The emergence and evolutionary history of semiotic systems and processes are among the topics that attract the most remarkable number of researchers in a variety of theoretical and experimental fields. As ‘behavior associated with the language does not fossilize’ (Hauser et al., 2000), the most important developments are theoretical, comparative and computational modeling (Christiansen & Kirby, 2003). The computational approaches are dedicated to the building of artificial (virtual and embodied) creatures and environments through which one can simulate the minimum requirements to observe the emergence and evolution of semiotic systems.

Neuroethology, cognitive science, evolutionary biology and behavioral ecology are some of the areas that provide the most robust gathering of empirical and theoretical strategies to computationally test hypotheses about the emergence and evolutionary history of many semiotic systems, processes and properties. Approaches work in different descriptive levels (e.g., synthax, morphology, social communication and interaction) (Steels, 2003; Cangelosi & Parisi, 2002). Depending on the theoretical framework, and computational tools, one can test a range of factors that affect the philo/ontogeny of many processes, such as the adaptive role of compositional structures, the benefits arising from the emergence of symbolic processes, the presumed biological substrates responsible for the evolution of these processes, the decisive role of cognitive artifacts and technologies.

In theoretical and philosophical terms, the constraints derived from Jakob von Uexkull’s biosemiotics, and the pragmatic semiotics of Charles S. Peirce, have provided various subsidies and a collection of restriction to conceive, adjust and regulate the simulations and experimental protocols (Ziemke & Sharkey, 2001; Queiroz & Merrell, 2009). These authors have ‘inspired’ computational strategies with principles related to autonomy, embedded and situated semiotic systems, and self-organization processes with emerging qualitative properties.

The International Journal of Signs and Semiotic Systems (IJSSS) is the first journal profoundly devoted to the modeling of semiotic systems and process. The journal offers a space of intense collaboration from empirical studies and theoretical frameworks toward a deeper understanding of semiotic process and an integrated vision of its synthesis in artificial systems. In establishing this journal, we
encourage collaborative approaches regarding semiotic systems and processes, ranging from biological and empirical modeling to formal-theoretical studies. Our primary objective is to bring together multidisciplinary efforts in computational, empirical, theoretical and formal approaches in modeling semiotic processes, especially those that contribute to the design and synthesis of semiotic systems, such as biological evidences or evolutionary and philosophical frameworks. The frameworks and theories explored take into account recent developments from neurocognitive science, cognitive ethology, second order cybernetics, artificial life, biosemiotics and evolutionary biology.

Topics to be discussed in this journal include (but are not limited to) emergence and evolution of semiotic processes, evolution of information interpretation systems, embodied and situated semiotic processes and systems, biologically inspired models of semiotic systems, collaborative semiotic processes and applications, theories of meaning, sign and symbol grounding, technological semiotic artifacts, Umwelt, semiotic landscapes and niches.

In this first issue we have the participation of important authors from many areas of expertise.

Peirce’s philosophy established a rigorous logical-phenomenological criteria to distinguish different types of signs processes as well as to distinguish semiosis from reactive behavior (Peirce, 1998, p. 424). This is considered one of the most important topics of discussion in biosemiotics and Alife of language and communication evolution because well-defined criteria should permits the identification of innovations, major semiotic transitions and patterns of semiotic complexification in natural and artificial worlds. Approaches carried out by Peircean scholars do not specify the dynamics responsible for the emergence of semiotic systems in Uexkulean adaptive scenario. Cariani’s article represents a remarkable contribution to the distinction of biological and computational sign-mediated adaptive percep-tion-action systems. According to his proposal, which is discussed in terms of the functional organization and operational structure of systems, a system can be called semiotic only if the sign-states of the system can be identified, such that their behavior can be described in terms of semiotic operations (processing of sign-types). His approach distinguishes between semiotic and non-semiotic systems in terms of characteristic form of internal organization or external behavior based on sets of distinctions. Three major sign-mediated domains are identified/described based on the construction and maintenance of complex organizations, appropriate effective action and coordination of behavior.

The predominant simulation model for simulating the emergence of emergence of linguistic categories in a community of agents is a naming game, first proposed by Steels (1996), involves a community of language users that initially do not share a common language but end up with a shared repertoire of expressions-meanings pairs. Starting from this existing model, Andy Lücking and Alexander Mehler argue that it needs extensions to cope with increasing complexity of linguistic categorization. Even though the naming game has already been extended to capture new meaning functions, the authors state that, due to the fact that the object of these extended naming game models is limited to color categories, existing simulation models fails to simulate more complex categories and more complex expressions. Lücking and Mehler advocate for new extensions that will allow the model to capture semantic compositionality and contextuality. They propose a sequence of extensions in linguistic categorization aspects of the naming game, including a sequence of levels of complexity starting from compositionality and ending up at contextuality, the difference between literal and dialog meanings, and the ontological provenance of meanings. Their proposal opens up new ways to explore the simulation model of the naming game, and as a future work Lücking and Mehler indicate the implementation of this new model and further extension of its level of complexity.
According to Fetzer’s approach, any simulation of human cognition (as sign users) is theoretically impossible because of the inextricably dependence of context in which semiotic systems are embedded. Complex interactions of conditions associated with different forms of ontic and epistemic aspects turn theoretically impossible to make any form of strong simulation of human cognitive life. According to his argument, human behavior (not stereotypical human mind) occurs as the effect of complex causal interactions between conscious, subconscious, or unconscious values of the variables motives, beliefs, ethics, abilities and capabilities. According to Fetzer’s semiotic theory of cognitive processes, transitions between thoughts are governed by deterministic, probabilistic, or chaotic laws of association that range over iconic, indexical, and symbolic “modes of transition”.

In this inaugural issue, we launch a target article with open commentaries. The target article is a positioning article on a relevant and open problem in the field, followed by commentaries written by various specialists and ending with a reply to comments by the target article’s author, and everything is published together to show the audience a broad and enriching view of significant topics. Here in the first issue, Angelo Cangelosi writes an article on symbol grounding problem, the problem of how an agent has to connect symbols with what they refer to. He identifies and describes three sub-problems in developing a grounded symbol system, besides linking symbols and referents, there is also the problems of establishing symbol-symbol relationships and of sharing a set of symbols in a community of agents. Cangelosi ends up pointing open challenges to research on symbol grounding and inviting commentators to address them. Eleven comments on this intriguing and long lasting problem in Artificial Intelligence were made by researchers with various expertise, including Stevan Harnad, Luc Steels, Tony Belpaeme, Carol Madden, Stéphane Lallée, Peter Ford Dominey, Stephen Cowley, Ju-yang Weng, Alberto Greco, Barbara Giolito, Domenico Parisi, Vincent C. Müller, Angelo Loula, João Queiroz and Ricardo Gudwin. As Cangelosi states in his reply to comments, there is “a great methodological and epistemological opportunity [in investigating computational approaches to the modelling of linguistic and symbolic capabilities]”.

REFERENCES


Hauser, M. D., Chomsky, N., et al. (2002). The faculty of language: what is it, who has it, and how did it evolve? Science, 298(5598), 1569-1579.


Angelo Loula is a Professor at the State University of Feira de Santana, Bahia, Brazil. He is a PhD candidate at the Department of Computer Engineering and Industrial Automation, FEEC/UNICAMP. He received his M.Sc. in Electrical Engineering from FEEC, his B.Sc. in Electrical Engineering from the Federal University of Bahia and a Technologist degree in Computing from Ruy Barbosa Faculty. He is the leader of Group for Research on Artificial Cognition. He is the co-editor of ‘Artificial Cognition Systems’ (IGI, 2006) and ‘Computação Cognição e Semiose’ (EDUFBA, 2007), and Advances in Modeling Adaptive and Cognitive Systems (UEFS, 2010). He is the Editor-in-Chief of the International Journal of Signs and Semiotic Systems. His research interests include artificial cognition, semiotic and meaning processes, communication, language evolution and acquisition, artificial life, adaptive behavior, complex systems and self-organization, embodied and situated cognition.

João Queiroz is a professor at the Institute of Arts and Design and at the Graduate Studies Program in Communication, Federal University of Juiz de Fora, Minas Gerais, Brazil. He earned a Ph.D. in Communication and Semiotics from the Catholic University of Sao Paulo (PUC-SP), and a post-doc fellowship in Intelligent Systems at the School of Electrical and Computer Engineering (FEEC-DCA), State University of Campinas (Unicamp, Brazil), and in Philosophy of Biology at the Institute of Biology, Federal University of Bahia (UFBA). He is the Editor-in-Chief of the International Journal of Signs and Semiotic Systems. He is author and co-editor of several books and special issues as well as numerous articles on the emergence and evolution of semiotic complexity in biological and artificial systems. He is the director of the Group for Research in Cognitive Science and Semiotics (UFJF), Group for Research on Artificial Cognition (UEFS), an associate researcher of the Research Group on History, Philosophy and Biology Teaching (UFBA), and member of the Institute for Research on Anticipatory Systems (The University of Texas at Dallas). His research interests include evolution of semiotic complexity; emergence of symbolic based communication; artifacts and cognitive technologies; complexity studies; C.S. Peirce’s semiotic and pragmatism.