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INTRODUCTION

1. The notion of a cognitive system is among the basic concepts of cognitive science. Given its great generality, it is also regarded as one of its major theoretical categories. Every system that receives, codes, processes, and exploits information about the environment can be classified as a cognitive system, so, by this broad construal, cognitive systems are information systems. To a significant extent, they are also computational systems, which process information according to particular algorithms. Every information system is equipped with mechanisms that enable it to create various representations of its surroundings. Therefore, cognitive systems are also representational systems. COGNITION, INFORMATION, COMPUTATION, and REPRESENTATION are fundamental, interrelated categories used in all subdisciplines of cognitive science.

2. There are many special problems concerning cognitive systems. They include questions having to do with: a) what kinds of cognitive systems there are (natural, artificial, hybrid ones), b) how they have evolved, c) the relation between cognitive processes and information processes (algorithmic, non-algorithmic ones), d) whether or not cognitive systems are representational in character, d) the relations between computational and neurobiological cognitive mechanisms, e) artificial neural networks as models of natural cognitive processes, f) coupled, extended, and collective cognitive systems.

An important distinction that applies to the class of cognitive systems is the one between natural and artificial systems. Natural cognitive systems are those systems, capable of cognitive activities, that have been created by processes of biological evolution. It is the task of the evolutionary theory of cognitive systems to describe, classify, and explain the mechanisms of their emergence. Artificial cognitive systems include all manner of devices (artifacts) that can receive and process information as well as solve problems

by appeal to internal representations of the environment. Artificial intelligence, cognitive and developmental robotics, the theory of neural networks – all these disciplines are concerned with constructing and studying artificial cognitive systems that simulate such cognitive capacities of natural systems as perception, memory, learning, intelligence, navigation in space, problem solving, linguistic competence, etc.

An interesting kind of cognitive system are hybrid systems – part natural and part artificial. They include people and other animals that realize cognitive processes by using cognitive implants as replacements for their natural cognitive organs. Man's uniqueness in nature consists, among other things, in being able to manufacture and exploit a variety of cognitive tools thanks to which he can acquire knowledge that would otherwise be impossible to attain. Problems concerning coupled and hybrid systems are the subject of many discussions surrounding the problem of extended cognition.

3. This issue opens a new SLGR series in cognitive science. In the first part of the issue, entitled "Cognitive Systems", we have collected papers on a variety of topics, such as the cognitive science of science, computational models of cognitive processes, extended and distributed cognitive systems, representational systems and mechanistic explanation in cognitive science, semiotic systems, genetic algorithms, and the acquisition of various concepts of infinity by human cognitive systems. The second part, entitled "Varia", contains three papers on subjects that fall outside the purview of cognitive science. They are about object-oriented programming (computer science), an application of syllogisms to modeling the behavior of parasites (applied logic), and the transgressional model of personality as applied to marriage counseling (applied psychology).

4. The issue opens with Witold Marciszewski's essay "On Accelerations in Science Driven by Daring Ideas: Good Messages from Fallibilistic Rationalism", where he argues, in a Popperian vein, that acceleration of progress in the natural sciences is achieved by exploring innovative hypotheses whose high information content is inversely proportional to their probability. This idea is then applied to mathematics, which, according to Marciszewski, develops by way of constructing more and more abstract theories in order to reduce the complexity of proofs and calculations. Thus, the probability of error in the proofs is decreased but at the cost of relying on more risky premises.

Marcin Miłkowski, in his paper "Evaluating Artificial Models of Cognition", looks at a variety of artificial models of cognition and asks how the standards of their evaluation depend on the functions the models are in-

tended to fulfill. The functions discussed include: predicting and explaining a target phenomenon, offering an exact formulation of a theory, showing the consistency and completeness of a theory, guiding discovery, explaining the general features of cognition, and providing a possibility proof (e.g., Mc-Clelland and Rumelhart's model of past tense acquisition shows that it is possible to learn morphology without learning explicit rules). Miłkowski introduces a useful distinction between a model's intended focus and its scaffolding to mark the difference between those elements of a model that are intended to correspond to its target system and those that play a merely supportive role.

Paweł Gładziejewski, in "Explaining Cognitive Phenomena with Internal Representations: A Mechanistic Perspective", takes up the problem of explicating the notion of representation. He argues that a mechanism that is genuinely representational must jointly satisfy four constraints: the structural resemblance condition, the action-guidance condition, the decouplability condition, and the error-detection condition. Gładziejewski contends that this explication is both intuitive and immune to many anti-representationalist objections. At the end of his paper, Gładziejewski also suggests which theories in cognitive science posit such representational mechanisms.

Łukasz Afeltowicz and Witold Wachowski, in "How Far We Can Go Without Looking Under the Skin: The Bounds of Cognitive Science", analyze Edwin Hutchins' theory of distributed cognition in the context of both classical cognitive science and some recent approaches to cognition, including the theses of the extended mind, the embodied mind, and situated cognition. The authors show that the theory of distributed cognition is independent of the extended mind thesis and need not even try to address the issue of cognitive agency.

The next paper, "Extended Cognitive System and Epistemic Subject" by Barbara Trybulec, is concerned with similar problems, though seen from a different perspective. It attempts to reconcile the notion of epistemic subject as explicated in terms of virtue epistemology, with Richard Menary's account of Integrated Cognition, which is a version of the thesis of the extended mind.

Piotr Koderak, in "On a Cognitive Model of Semiosis", asks whether we can classify some artificial systems, such as the SnePs, as genuinely semiotic ones: i.e., capable of providing interpretation for utterances independently of the system's designers or users. Konderak asserts that the answer is in the affirmative and argues, from the perspective of Peircean semiotics, that claims to the contrary rest on overly restrictive accounts of semiosis.

Marek Havlík and Tomáš Marvan, in "The Default Mode Network and the Problem of Determining Intrinsic Mental Contents", discuss a shift that has recently occurred in neuroscience, where a purely reactive view of the brain, according to which the brain simply responds to various stimuli, has been replaced by an account on which a great deal of brain activity is in fact intrinsic (i.e., unevoked by any stimulus). Havlík and Marvan also show that the discovery of endogenous brain activity raises serious methodological problems, including the question of how to provide a mechanistic explanation of the function of intrinsic brain activity if we cannot use the standard methods of excitation and inhibition.

Marek Hetmański, in "Metaphoric Confinement of Information", analyzes Shannon and Weaver's *The Mathematical Theory of Communication* in terms of the metaphors the authors invoke to flesh out the abstract notions of information, probability, and uncertainty.

Kazimierz Trzęsicki, in "How are Concepts of Infinity Acquired?", discusses the evolution of the concepts of infinity throughout the history of philosophy and mathematics, focusing on the debate over the ontic and conceptual status of actual infinity. The paper closes with an analysis of the views of Georg Cantor.

Paweł Stacewicz, in "Evolutionary Schema of Modeling Based on Genetic Algorithms", focuses on the question of how to (at least) partly mechanize the process of building computational models of the phenomena, irrespective of the field of investigation in which the model is being constructed. Stacewicz proposes to achieve this aim by employing genetic algorithms to whole populations of models.

Finally, the paper by Miguel López Astorga entitled "Evolved Mechanisms Versus Underlying Conditional Relations" takes up the problem of whether the social contracts theory is sufficiently justified by experimental data, such as those provided by Fiddick, Cosmides, and Tooby. López Astorga offers a tentative alternative explanation of the data in terms of the mental models theory, though he does not endorse it.

The editors of SLGR intend subsequent issues of the SLGR series in cognitive science to be monographs devoted to particular special problems.