

## **FS 04: Biologically Inspired Cognitive Architectures (BICA) – Final Program**

*Organizing/Program Committee: Alexei Samsonovich (chair), Antonio Chella, Ben Goertzel, Richard H. Granger, Laurent Itti, Deepak Khosla, Shane T. Mueller, David C. Noelle, Murray Shanahan, Samuel Adams, James Albus, Jerry Ball, Alan Bond, Michael Cox, Son Dao, Stanley Franklin, John Gero, Elkhonon Goldberg, Andreas Herzog, Eva Hudlicka, Neil Jacobstein, Christian Lebiere, Evguenia Malaia, Howard Shrobe, Narayan Srinivasa, Brian Tsou, Pei Wang, John Weng*

Registration starts at 8:00 am on Friday and at 8:30 am on Saturday and Sunday, November 7-9. Technical Sessions start at 9:00 AM on November 7-9 in Room Fitzgerald C, Westin Arlington Gateway Hotel, 801 N. Glebe Rd., Arlington, VA 22203

### **Friday, November 7**

**9:00 am – 10:30 am**      **Technical Session 1: Bridging the Gap.** *Chair: Benjamin Goertzel*

9:00 am – 9:05 am      Alexei Samsonovich: Welcome

9:05 am – 9:35 am      Susan L. Epstein (keynote): Building a Constraint Solver that Learns

9:35 am – 10:00 am      Don Perlis (keynote): To BICA and Beyond: RAH-RAH-RAH! -- or - How Biology and Anomalies Together Contribute to Flexible Cognition

10:00 am – 10:30 am      Steve Grossberg (keynote): Towards Self-Organizing Autonomous Brain-Inspired Cognitive Architectures

**10:30 am – 11:00 am**      **Coffee Break**

**11:00 am – 12:30 pm**    **Technical Session 2:** Embodied BICA. *Chair: Stuart Shapiro*

11:00 am – 11:25 am    Antonio Chella (keynote): A Brain Inspired Architecture for an Outdoor Robot Guide

11:25 am – 11:45 am    David Noelle (keynote): Function Follows Form: Biologically Guided Functional Decomposition of Memory Systems

11:45 am – 12:00 pm    Christian Lebiere: The SAL Integrated Cognitive Architecture

12:00 pm – 12:15 pm    Michael Kandeler: A Categorization of Contextual Constraints

12:15 pm – 12:30 pm    Benjamin Goertzel: XIA-MAN: An Extensible, Integrative Architecture for Intelligent Humanoid Robotics

**12:30 pm – 2:00 pm**    **Lunch: Organized BICA lunch at Front Page (see the map).  
Reservation is made for 25 – 60 people, start at 12:45 pm**

**2:00 pm – 3:30 pm**    **Technical Session 3:** Language acquisition and cognitive growth.  
*Chair: Ralph Weischedel*

2:00 pm – 2:15 pm    Ralph Weischedel and Elizabeth Boschee: An Exploratory Study Towards “Machines that Learn to Read”

2:15 pm – 2:30 pm    Josefina Sierra: Grounded Language Acquisition Enables Intuitive Reasoning

2:30 pm – 2:45 pm    Evguenia Malaia: The Biological Bases of Syntax-Semantics Interface in Natural Languages: Cognitive Modeling and Empirical Evidence

- 2:45 pm – 3:00 pm Paul Kogut: Applications of BICA to Intelligence Analysis
- 3:00 pm – 3:15 pm Omid Madani: Systems Learning for Complex Pattern Problems
- 3:15 pm – 3:30 pm Brandon Rohrer: A Unified Architecture for Cognition and Motor Control Based on Neuroanatomy, Psychophysical Experiments, and Cognitive Behaviors

**3:30 pm – 4:00 pm** **Coffee Break**

**4:00 pm – 4:45 pm** **Technical Session 4: Language and metacognition. Chair: Don Perlis**

- 4:00 pm – 4:15 pm Wei Chen: Modeling Mental Contexts and Their Interactions
- 4:15 pm – 4:30 pm Albert Kim and Martha Palmer: Figurative Language: “Meaning” is Often More Than Just a Sum of the Parts
- 4:30 pm – 4:45 pm Sergei Nirenburg and Marjorie McShane: A Simulated Physiological/Cognitive “Double Agent”

- 4:45 pm – 5:45 pm** **Panel Discussion I: Brainstorm on language, embodiment and the critical mass of intelligence. Leader: Alexei Samsonovich**
- Panelists:** Kenneth De Jong, Dennis Perzanowski, Stuart Shapiro, Ralph Weischedel, Antonio Chella, Wei Chen, Roberto Pirrone, Christian Lebiere, Benjamin Goertzel
- Agenda:** to identify the language component of the critical mass of intelligence required for bootstrapped cognitive growth.

**6:00 pm – 7:00 pm** **Reception (joined with all symposia)**

**Saturday, November 8**

**9:00 am – 10:30 am**     **Technical Session 5:** Large scale and industry view of BICA.  
*Chair: Antonio Chella*

9:00 am – 9:25 am     Deepak Khosla (keynote): Perceptive Machines: From Selective Attention and Recognition to Visual Cognition

9:25 am – 9:35 am     Narayan Srinivasa: Learning Invariant Sensory-Motor Transforms for Fault-Tolerant Control of Redundant Robots

9:35 am – 9:45 am     Rajan Bhattacharyya: Bio-Inspired Planning and Reaching in Complex Environments

9:45 am – 10:00 am     Jeremy Wyatt: Multiple Workspaces as an Architecture for Cognition

10:00 am – 10:15 am     Dan Hammerstrom: Bayesian Memory: A Possible Hardware Building Block for Intelligent Systems

10:15 am – 10:30 am     Knud Thomsen: The Ouroboros Model

**10:30 am – 11:00 am**     **Coffee Break**

**11:00 am – 12:30 pm**     **Technical Session 6:** Biological constraints vital for BICA. *Chair: Deepak Khosla*

11:00 am – 11:20 am     James Albus (keynote): Reverse Engineering the Brain

11:20 am – 11:40 am     Walter Schneider (keynote): Reverse Engineering the Brain With a Circuit Diagram Based on a Segmented Connectome and

## System Dynamics

- 11:40 am – 12:00 pm Michael Anderson (keynote): Circuit Sharing and the Implementation of Intelligent Systems
- 12:00 pm – 12:10 pm Andras Lorincz: Hippocampal Formation Breaks Combinatorial Explosion for Reinforcement Learning: A Conjecture
- 12:10 pm – 12:20 pm Tsvi Achler: A Novel Classification Method Using Self-Regulatory Feedback
- 12:20 pm – 12:30 pm Rodrigo Ventura: Action and Adaptation: Lessons from Neurobiology and Challenges for Robot Cognitive Architectures
- 12:30 pm – 2:00 pm** **Lunch: Organized BICA lunch at Uncle Julio's Rio Grande Café (see the map). Reservation for 40 people, start at 12:45 pm**
- 2:00 pm – 3:30 pm** **Technical Session 7: Biological constraints and natural learning.**  
*Chair: Christian Lebiere*
- 2:00 pm – 2:15 pm Giorgio Ascoli: Quantifying Memory Retrieval: From Neural Substrates to the Subjective Content
- 2:15 pm – 2:30 pm Cyril Brom: Episodic Memory for Human-like Agents and Human-like Agents for Episodic Memory
- 2:30 pm – 2:45 pm Haris Dindo: Learning through Observation and Imitation: An Overview of the ConSCIS Architecture
- 2:45 pm – 3:00 pm Jaime Gomez: Cognitive Ontologies: Mapping Structure and Function of the Brain from a Systemic View

3:00 pm – 3:15 pm Jim Staszewski: Cognitive Models of Human Expertise and Their Scientific and Practical Value

3:15 pm – 3:30 pm J. Storrs Hall: Servo Stacks: An Architecture for Cognitive and Developmental Robotics

**3:30 pm – 4:00 pm** **Coffee Break**

**4:00 pm – 4:30 pm** **Technical Session 8:** Metacognition and psychological constraints. *Chair: Eva Hudlicka*

4:00 pm – 4:10 pm Jim Eilbert: The Internal World Models Needed to Perform Situation Estimation

4:10 pm – 4:20 pm John Gero: A Cognitively-Based Constructivist Approach to Memory and Reasoning

4:20 pm – 4:30 pm Gregor Kaczor: Evolving Complete Cognitive Architectures: The Role of Neural Competition and Diffusive Emotional Control for Learning and Emergent Cognitive Capabilities

**4:30 pm – 5:30 pm** **Panel Discussion II:** “B” in BICA and natural cognitive growth of BICA. **Leader:** David Noelle.

**Panelists:** Steve Grossberg, Christian Lebiere, Andras Lorincz, Giorgio Ascoli, Neil Jacobstein, Jaime Gomez

**Agenda:** The focus will be upon promising methods for extracting technological insights from biological findings, on existing evidence that this approach has benefits over more traditional engineering approaches, and on communicating the promise.

- 5:30 pm – 5:45 pm**      **Coffee Break**
- 5:45 pm – 7:15 pm**      **AAAI FSS-08 Plenary Session:** Plenary talks followed by individual symposia highlights and summaries. BICA symposium highlights/summary presented by Wei Chen.
- 7:30 pm – 10:00 pm**      **BICA Dinner at Brickskeller: bus departs from Westin at 7:30 pm (35 seats)**
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## Sunday, November 9

- 9:00 am – 10:30 am**      **Technical Session 9:** Self-regulation and emotion. *Chair: Josefina Sierra*
- 9:00 am – 9:20 am      Roger Azevedo (keynote): Detecting, Tracking, and Modeling Self-Regulatory Processes during Complex Learning with Hypermedia
- 9:20 am – 9:35 am      Roberto Pirrone: Awareness Mechanisms for an Intelligent Tutoring System
- 9:35 am – 9:50 am      Alexei Samsonovich: Cognitive Constructor: A Biologically-Inspired Self-Regulated Learning Partner
- 9:50 am – 10:05 am      Eva Hudlicka: Modeling the Mechanisms of Emotion Effects on Cognition
- 10:05 am – 10:20 am      Joanna Bryson: Improved Animal-Like Maintenance of

Homeostatic Goals via Flexible Latching

10:20 am – 10:30 am Mark Waser: Discovering the Foundations of a Universal System of Ethics as a Road to Safe Artificial Intelligence

10:30 am – 11:00 am **Coffee Break**

11:00 am – 11:55 am **Technical Session 10: Metrics, tests and roadmaps.** *Chair: Alexei Samsonovich*

11:00 am – 11:20 am Shane Mueller (keynote): Adapting the Turing Test for Embodied Neurocognitive Evaluation of Biologically-Inspired Cognitive Agents

11:20 am – 11:35 am Art Pope: CASTLE: A Framework for Integrating Cognitive Models into Virtual Environments

11:35 am – 11:55 am Daniel Oblinger (keynote): Toward an Adaptive Intelligent Agent

11:55 am – 12:00 pm **Questions**

12:00 pm – 12:30 pm **Panel Discussion III: Metrics, tests, and the roadmap to human-level intelligent BICA.** **Leaders:** *Shane Mueller and Daniel Oblinger.*

**Panelists:** Deepak Khosla, David Noelle, Antonio Chella, Alexei Samsonovich, Ricardo Sanz.

**Agenda:** (i) moving from hypothesis to conceptual measurable to measure to metric; (ii) roadmap.

12:30 pm

**Adjourn**

**All coffee breaks****Poster Session**

Sanford Freedman: Synthetic Cognitive Agent Situational Awareness Components

Christian Huyck: A Neuropsychological Framework for Advancing Artificial Intelligence

Ricardo Sanz: A Principled Approach for Systematic Mind Engineering

Also: Deepak Khosla, Knud Thomsen, Alexei Samsonovich, Joanna Bryson, Wei Chen, Christian Lebiere, Tsvi Achler, Cyril Brom, Brandon Rohrer, Giorgio Ascoli

(posters should be removed by 12:45 pm)

**Sunday, 12:45 pm**

**Organized trip to Spy Museum (by metro): all participants are invited.**



Neighborhood map of the conference location (Westin):

- 1 – Front Page (lunch on Friday),
- 3 – Uncle Julio’s Rio Grande Cafe (lunch on Saturday),
- M – Ballston metro station.

Updated 2008-10-31