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The titles published in this series are listed at the end of this volume.
EVOLUTIONARY EPISTEMOLOGY, LANGUAGE AND CULTURE

A Non-Adaptationist, Systems Theoretical Approach

edited by

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Springer
“[...] to he who has arrived, no satisfaction can be given, whereas he who is ‘in progress’ will always be grateful.”

Otto Neurath
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Preface by the editors

Evolutionary Epistemology, Language and Culture was the title and the theme of a conference held at the Vrije Universiteit Brussel, Brussels, Belgium, in May 2004. The conference was organized by the Centre for Logic and Philosophy of Science (http://www.vub.ac.be/CLWF) and the Leo Apostel Centre (http://www.vub.ac.be/CLEA).

For the first time in history, scholars working on language and culture from within an evolutionary epistemological framework, and thereby emphasizing complementary or deviating theories of the Modern Synthesis, were brought together. Of course there have been excellent conferences on evolutionary epistemology in the past, as well as numerous conferences on the topics of language and culture. However, until now these disciplines had not been brought together into one all-encompassing conference. Moreover, previously there never had been such stress on alternative and complementary theories of the Modern Synthesis.

As this volume will make clear and as did the conference itself, this specific inter- and transdisciplinary approach is one of the next crucial steps that needs to be taken, if we ever want to unravel the secrets of phenomena such as language and culture.

Evolutionary epistemology (EE), a term coined by Donald T. Campbell, is an academic discipline that grew out of naturalized philosophy and philosophy of science. For a long time, EE has been made equivalent to the slogansque one-liner introduced by Michael Ruse, who stated that evolutionary epistemology is about taking Darwin seriously. By this he meant that whenever we seek to understand phenomena such as language, culture, science, human creativity, cognition, or indeed, all other phenomena of life, we need to use the theory of Natural Selection, as first introduced by Charles Darwin.

This scientific statement was of enormous import, for it defined for the first time very clearly what the goal of evolutionary epistemology is: it is about accepting that all of life’s phenomena and behaviours, be they human or non-human, are the result of an evolutionary process, and, even more importantly, that we can understand and explain these phenomena by studying this evolutionary process.

This means that the primary goal of all the sciences and of all scientific thinking concerned with the study of living phenomena or the behaviours expressed by various organisms, is to find explanations for these phenomena and
behaviours from within a naturalistic approach. And this in turn implies that we should not only implement evolutionary and biological thinking within human or exact sciences, but that we should also naturalize the methodologies used.

The biological sciences in general and more specifically, evolutionary thinking have progressed enormously over the past decades, making it quite clear that evolution is a phenomenon that can occur in many different ways, sometimes even different from natural selection. Today we know that natural selection and evolution are far from synonymous and that they do not explain isomorphic phenomena in the world.

‘Taking Darwin seriously’ is the way to go, but today the time has come to take alternative and complementary theories that developed after the Modern Synthesis, equally seriously, and, furthermore, to examine how language and culture can merit from these diverse disciplines.

At the EELC conference, Franz Wuketits, one of the leading figures within EE, made two important observations. The first remark was that within the last few years, it seemed as if EE had vanished from the scientific agenda: all the commotion the discipline had brought about when it was first launched in the mid-20th century, seemed to have been fading away, along with the discipline itself. Wuketits was quite right in adding that it would be an enormous loss for the scientific enterprise if the latter were to happen.

His second observation was that he was very happy to see that, with the EELC conference, the research topic was being put back on the scientific agenda, and he stressed that the theme should have emphasized even more the relevance of EE for the study of languages and cultures, in the plural.

These two points were very well taken, indeed, and we would like to add that EELC is very much about applying evolutionary epistemology to the study of languages and cultures, even more so, it is about bringing evolutionary epistemologies to bear on languages and cultures, all written in the plural. For today, EE is a discipline that has many facets and, therefore, the time has come not only to take Darwin seriously, but to take the different evolutionary epistemologies seriously.

This book is the first attempt to reinstate EE as one of the top-five priorities of the scientific endeavour, and it is with great confidence that we say, that if we take evolutionary epistemology seriously—for the tremendous importance of this discipline is yet to be felt in varying disciplines—the scientific research fields of language and culture will flourish even more.

**CHAPTER OUTLINE**

In the introduction, Nathalie Gontier gives a general account of what evolutionary epistemology, language and culture is all about, providing a short historical overview of how evolutionary epistemology became a topic on the scientific agenda of epistemologists.
In the first part, she examines how, through the history of philosophy, the idea of a first philosophy that would explain how we can acquire, describe and explain knowledge was adhered to by different scholars. She then sets out to demonstrate how this idea of a first philosophy was overthrown by the naturalistic approach, first introduced by Quine. Gontier explains how, contrary to a sociology of science or post-modern thinking, evolutionary epistemology can give scientific explanations of how knowledge is acquired and how we can examine its validity, by accepting the very fact that knowledge itself is a biological product and that it hence needs to be explained from within evolutionary biology.

In the second part of the article, the author compares various universal evolutionary frameworks that are put forward by different scholars within EE. Here, Gontier distinguishes between traditional EE and new EE, where adherents of the former develop universal selectionist accounts. The former take an adaptationist point of departure, and hence emphasize the active role of the environment, while the latter subscribe to an organismic point of view, based more on system-theoretical approaches to evolution.

In the third part, she examines why anthropologists in general find a naturalistic approach to culture appalling. She then explains how the study of culture can nevertheless benefit from an evolutionary epistemological stance, without losing the specificity of the subject matters.

Finally, Gontier hints at how evolutionary epistemology can be implemented in the study of language, its origin and evolution.

The book is divided into four parts, where different theories of evolutionary epistemology are first discussed on their own, and later implemented in language and culture. The contributions in the final part show how EE, implemented in language and/or culture can benefit from various modelling techniques. In the preparation of the book there was no attempt made to harmonize the varying views put forward and defended by the different authors. On the contrary, our main goal has been to demonstrate just how heterogynous the field of EE (and evolutionary studies in general) is. Indeed, this diversity of opinions is a property that we understand to be absolutely vital and necessary for the development of the discipline. Therefore, we have chosen to juxtapose these different views, and, hopefully, in the process encourage others to share our opinion that all these complementary and alternative views are equally important. Indeed, they could well cast new light upon old problems in an extremely relevant way.

PART 1: EVOLUTIONARY EPISTEMOLOGY

In the first part, different evolutionary epistemologies are analyzed and compared. Questions that are raised are whether EE always needs to be based on adaptationist accounts; how EE poses itself as a genuine alternative to
essentialist thinking; whether EE differs from constructivist accounts; and
whether the selection schemes that are proposed to be at work in different
phenomena, such as the evolution of life, science or culture, have been suc-
cessful in bringing about the abandonment of essentialist thinking.

Contrary to earlier versions of evolutionary epistemology, where adapta-
tionists accounts are taken as starting point to develop these theories, Franz
Wuketits explores the possibilities of a non-adaptationist approach within
EE. Earlier versions understand organisms as passive elements that are or
are not adapted to the environment. This view somehow gives the impression
that organisms are passive objects, shaped by the active environment they live
in. Wuketits refutes this idea, and pleads for the adoption of an organismic
perspective in evolutionary thinking. Based upon the systems-theoretical
approach, he argues that inner processes of internal selection, self-regulation and
inner order need to be taken into account when examining an organism. And
this idea, together with the fact that there is a constant interaction between an
organism and its surroundings, makes Wuketits defend that adaptability (as
opposed to adaptation) is not defined by the environment, but by the organism
itself. This view also has serious epistemological consequences: instead of
assuming that the perceiving apparatus of different organisms needs to corre-
spond (in a realistic sense of the word) to the outer world, the author argues
that this notion needs to be replaced by the notion of a functional coherence.

The contribution of Alexander Riegler is a highly ambitious undertaking. He
considers on the one hand ‘evolutionary epistemology’ and, on the other,
‘radical constructivism’, proposing a theory to bridge the gap between the two
approaches. He characterizes the former as an approach that focuses on exter-
nal behaviour, while the latter emphasizes the perspective from within. This
bridging attempt leads to a critical evaluation of the concept of hypothetical
realism.

Olaf Diettrich searches for the biological boundary conditions for our clas-
sical physical world-view. He shows that the laws of nature are not objective
properties of the world, rather they can be derived as invariants of human acting
operators—from locomotion bringing about the classical conservation laws,
as shown by Emmy Noether, up to the inborn cognitive operators bringing
about the symmetries and regularities which constitute our classical world-
view. Our organic phenotype, therefore, provides the boundary condition for
our cognitive phenotype. Modern physical facilities that do not commute with
the inborn operators require non-classical world-views.

Whether the real world is something more than the world of our expe-
rience is a question also raised by Adrianna Wozniak. Relations between
Neo-Darwinism, transcendental philosophy and cognitive sciences are exam-
ined, and the nature of the phylogenetically acquired knowledge and the basic
assumptions of evolutionary epistemology are analyzed. The speculations of
constructivism and of subjective or transcendental idealism are criticized from the perspective of the suppositions of evolutionary epistemology. Finally, the ontological status of logic and mathematics are discussed from an evolutionary point of view.

We end the first part with Derek Turner’s contribution. Contrary to the statement that Universal Darwinists undermine traditional essentialism, Turner argues that these scientists still adhere to a certain form of what he calls ‘process essentialism’ that, in essence, resembles Aristotelian thinking. After giving a general overview of the universal selection schemes as formulated by David Hull and Daniel Dennett, he examines how these selection principles are implemented in the study of science and culture. The basic idea, developed by Universal Darwinists is that phenomena like science and culture show an analogy regarding the specific kinds of evolutionary processes they can undergo, and this analogy, according to Turner, is based upon the idea that these similar evolutionary processes share essential features. Contrary to Universal Darwinists, the author proposes that we should not distinguish between accidental and essential properties of the evolutionary process, rather we should treat the different features of the evolutionary process as sharing a Wittgensteinian family resemblance.

PART 2: EVOLUTIONARY EPISTEMOLOGY AND LANGUAGE

The second part focuses on how evolutionary epistemology can be applied to language and vice versa. Questions raised include on the one hand, whether linguistics in itself suffices to understand language; and on the other hand the applicability of natural selection and modularity theory are being questioned and complemented with dynamical systems theories. The search for an adequate unit and level of selection is examined and authors ask whether it is fruitful or not to compare languages with biological species and/or organisms.

Mario Alinei forms a bridge with the first part, because he too questions essentialist thinking, as it applies to the field of linguistics. He attacks the mystifying view that language is a living organism, governed by an organic law. He sketches the historical setting that created this misunderstanding and in its stead he proposes a new theory—the ‘Palaeolithic Continuity Theory (PCT)’—that holds that language is a social artefact with an interface with nature, governed by a law of conservation and only exceptionally prone to change. Furthermore he believes that PCT should be applicable to all cultural phenomena expressible in language, thereby making the connection with evolutionary epistemology.

The origin of language is re-examined from within the ‘extended mind model’, a theoretical framework developed by Robert Logan. He posits that
language emerged to deal with the increasing complexity of hominid life. The author demonstrates how complexity theory and chaos theory can contribute to a better understanding of how language evolved. The emergence of language, according to Logan, represented a bifurcation from percept-based thinking to concept-based thinking. Our first concepts were our first words, which acted as strange attractors for all the percepts associated with these concepts.

Jean-Philippe Magué sets out to deal with the problem of the evolution of the lexicon in a changing environment. The basic metaphor, accredited to Salikoko Mufwene, is to see languages as species and idiolects as individuals. A multi-agent model is presented that models evolution of languages and is based upon the Roschian insights about categorization. A series of simulations shows the model at work demonstrating its strengths and shortcomings.

Besides the fact that we should take Darwin seriously, Nathalie Gontier pleads for an implementation of a universal symbiogenesis principle in the study of the origin and evolution of language. Therefore, she distinguishes between a vertical evolution concept, that is typical in Neo-Darwinian explanations of evolution by means of natural selection, and a horizontal evolution concept, characteristic of symbiogenesis, plant hybridization and the epidemiology of viruses. Gontier argues that the language-as-species metaphor is misleading in more than one way, because it essentializes language, making an abrupt distinction between the language-using-organisms and language itself, leaving scholars with the problem of combining these two element again. Finally, the author explores how a principle of universal symbiogenesis can be implemented in ideas about language variation and language change, language genes and conceptual blending.

Annemarie Peltzer-Karpf deals with past and present accounts of modularity in both neural and cognitive organizations. The discussion is placed within and against the framework of dynamic systems theory applied to the language acquisition of mono- and bilingual children. Data drawn from a large-scale long-term study of bilingual development in Turkish and Bosnian/Croatian/Serbian immigrant children provide evidence for the interplay of non-linear processes and the influence of environmental conditions on language and linguistic behaviour.

**PART 3: EVOLUTIONARY EPISTEMOLOGY AND CULTURE**

In the third part which focuses on how evolutionary epistemology can be implemented in culture, we again encounter criticisms directed towards essentialist thinking. This is most apparent in the nature/nurture debate on the one hand, and in the presumed dualistic interactions that occur between the organism and the environment on the other hand. The contributors of this part
examine how we can overcome these dichotomous barriers. Based on alternative and complementary theories of the Modern Synthesis, all mainly inspired by system theoretical frameworks, the authors propose new levels and units of selection that are just as much present in the biological as in the cultural sphere.

A critical analysis of the concept ‘human nature’, is given by Tim Ingold, for he argues that this concept is a Western construal that impacts on a fundamental dichotomy at the heart of evolutionary thinking: namely the nature/culture divide. He argues that it is evolutionary science itself that continues this dichotomy, although researchers claim to do the contrary, because early hominids and even contemporary hunter-gatherers are conceived as standing at the crossroad between biological evolution on the one hand, and history and culture on the other. In his article, Ingold demonstrates that this dichotomous relationship is founded upon essentialist notions of ‘human nature’ and the author sets out to examine the presence of this notion in the biological species concept, ideas of a universal reason as defended by adherents of the doctrine of psychic unity, and within the idea of a genetic blueprint.

An extremely ambitious attempt to formulate a new framework for evolutionary epistemology, relying on Dynamic Systems Theory, is presented by Eugenia Ramirez-Goicoechea. Her goal is to consider a human being as a relational organism with its environment or, in other words, to emphasize the role of the sociocultural. Non-linearity, non-determinism and non-duality are core concepts in the formulation of this approach that also proposes a model for the re-creation and embodiment of knowledge from generation to generation.

Jean Lachapelle, Luc Faucher and Pierre Poirier revisit the Baldwin effect (the idea that learning can influence the rate and direction of evolution by natural selection). Inspired by a recent article from Godfrey-Smith, the authors propose a new, extended version of the Baldwin effect that leans on and incorporates the concept of ‘niche construction’. Following Deacon’s ideas on cultural niche construction, Lachapelle, Faucher and Poirrier then set out to demonstrate that the Baldwin effect, understood along these lines, played a fundamental role in the evolution and development of social norms.

Kathleen Coessens understands the evolutionary process that human beings underwent and their cultural creativity, as both depending on what she calls ‘evolutionary flexibility’. Starting off with a phenomenological approach of the human body, Coessens then goes on to examine how evolutionary concepts such as adaptation, exaptation and affordances could bring about the possibility of introducing creative flexibility within evolutionary biology. Finally, she investigates how these forms of evolutionary flexibility at the biological level could lie at the basis of cultural creativity and vice versa, because she emphasizes that both processes are intertwined.
We end the third part with the contribution of Hugo Mercier. He takes on the challenging problem of explaining the status of mathematical knowledge from within an evolutionary epistemological framework. Usually the difficulty is to succeed in bringing about the transition from innate mathematical knowledge, modular or not, e.g., ‘the number sense’, to formal mathematics as we know it today. If Mercier’s analysis holds good, it offers at the same time an explanation of the famous ‘unreasonable effectiveness of mathematics’.

PART 4: EVOLUTIONARY EPISTEMOLOGY AND MODELLING

In the final part, we focus on how EE can be implemented in modelling techniques and vice versa. Modelling techniques as introduced by scholars working in Artificial Intelligence, Game Theory and even Quantum Mechanics, are today becoming part and parcel of scientific undertakings. Yet a lot of suspicions are being raised with respect to their value and helpfulness in examining, introducing and testing various theories. In this part, different academics working within different, sometimes non-neo-Darwinian fields, demonstrate how their theories can be used as well, and in so doing, they tackle some misunderstandings and confusions that are used to attack their models.

Bart de Boer gives us a general overview of how computer models can be used to investigate language evolution. He argues that language has extremely complex dynamics that can either be examined at the level of the individual, or at the level of a population. Systems with complex interactions have complex and difficult to predict dynamics, and computer simulations are, therefore, useful in studying them. The author presents three different techniques for building computer simulations on an accessible level: direct optimization, genetic algorithms and agent-based models and illustrates them with a number of examples. Finally, De Boer emphasizes the importance of correctly measuring and interpreting the results obtained from computer simulations, and shows how these models can be implemented in evolutionary epistemology and vice versa.

The view that linguistic conceptual domains are partly conventional and the result of a cultural evolution is the point of departure taken by Joachim De Beule. Contrary to the idea that language can be understood as a system of word-to-meaning mappings, he stresses the important role language users play in the conventionalization of language in order to solve the problem of efficient communication. He thereby focuses on the syntax and semantics of linguistic constructions about time. After examining how this conventionalization process takes place in natural languages, De Beule presents a computer model where a simulated population of autonomous language users evolve a shared ontology and language to communicate temporal information.
Ahti-Veikko Pietarinen discusses the distinction between semantic and pragmatic components of language from the game-theoretic point of view, and concludes that game-internal factors do not mark out the difference between what is semantic and what is pragmatic in language. He further provides an extension of game-theoretic semantics to evolutionary situations in order to capture not only the static meaning relations between language and the world but also semantic and pragmatic change.

The final article is contributed by Diederik Aerts, Marek Czachor and Bart D’Hooghe. The authors show that in human language rather unexpectedly genuine quantum structures manifest themselves. It leads the authors to reconsider the neo-Darwinian evolutionary scheme which they allege is too ‘classical’ in its conception, thus too limited to accommodate the quantum world. Moreover, they propose a novel way of looking at conceptual change, leading to new relations between biology and epistemology, EE in particular.

With this book we hope to make it clear to the reader that the specific combination of evolutionary epistemology, language and culture, is a very promising one. Indeed, for uni-directionally not only means that linguists and anthropologists should implement EE in their studies, but also that evolutionary epistemologists should focus even more than they have in the past, on the study of language and culture.
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First of all we wish to express our sincere gratitude towards all the participants of the EELC conference. Secondly, we are very much indebted to the contributors of this volume, because they have made the book what it is today. Thirdly, we want to thank our series-editor and the whole springer team very cordially for all their efforts.

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