From „Just-so" Stories to an Acceptable Account of the Evolution of Storytelling. Fiction or Future?
Symposium on Evolutionary Perspectives in Empirical Studies of Literature and Media, Internationale Gesellschaft für Empirische Literaturwissenschaft (IGEL), University of Utrecht, the Netherlands.

VERPOOTEN J.
Sensory Exploitation and Human Artistic Behaviours: The Appearance of Iconic Art Traditions.
European Human Behaviour and Evolution Association (EHBEA), University of Wroclaw and Polish Academy of Sciences, Wroclaw, Poland.

68 VERPOOTEN J.
Stories as Spandrels? Comparative Hypothesis Appraisal Requires Scrutinizing Non-adaptive Alternatives for the Evolution of Fiction.
Symposium on Evolutionary Perspectives in Empirical Studies of Literature and Media, Internationale Gesellschaft für Empirische Literaturwissenschaft (IGEL), University of Utrecht, the Netherlands.

VERPOOTEN J, JOYE Y.
Born to Build? A Comparative Analysis of Architecture and Building Behaviour Across Species.
Human Evolution and Behavior Network (HEBeN) Workshop, Katholieke Universiteit Leuven, Belgium.

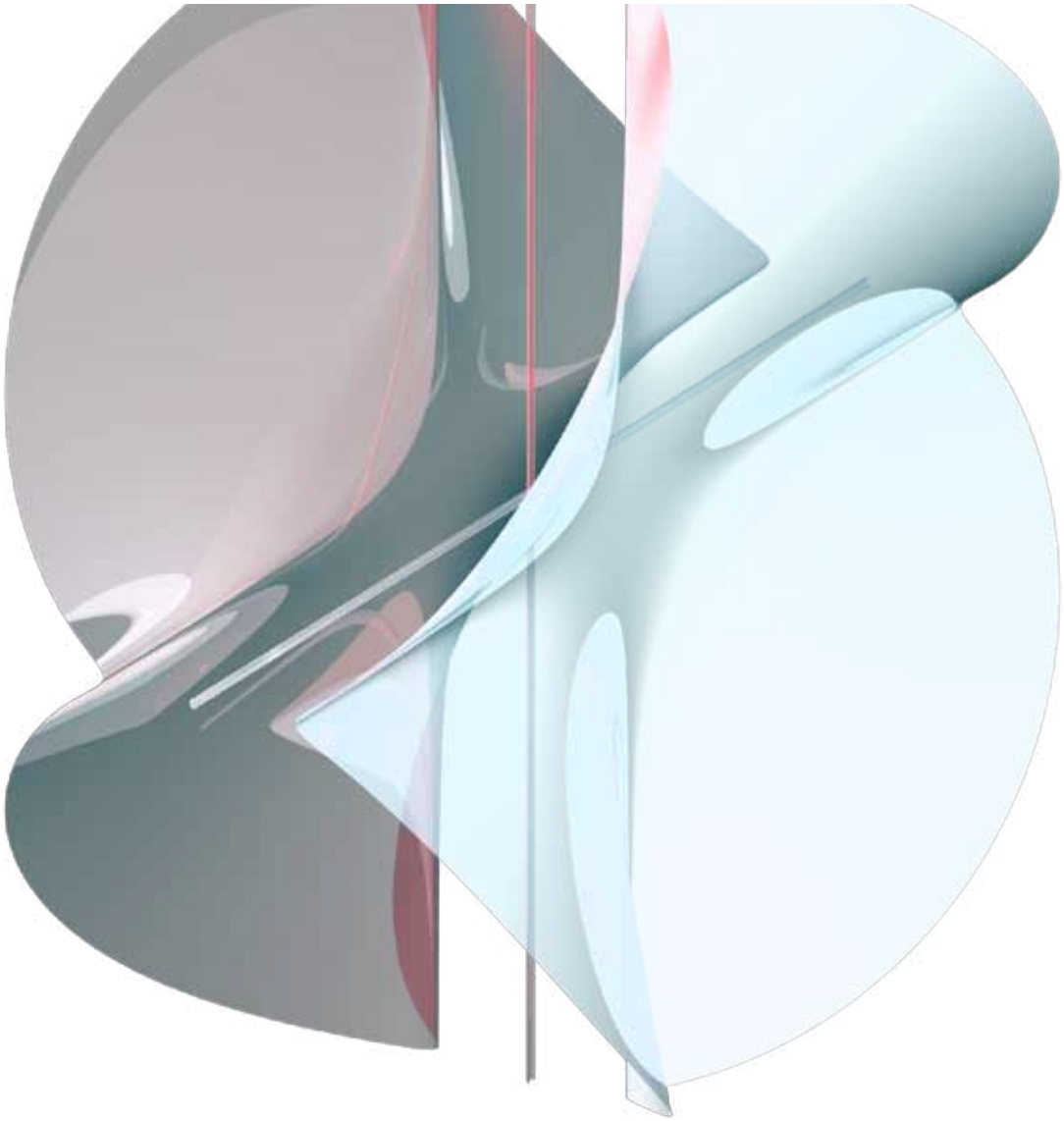
WILKE A.
Past and Present Environments: The Evolution of Decision Making.
Human Behavior & Evolution Society, Univerity of Oregon, USA.

WILKE A.
Past and Present Environments: The Evolution of Decision Making.
Economic Psychology Brown Bag, University of Basel, Switzerland.

WILKE A.
Past and Present Environments: The Evolution of Decision Making.
CEU Cognitive Development Center, Budapest, Hungary.

Weitere Aktivitäten
Further Activities

5



Viele der Aktivitäten des KLI
gehen über den wissenschaftlichen
Kernbereich hinaus.
Von diesen sind manche hier
stellvertretend genannt
und zusätzliche Förderungen
werden dankend angeführt.

5.1 EASPLS Graduate Meeting

First European Advanced Seminar in the Philosophy of the Life Sciences,
Causation and Disease in the Postgenomic Era
Hosted by the Brocher Foundation, Geneva, September 6 – 11, 2010

Participating Institutions: Brocher Foundation – ESRC Centre for Genomics in Society, University of Exeter (Exeter) – European School for Molecular Medicine (Milan) – Institut d'Histoire de la Médicine et de la Santé (Geneva) – Institut d'Histoire et de Philosophie des Sciences et des Techniques, Paris-1 Sorbonne (Paris) – Konrad Lorenz Institute for Evolution and Cognition Research (Altenberg) – Max-Planck-Institut für Wissenschaftsgeschichte (Berlin)

Lecturers: Giovanni Boniolo (Milan) – Werner Callebaut (Altenberg) – John Dupré (Exeter) – Michael Esfeld (Lausanne) – Bernardino Fantini (Geneva) – Lisa Gannett (Halifax) – Jean Gayon (Paris) – Annick Lesne (Paris) – Sandra Mitchell (Pittsburgh) – Guiseppe Testa (Milan) – C. Kenneth Waters (Minneapolis)

5.2 Zusätzliche Förderungen

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