

Stefano Nolfi · Marco Mirolli (Eds.)

Evolution of Communication and Language in Embodied Agents

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AW Chickering

Evolution Of Communication And Language In Embodied Agents:

Evolution of Communication and Language in Embodied Agents Stefano Nolfi, Marco Mirolli, 2009-11-28 This field of research examines how embodied and situated agents such as robots evolve language and thus communicate with each other This book is a comprehensive survey of the research in this emerging field The contributions explain the theoretical and methodological foundations of the field and then illustrate the scientific and technological potentials and promising research directions. The book also provides descriptions of research experiments and related open software and hardware tools allowing the reader to gain a practical knowledge of the topic The book will be of interest to scientists and undergraduate and graduate students in the areas of cognition artificial life artificial intelligence and linguistics Perspectives on the Origins of Language Claire Lefebvre, Bernard Comrie, Henri Cohen, 2013-11-15 The question of how language emerged is one of the most fascinating and difficult problems in science In recent years a strong resurgence of interest in the emergence of language from an evolutionary perspective has been helped by the convergence of approaches methods and ideas from several disciplines The selection of contributions in this volume highlight scenarios of language origin and the prerequisites for a faculty of language based on biological historical social cultural and paleontological forays into the conditions that brought forth and favored language emergence augmented by insights from sister disciplines The chapters all reflect new speculation discoveries and more refined research methods leading to a more focused understanding of the range of possibilities and how we might choose among them There is much that we do not yet know but the outlines of The Horizons of Evolutionary Robotics Patricia A. Vargas, Ezequiel A. Di Paolo, Inman the path ahead are ever clearer Harvey, Phil Husbands, 2014-03-28 An authoritative overview of current research in this exciting interdisciplinary field Evolutionary robotics ER aims to apply evolutionary computation techniques to the design of both real and simulated autonomous robots The Horizons of Evolutionary Robotics offers an authoritative overview of this rapidly developing field presenting state of the art research by leading scholars. The result is a lively expansive survey that will be of interest to computer scientists robotics engineers neuroscientists and philosophers The contributors discuss incorporating principles from neuroscience into ER dynamical analysis of evolved agents constructing appropriate evolutionary pathways spatial cognition the coevolution of robot brains and bodies group behavior the evolution of communication translating evolved behavior into design principles the development of an evolutionary robotics based methodology for shedding light on neural processes an incremental approach to complex tasks and the notion of mindless intelligence complex processes from immune systems to social networks as a way forward for artificial intelligence Contributors Christos Ampatzis Randall D Beer Josh Bongard Joachim de Greeff Ezequiel A Di Paolo Marco Dorigo Dario Floreano Inman Harvey Sabine Hauert Phil Husbands Laurent Keller Michail Maniadakis Orazio Miglino Sara Mitri Renan Moioli Stefano Nolfi Michael O Shea Rainer W Paine Andy Philippides Jordan B Pollack Michela Ponticorvo Yoon Sik Shim Jun Tani Vito Trianni Elio Tuci Patricia A Vargas Eric D

Vaughan **The Origin of Language and Consciousness** Nikolai S. Rozov, 2023-06-24 This book presents an evolutionary theory of the origin and step by step development of linguistic structures and cognitive abilities from the early stages of anthropogenesis to the Upper Paleolithic Emphasizing the social nature of the human mind and using an extended version of C Hempel's explanatory logic the author proves that language and consciousness emerged and evolved through the daily efforts of our ancestors to overcome mutual misunderstandings in increasingly complex social orders with increasing tasks on memory thinking and normative regulation of behavior with the addition of new and new communicative concerns The book addresses questions such as the following What unique social conditions led to the emergence of the first protosyllables and protowords What steps enabled the crossing of the linguistic Rubicon between animal communication and human speech Why were syllables and phonemes needed How did our ancestors overcome the difficulties of misunderstanding How when and why did ancient people learn to speak in turns Why did they begin to talk about past and distant events What is consciousness and how did it evolve along with language How many original languages were there and why are there roughly 200 philas language macrofamilies How and why did the number of languages and the degree of their complexity change in pre written history Did the Romance languages really evolve from Latin Accordingly the book will appeal to scholars in various disciplines who are interested in a better understanding of the cognitive aspects of anthropogenesis and the ancient Springer Handbook of Computational Intelligence Janusz Kacprzyk, Witold origins of language and consciousness Pedrycz, 2015-05-28 The Springer Handbook for Computational Intelligence is the first book covering the basics the state of the art and important applications of the dynamic and rapidly expanding discipline of computational intelligence This comprehensive handbook makes readers familiar with a broad spectrum of approaches to solve various problems in science and technology Possible approaches include for example those being inspired by biology living organisms and animate systems Content is organized in seven parts foundations fuzzy logic rough sets evolutionary computation neural networks swarm intelligence and hybrid computational intelligence systems Each Part is supervised by its own Part Editor's so that high quality content as well as completeness are assured *Information Systems Architecture and Technology: Proceedings* of 36th International Conference on Information Systems Architecture and Technology - ISAT 2015 - Part II Adam Grzech, Leszek Borzemski, Jerzy Świątek, Zofia Wilimowska, 2016-02-23 This four volume set of books constitutes the proceedings of the 36th International Conference Information Systems Architecture and Technology 2015 or ISAT 2015 for short held on September 20 22 2015 in Karpacz Poland The conference was organized by the Computer Science and Management Systems Departments Faculty of Computer Science and Management Wroclaw University of Technology Poland The papers included in the proceedings have been subject to a thorough review process by highly qualified peer reviewers The accepted papers have been grouped into four parts Part I addressing topics including but not limited to systems analysis and modeling methods for managing complex planning environment and insights from Big Data research projects Part II

discoursing about topics including but not limited to Web systems computer networks distributed computing and multi agent systems and Internet of Things Part III discussing topics including but not limited to mobile and Service Oriented Architecture systems high performance computing cloud computing knowledge discovery data mining and knowledge based management Part IV dealing with topics including but not limited to finance logistics and market problems and artificial Computational Science - ICCS 2025 Workshops Maciej Paszynski, Amanda S. Barnard, Yongjie intelligence methods Jessica Zhang, 2025-08-06 The 6 volume set constitutes the workshop proceedings of the 25th International Conference on Computational Science ICCS 2025 which took place in Singapore Singapore during July 7 9 2025 The 137 full papers and 32 short papers presented in these proceedings were carefully reviewed and selected from 322 submissions. The papers are organized in the following topical sections Volume I Advances in high performance computational earth sciences numerical methods frameworks artificial intelligence approaches for network analysis artificial intelligence and high performance computing for advanced simulations and biomedical and bioinformatics challenges for computer science Volume II Computational health computational modeling and artificial intelligence for social systems and computational optimization modelling and simulation Volume III Computational science and AI for addressing complex and dynamic societal challenges equitably computer graphics image processing and artificial intelligence computing and data science for materials discovery and design and large language models and intelligent decision making within the digital economy Volume IV Machine learning and data assimilation for dynamical systems and multi criteria decision making methods applications and innovations Volume V Credible Multiscale modelling and simulation numerical algorithms and computer arithmetic for computational science quantum computing retrieval augmented generation and simulations of flow and transport modeling algorithms and computation Volume VI Smart systems bringing together computer vision sensor networks and artificial intelligence solving problems with uncertainty and teaching computational science The Cambridge Handbook of Biolinguistics Cedric Boeckx, Kleanthes K. Grohmann, 2013-02-14 Biolinguistics involves the study of language from a broad perspective that embraces natural sciences helping us better to understand the fundamentals of the faculty of language This Handbook offers the most comprehensive state of the field survey of the subject available A team of prominent scholars working in a variety of disciplines is brought together to examine language development language evolution and neuroscience as well as providing overviews of the conceptual landscape of the field The Handbook includes work at the forefront of contemporary research devoted to the evidence for a language instinct the critical period hypothesis grammatical maturation bilingualism the relation between mind and brain and the role of natural selection in language evolution It will be welcomed by graduate students and researchers in a wide range of disciplines including linguistics evolutionary biology and Theoretical and Computational Models of Word Learning: Trends in Psychology and Artificial cognitive science <u>Intelligence</u> Gogate, Lakshmi,2013-02-28 The process of learning words and languages may seem like an instinctual trait

inherent to nearly all humans from a young age However a vast range of complex research and information exists in detailing the complexities of the process of word learning Theoretical and Computational Models of Word Learning Trends in Psychology and Artificial Intelligence strives to combine cross disciplinary research into one comprehensive volume to help readers gain a fuller understanding of the developmental processes and influences that makeup the progression of word learning Blending together developmental psychology and artificial intelligence this publication is intended for researchers practitioners and educators who are interested in language learning and its development as well as computational models Language, Cognition, and the Way We Think Nikola A. formed from these specific areas of research Kompa, 2024-07-25 The cognitive potency of the human mind can be fully appreciated only if it is conceived of as a linguistic mind This is the starting point of Nikola Kompa's investigation into the relationship between language and cognition Underpinned by philosophical ideas from Plato to Ockham and from Locke to Vygotsky Kompa uses theories within the philosophy of language mind and cognitive science and draws on neuro psychology and psycholinguistic studies to explore core ideas about language and cognition How did language transform our ancestors into creatures of considerable cognitive and social accomplishment How does language augment cognition Is language only a means of communicating our ideas or is a means of thinking itself Her study has repercussions for a broad range of questions from how humans differ from other animals and what a cognitive architecture looks like if it approximates the achievements of the human mind to questions of education and cross cultural communication Theorizing and forming hypotheses about how language and cognition might have coevolved how the availability of symbolic labels enhance various cognitive functions what the cognitive function of inner speech might be and how inner speech and thought relate to each other Kompa addresses the perennial philosophical question of what the benefits of having a language might be and brings into sharper relief the intimate connection between linguistic and other cognitive functions Informed by recent discussions on language evolution labels and inner speech this timely contribution helps us understand more about how language changes the way we think **Transactions on Computational Collective Intelligence VII** Ngoc-Thanh Nguyen, 2012-07-18 These Transactions publish research in computer based methods of computational collective intelligence CCI and their applications in a wide range of fields such as the Semantic Web social networks and multiagent systems TCCI strives to cover new methodological theoretical and practical aspects of CCI understood as the form of intelligence that emerges from the collaboration and competition of many individuals artificial and or natural The application of multiple computational intelligence technologies such as fuzzy systems evolutionary computation neural systems consensus theory etc aims to support human and other collective intelligence and to create new forms of CCI in natural and or artificial systems This seventh issue contains a collection of ten carefully selected and thorougly revised contributions Applications of Evolutionary Computation Cecilia Di Chio, Alexandros Agapitos, Stefano Cagnoni, Carlos Cotta, Francisco Fernández de Vega, Gianni A. Di Caro, Rolf Drechsler, Anikó Ekárt, Anna I.

Esparcia-Alcázar, Muddassar Faroog, W.B. Langdon, Juan-I. Merelo-Guervós, Mike Preuss, Hendrik Richter, Sara Silva, Anabela Simões, Giovanni Squillero, Ernesto Tarantino, Andrea Tettamanzi, Julian Togelius, Neil Urquhart, Sima Uyar, Georgios N. Yannakakis, 2012-03-24 This book constitutes the refereed proceedings of the International Conference on the Applications of Evolutionary Computation EvoApplications 2012 held in M laga Spain in April 2012 colocated with the Evo 2012 events EuroGP EvoCOP EvoBIO and EvoMUSART The 54 revised full papers presented were carefully reviewed and selected from 90 submissions EvoApplications 2012 consisted of the following 11 tracks EvoCOMNET nature inspired techniques for telecommunication networks and other parrallel and distributed systems EvoCOMPLEX algorithms and complex systems EvoFIN evolutionary and natural computation in finance and economics EvoGAMES bio inspired algorithms in games EvoHOT bio inspired heuristics for design automation EvoIASP evolutionary computation in image analysis and signal processing EvoNUM bio inspired algorithms for continuous parameter optimization EvoPAR parallel implementation of evolutionary algorithms EvoRISK computational intelligence for risk management security and defense applications EvoSTIM nature inspired techniques in scheduling planning and timetabling and EvoSTOC evolutionary algorithms in stochastic and dynamic environments **English Lexicogenesis** D. Gary Miller, 2014-02-20 English Lexicogenesis investigates the processes by which novel words are coined in English and how they are variously discarded or adopted and frequently then adapted Gary Miller looks at the roles of affixation compounding clipping and blending in the history of lexicogenesis including processes taking place right now The first four chapters consider English morphology and the recent types of word formation in English the first introduces the morphological terminology used in the work and the book s theoretical perspectives chapter 2 discusses productivity and constraints on derivations chapter 3 describes the basic typology of English compounds and chapter 4 considers the role of particles in word formation and recent construct types specific to English Chapters 5 and 6 focus respectively on analogical and imaginative aspects of neologistic creation and the roles of metaphor and metonymy In chapters 7 and 8 the author considers the influence of folk etymology and tabu and the cycle of loss of expressivity and its renewal After outlining the phonological structure of words and its role in word abridgements he examines the acoustic and perceptual motivation of word forms He then devotes four chapters to aspects and functions of truncation and to reduplicative and conjunctive formations In the final chapter he looks at the relationship between core and expressive morphology and the role of punning and other forms of language play before summarizing his arguments and findings and setting out avenues for future research The Oxford Handbook of Language Evolution Maggie Tallerman, Kathleen R. Gibson, 2012 Leading scholars present critical accounts of every aspect of the field including work in animal behaviour anatomy genetics and neurology the prehistory of language the development of our uniquely linguistic species and language creation transmission and change Handbook of Collective Robotics Serge Kernbach, 2013-05-29 This book is devoted to mechatronic chemical bacteriological biological and hybrid systems utilizing cooperative networked

swarm self organizing evolutionary and bio inspired design principles and targeting underwater ground air and space applications It addresses issues such as open ended evolution self replication self development **Complex Behavior in** Evolutionary Robotics Lukas König, 2015-03-30 Today autonomous robots are used in a rather limited range of applications such as exploration of inaccessible locations cleaning floors moving lawns etc However ongoing hardware improvements and human fantasy steadily reveal new robotic applications of significantly higher sophistication For such applications the crucial bottleneck in the engineering process tends to shift from physical boundaries to controller generation As an attempt to automatize this process Evolutionary Robotics has successfully been used to generate robotic controllers of various types However a major challenge of the field remains the evolution of truly complex behavior Furthermore automatically created controllers often lack analyzability which makes them useless for safety critical applications In this book a simple controller model based on Finite State Machines is proposed which allows a straightforward analysis of evolved behaviors To increase the model's evolvability a procedure is introduced which by adapting the genotype phenotype mapping at runtime efficiently traverses both the behavioral search space as well as recursively the search space of genotype phenotype mappings Furthermore a data driven mathematical framework is proposed which can be used to calculate the expected success of evolution in complex environments Cognitive Robotics Angelo Cangelosi, Minoru Asada, 2022-05-17 The current state of the art in cognitive robotics covering the challenges of building AI powered intelligent robots inspired by natural cognitive systems A novel approach to building AI powered intelligent robots takes inspiration from the way natural cognitive systems in humans animals and biological systems develop intelligence by exploiting the full power of interactions between body and brain the physical and social environment in which they live and phylogenetic developmental and learning dynamics This volume reports on the current state of the art in cognitive robotics offering the first comprehensive coverage of building robots inspired by natural cognitive systems Contributors first provide a systematic definition of cognitive robotics and a history of developments in the field They describe in detail five main approaches developmental neuro evolutionary swarm and soft robotics. They go on to consider methodologies and concepts treating topics that include commonly used cognitive robotics platforms and robot simulators biomimetic skin as an example of a hardware based approach machine learning methods and cognitive architecture Finally they cover the behavioral and cognitive capabilities of a variety of models experiments and applications looking at issues that range from intrinsic motivation and perception to robot consciousness Cognitive Robotics is aimed at an interdisciplinary audience balancing technical details and examples for the computational reader with theoretical and experimental findings for the empirical scientist Developmental Robotics Angelo Cangelosi, Matthew Schlesinger, 2015-01-23 A comprehensive overview of an interdisciplinary approach to robotics that takes direct inspiration from the developmental and learning phenomena observed in children's cognitive development Developmental robotics is a collaborative and interdisciplinary approach to robotics that is directly inspired by the

developmental principles and mechanisms observed in children's cognitive development. It builds on the idea that the robot using a set of intrinsic developmental principles regulating the real time interaction of its body brain and environment can autonomously acquire an increasingly complex set of sensorimotor and mental capabilities. This volume drawing on insights from psychology computer science linguistics neuroscience and robotics offers the first comprehensive overview of a rapidly growing field After providing some essential background information on robotics and developmental psychology the book looks in detail at how developmental robotics models and experiments have attempted to realize a range of behavioral and cognitive capabilities. The examples in these chapters were chosen because of their direct correspondence with specific issues in child psychology research each chapter begins with a concise and accessible overview of relevant empirical and theoretical findings in developmental psychology The chapters cover intrinsic motivation and curiosity motor development examining both manipulation and locomotion perceptual development including face recognition and perception of space social learning emphasizing such phenomena as joint attention and cooperation language from phonetic babbling to syntactic processing and abstract knowledge including models of number learning and reasoning strategies Boxed text offers technical and methodological details for both psychology and robotics experiments **The Freedom of Words** Anna M. Borghi, 2023-08-10 An exploration of how language shapes our mental and social lives with a focus on abstract language and Foundations of Intelligent Systems Yinglin Wang, Tianrui Li, 2011-11-25 Proceedings of the Sixth International thought Conference on Intelligent System and Knowledge Engineering presents selected papers from the conference ISKE 2011 held December 15 17 in Shanghai China This proceedings doesn t only examine original research and approaches in the broad areas of intelligent systems and knowledge engineering but also present new methodologies and practices in intelligent computing paradigms The book introduces the current scientific and technical advances in the fields of artificial intelligence machine learning pattern recognition data mining information retrieval knowledge based systems knowledge representation and reasoning multi agent systems natural language processing etc Furthermore new computing methodologies are presented including cloud computing service computing and pervasive computing with traditional intelligent methods The proceedings will be beneficial for both researchers and practitioners who want to utilize intelligent methods in their specific research fields Dr Yinglin Wang is a professor at the Department of Computer Science and Engineering Shanghai Jiao Tong University China Dr Tianrui Li is a professor at the School of Information Science and Technology Southwest Jiaotong University China

Unveiling the Energy of Verbal Artistry: An Psychological Sojourn through **Evolution Of Communication And Language In Embodied Agents**

In a global inundated with displays and the cacophony of immediate transmission, the profound power and mental resonance of verbal beauty often fade in to obscurity, eclipsed by the constant assault of noise and distractions. However, located within the musical pages of **Evolution Of Communication And Language In Embodied Agents**, a interesting work of literary beauty that pulses with raw emotions, lies an memorable trip waiting to be embarked upon. Published by a virtuoso wordsmith, that mesmerizing opus courses viewers on an emotional odyssey, delicately exposing the latent potential and profound affect stuck within the delicate internet of language. Within the heart-wrenching expanse with this evocative evaluation, we can embark upon an introspective exploration of the book is central subjects, dissect its captivating writing type, and immerse ourselves in the indelible impression it leaves upon the depths of readers souls.

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