International Conference on Development and Learning 2006
Bloomington, Indiana
May 31 – June 3, 2006

PROGRAM
Welcome

We welcome you to the International Conference on Development and Learning 2006 in Bloomington, Indiana!

This is the fifth conference in this series, following highly successful events in 2000 (at Michigan State University in Lansing, MI), 2002 (at MIT in Boston, MA), 2004 (at UCSD/Salk Institute in La Jolla, CA) and 2005 (Osaka, Japan). Each of these previous conferences has made a unique contribution to the emerging fields of development and learning, and has united researchers from a wide spectrum of fields, ranging from developmental psychology to neural networks and robotics. We hope that this year’s meeting will continue this trend and that there will be many fruitful exchanges between participating researchers in this highly interdisciplinary field.

This conference would not have been possible without your paper submissions (in record number this year) and participation. Major sponsorship for the conference was provided by the Office of the Vice President for Research at Indiana University, the IU Chancellor’s Office, the IU College of Arts and Sciences, the IU International Programs Office, and a Training Grant funded by NIH. IEEE provides technical co-sponsorship of the meeting.

This program booklet provides information about the conference venues, dates and times of scientific sessions, and our social events. If you have any questions during the conference please feel free to contact a member of the program committee or a local volunteer.

We hope that you will have a stimulating and exciting time at the conference. Have fun!

Linda Smith (chair)
Olaf Sporns
Chen Yu
Mike Gasser
Cynthia Breazeal
Gedeon Deak
John Weng
**General Program Notes:**

All sessions on May 31, June 1, and June 2 are held in **Woodburn 100, Woodburn Hall**. Woodburn Hall is located at 1100 E 7th Street, 1 block east of the Indiana Memorial Union.

Sessions on June 3 (Saturday) will be held in the **Dogwood Room, Indiana Memorial Union**.

The barbecue party on June 1 will take place at the **Neal Marshal Center**, 275 Jordan Ave., 2 blocks east of the Indiana Memorial Union.

On June 3, 7:30-9:00, there will be a joint ICDL Farewell and ALife Opening Reception at the **IU Art Museum**.

Registration will be open during the entire conference. The registration desk will be staffed all day on Wednesday, May 31, and from 8:00 am – 9:00 am on June 1, 2 and 3. On-site registration will be available on May 31 (all-day) and during lunch breaks on June 1, 2 and 3. Registration packets for pre-registered participants can be picked up at the registration desks at any time during the conference.

Poster Sessions are scheduled for Thursday, June 1, and Friday, June 2. These sessions will be held in the **Georgian Room, Indiana Memorial Union**. Please check in the back of the program for the poster titles that will be presented on these two days. Each poster can only be presented on the assigned date. Posters and poster boards are not numbered, please select any available poster board for your poster presentation. Poster boards are 4×8 foot (approx. 1.2×2.4 meters). Tacks will be available. Poster boards will be ready for installing posters beginning at 8:30 am and posters should be removed by 5:00 pm on the same day. Poster presenters should be present at their posters during the “lunch break and poster session” time periods. Food and drink will be available at the posters.

Poster listings are at the back of this program.

All refreshment breaks, welcome reception, barbecue, dessert buffet, poster lunches, and admission to ALife Opening Reception are included and covered by ICDL registration.

All workshops and special sessions of ICDL and ALife on Saturday, June 3, can be attended by all registered participants of either conference. ICDL participants should please wear their badges for all joint ALife/ICDL events.
<table>
<thead>
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<th>Time</th>
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| 7:15 am - 5:00 pm | Registration  
Conference Lounge, IMU                                      |
| 8:30 am      | Welcome and Opening of the Conference  
Linda Smith (Indiana University, Program Chair) |
| 8:35 am – 10:30 am | Special Session I  
The Dynamic Field Approach to Embodied Cognition: Integrating Insights from Babies, Brains and Bots  
Organizers: John Spencer (University of Iowa), Gregor Schöner (University of Bochum) |
| 8:35 am – 9:05 am | “Dynamic Field Theory: Conceptual Foundations”  
Gregor Schöner |
| 9:05 am – 9:40 am | “Grounding Cognition in the Dynamics of the Brain, Body, and Development”  
John Spencer |
| 9:40 am – 10:05 am | “A Robotic Implementation of the Dynamic Field Theory of Infant Perseveration”  
Evelina Dineva |
| 10:05 am – 10:30 am | “Toward an Embodied Theory of Spatial Language: The View from Above”  
John Lipinski, Larissa Samuelson |
| 10:30 am – 10:50 am | Coffee Break |
| 10:50 am – 12:30 pm | Talks Session I |
| 10:50 am – 11:15 am | “Preferred Views in Children’s Active Exploration of Objects”  
Alfredo Pereira, Karin James, Susan Jones, Linda Smith |
| 11:15 am – 11:40 am | “Flexibility and Stability in Spatial Categorization”  
Alycia M. Hund |
| 11:40 am – 12:05 pm | “Dopamine and the Development of Executive Dysfunction in Autism”  
Trenton Kriete, David Noelle |
| 12:05 pm – 12:30 pm | “Nonlinear Change Models in Heterogeneous Populations When Class Membership is Unknown: The Latent Classification Differential Change Model”  
Ken Kelley |
<p>| 12:30 pm – 2:00 pm | Lunch Break |</p>
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<tr>
<th>Time</th>
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<tr>
<td>2:00 pm – 3:40 pm</td>
<td><strong>Talks Session II</strong></td>
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| 2:00 pm – 2:25 pm | “Infants Learn to Imitate by Being Imitated”  
Susan Jones                                                  |
| 2:25 pm – 2:50 pm | “Children and Adults Rely on Body Parts for Early-Acquired Verbs”  
Josita Maouene, Shohei Hidaka, Linda Smith                       |
| 2:50 pm – 3:15 pm | “Thinking About Thinking in Computers, Robots, and People”  
Daniel Levin, Megan Saylor, Alexander Varakin, Stephen Gordon, Kazuhiko Kawamura, Mitchell Wilkes  |
| 3:15 pm – 3:40 pm | “Perceptual Theory of Mind: An Intermediary between Visual Salience and Noun/Verb Acquisition”  
Amitabha Mukerjee, Mausoom Sarkar                                   |
| 3:40 pm – 4:00 pm | **Coffee Break**                                                               |
| 4:00 pm – 5:15 pm | **Talks Session III**                                                          |
| 4:00 pm – 4:25 pm | “Perseveration as a Developmental Achievement: Lessons from the A-not-B Task”  
Melissa Clearfield, Linda Smith and Esther Thelen                |
| 4:25 pm – 4:50 pm | “The Real-Time and Developmental Dynamics of Position Discrimination”  
Vanessa Simmering, John Spencer, Gregor Schöner                   |
| 4:50 pm – 5:15 pm | “Fast Learning to Recognize Objects: Dynamic Fields in Label-Feature Spaces”  
Christian Faubel, Gregor Schöner                                    |
| 5:15 pm – 5:30 pm | **Break**                                                                     |
| 5:30 pm – 6:30 pm | **Keynote I**  
“Rationalists do it by the Rules – Empiricists do it to the Rules”  
Shimon Edelman (Cornell University)                                |
| 6:30 pm – 8:00 pm | **Welcome Reception**  
University Club President’s Room, 1st floor, IMU  
Wine and Cheese                                                  |
<p>| 8:00 pm         | <strong>End of Day 1</strong>                                                               |</p>
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<td>8:30 am – 5:00 pm</td>
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<td><strong>Dynamics of Development I</strong></td>
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<td>Posters for this session are listed at the back of this program.</td>
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<tr>
<td>8:30 am – 10:15 am</td>
<td>Special Session II</td>
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<td><strong>The Role of Distributed Intelligence in Building a Social Brain</strong></td>
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<td>Organizer: Michael Goldstein (Cornell University)</td>
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<td>8:30 am – 8:55 am</td>
<td>“Collective Behavior in Insects: Mechanisms of Synchronization”</td>
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<td>Emma Despland</td>
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<td>8:55 am – 9:20 am</td>
<td>“Can Biorobotics Help us Understand Behavioral Development?”</td>
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<td>Jeff Schank</td>
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<td>9:20 am – 9:45 am</td>
<td>“Prelinguistic Vocal Development is a Product of Distributed</td>
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<td>Michael Goldstein</td>
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<td>9:45 am – 10:15 am</td>
<td>Roundtable discussion</td>
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<td>10:15 am – 10:30 am</td>
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<td>10:30 am – 11:30 am</td>
<td>Keynote II</td>
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<td><strong>“Social Gateways: Pathways to Learning and Development”</strong></td>
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<td>Meredith West (Indiana University, Bloomington)</td>
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<td>11:30 am – 12:20 am</td>
<td>Talks Session IV</td>
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<tr>
<td>11:30 am – 11:55 am</td>
<td>“Grounded Pronoun Learning and Pronoun Reversal”</td>
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<td>Kevin Gold, Brian Scassellati</td>
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<tr>
<td>11:55 am – 12:20 pm</td>
<td>“Learning About Humans During the First 6 Minutes of Life”</td>
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<td>Nicholas Butko, Ian Fasel, Javier Movellan</td>
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<td>12:20 pm – 2:00 pm</td>
<td>Lunch Break and Poster Session I</td>
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<td>Smoothie Bar, Silver Dollar Sandwiches, and Finger Food</td>
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2:00 pm – 3:00 pm  Keynote III
"From Syllables to Syntax to Symbols: Statistical Learning and the Beginnings of Language Acquisition"
Jenny Saffran (University of Wisconsin, Madison)

3:00 pm – 3:50 pm  Talks Session V
3:00 pm – 3:25 pm  “Infant Dialect Discrimination”
Jennifer Phan, Derek Houston
3:25 pm – 3:50 pm  “Abstraction of Function: The Experiential and Conceptual Foundations of Tool-Use in Human Children”
Gedeon Deak

3:50 pm – 4:00 pm  Coffee Break

4:00 pm – 7:00 pm  Special Session III
Learning, Development and Emotion in Everyday Robots
Organizers: Fumihide Tanaka (Sony), Javier Movellan (UCSD)

4:00 pm – 4:25 pm  Opening
“The RUBI Project: Designing Everyday Robots by Immersion”
Fumihide Tanaka, Javier R. Movellan
4:25 pm - 4:50 pm  “Mechanisms of Social learning: Toward Robots that can Learn from Anyone”
Cynthia Breazeal
4:50 pm - 5:15 pm  “On-line Learning for Covert and Overt Perceptual Capability for Vision-based Navigation”
Zhengping Ji, Xiao Huang, Yuyang Weng
5:15 pm - 5:30 pm  Break
5:30 pm - 5:55 pm  “An Anthropologist in the Children's World: A Field Study of Children's Every-day Interaction with an Interactive Robot”
Hideki Kozima
5:55 pm - 6:20 pm  “Interactive and Social Robots Integrated with Ubiquitous Sensor Systems – Practical Scenarios for the Robot Society –“
Hiroshi Ishiguro
6:20 pm - 6:45 pm  “Unsupervised Learning Methods for Everyday Robots”
Ian Fasel, Javier R. Movellan
6:45 pm - 7:00 pm  Round-Table discussion

7:00 pm – 9:00 pm  Barbecue Party
Neal Marshall Center, 275 N. Jordan Ave. (2 blocks east of IMU at 7th Street)
Ribs, Fried Chicken and Vegetarian Menu

9:00 pm  End of Day 2
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<td><strong>Dynamics of Development II</strong></td>
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<td>8:30 am – 10:15 am</td>
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<td><strong>Toward a Constructivist Account of Development of Perceptual Completion</strong></td>
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<td>Organizer: Matthew Schlesinger (Southern Illinois Univ.)</td>
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<td>Participants: Scott Johnson (NYU), Dima Amso (Cornell Univ.), Matt Schlesinger (Southern Illinois Univ.)</td>
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<td>10:15 am – 10:30 am</td>
<td>Coffee Break</td>
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<td>10:30 am – 11:45 am</td>
<td>Talks Session VI</td>
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<td>10:30 am – 10:55 am</td>
<td>“Mapping Causal Relations in Sensorimotor Networks”</td>
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<td>Olaf Sporns, Jeremy Karnowski, Max Lungarella</td>
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<td>10:55 am – 11:20 am</td>
<td>“Interaction Histories: From Experience to Action and Back Again”</td>
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<td>Naeem Mirza, Christopher Nehaniv, Kerstin Dautenhahn, Rene te Boekhorst</td>
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<td>10:20 am – 11:45 am</td>
<td>“Emergence of Mirror Neurons in a Model of Gaze Following”</td>
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<td>Jochen Triesch, Hector Jasso, Gedeon Deak</td>
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<td>11:45 am – 12:45 pm</td>
<td>Keynote IV</td>
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<td>**“Are We One? On the Nature of Human Intelligence”</td>
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<td>Alex Pentland (MIT)</td>
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<td>12:45 pm – 2:15 pm</td>
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<td>12:45 pm – 2:15 pm</td>
<td>ICDL/AMD Technical Committee Business Meeting (by invitation only)</td>
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**Friday, June 2, 2006 -- PM**

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| 2:15 pm – 5:00 pm | **Special Session V**  
**Synergistic Intelligence: Approach to Human Intelligence through Understanding and Design of Cognitive Development**  
Organizer: Minoru Asada (Osaka University) |
| 2:15 pm - 2:40 pm | "Synergistic Intelligence towards Human and Humanoid Science"  
Minoru Asada |
| 2:40 pm - 3:05 pm | "Physio-SI: A Dynamics Based Approach to Humanoid Science"  
Koh Hosoda |
| 3:05 pm - 3:30 pm | "Perso-SI: A Cognitive Developmental Approach to Humanoid Science"  
Yasuo Kuniyoshi |
| 3:30 pm - 3:55 pm | "Socio-SI: An Interactive System Approach to Humanoid Science"  
Hiroshi Ishiguro |
| 3:55 pm - 4:20 pm | "SI-Mechanism: A Neurocognitive Science Approach to Human and Humanoid Science"  
Kenji Ogawa |
| 4:20 pm - 5:00 pm | Panel on "How can SI Contribute to Understanding Leaning and Development in Human and Humanoid?" |
| 5:00 pm – 5:15 pm | Coffee Break |
| 5:15 pm – 6:30 pm | **Talks Session VII** |
| 5:15 pm – 5:40 pm | “Transparency and Socially Guided Machine Learning”  
Andrea Thomaz, Cynthia Breazeal |
| 5:40 pm – 6:05 pm | “Learning Through Multimodal Interaction”  
Chen Yu, Hui Zhang, Linda Smith |
| 6:05 pm – 6:30 pm | “Self-Development Framework for Reinforcement Learning Agents”  
Andrea Bonarini, Alessandro Lazaric, Marcello Restelli, Patrick Vitali |
| 6:30 pm – 8:00 pm | Dinner on your own (please consult conference information for dinner options in and around the IMU) |
| 8:00 pm – 10:00 pm | **Evening Panel Discussion**  
Mathers Museum, 601 E 8th Street (2 blocks northwest of IMU)  
**Why Development Matters**  
Giorgio Metta, Cynthia Breazeal, Linda Smith  
*Dessert Buffet, Beverages and Bar* |
| 10:00 pm | End of Day 3 |
Saturday, June 3, 2006 -- AM

Note: All registered participants of ICDL can visit all workshops (ICDL and ALife) on this day. Please wear your ICDL badges. Special Sessions are held in the Dogwood Room of the IMU.

8:30 am – 5:00 pm  Registration (see program notes)
Conference Lounge, IMU

8:30 am – 12:30 pm  Special Session VI
Development and Incremental Learning in Perceptual Systems
Organizers: John Weng (MSU), Zhengyou Zhang (Microsoft )

8:30 am – 8:55 am  “Establishing an Appropriate Learning Bias through Development”
Vinod K. Valsalam, James A. Bednar, Risto Miikkulainen

8:55 am – 9:20 am  “Optimal In-Place Self-Organization for Cortical Development: Limited Cells,
Sparse Coding and Cortical Topography”
Juyang Weng and Matthew D. Luciw

9:20 am – 9:45 am  “Knowledge-based Learning with KBCC”
Thomas R. Shultz, François Rivest, László Egri, Jean-Philippe Thivierge

9:45 am – 10:10 am  “Knowledge Transfer in Learning to Recognize Visual Objects Classes”
Li Fei-Fei

10:10 am – 10:35 am  “Learned Attention”
John K. Kruschke

10:35 am – 11:00 am  “What Can I Control?: The Development of Visual Categories for a Robot’s Body
and the World that it Influences”
Charles C. Kemp, Aaron Edsinger

11:00 am – 11:25 am  “Behavior-Based Segmentation of Demonstrated Tasks”
Nathan Koenig, Maja J Mataric

11:25 am – 11:50 am  “Semantic Based Learning of Syntax in an Autonomous Robot: Preliminary
Results”
Matthew McClain, Stephen Levinson

11:50 am – 12:15 pm  “Learning Situation Models for Understanding Activity”
James L. Crowley, Olivier Brdiczka, Patrick Reignier

12:15 pm – 12:40 pm  “Perception of Social Interest”
Alex Pentland, Anmol Madan, Jon Gips

12:40 pm – 2:00 pm  Lunch Break
2:00 pm – 5:30 pm  **Special Session VII**  
**Classifying Activities in Manual Tasks**  
Organizer: Rod Grupen (Univ. Mass.)

2:00 pm  
Opening Remarks by Rod Grupen

2:10 pm – 2:35 pm  
“Modeling Reaching and Manipulating in 2- and 3-D Workspaces: The Posture-Based Model”  
A. Rosenbaum, Ruud G.J. Meulenbroek

2:35 pm – 3:00 pm  
“Towards a Vocabulary of Primitive Task Programs for Humanoid Robots”  
Evan Drumwright, Viktor Ng-Thow-Hing, Maja Mataric

3:00 pm – 3:25 pm  
“Learning Grasp Affordances through Human Demonstration”  
Andrew Fagg, Charles de Granville, Joshua Southerland

3:25 pm – 3:45 pm  
Break

3:45 pm – 4:10 pm  
“Imitation Learning of Hand Manipulation”  
Emanuel Todorov

4:10 pm – 4:35 pm  
“Manipulation Manifolds: Explorations into Uncovering Manifolds in Sensory-Motor Spaces”  
Chad Jenkins, Alan Peters, Bobby Bodenheimer

4:35 pm – 5:00 pm  
“Robot Manipulation of Human Tools: Autonomous Detection and Control of Task Relevant Features”  
Aaron Edsinger, Charles C. Kemp

5:00 pm – 5:30 pm  
“Improving Grasp Skills Using Schema Structured Learning”  
Robert Platt, Roderic Grupen, Andrew Fagg

5:50 pm – 7:00 pm  **Keynote V**  
**Joint ICDL/ALife Keynote**  
Welcome and Opening Remarks by Luis Rocha (Alife Program Chair) and Michael Dunn (Dean, School of Informatics, IU)

“Mechanisms of Social Learning Applied to Interaction”  
Cynthia Breazeal (MIT)  
School of Fine Arts Auditorium 015, Showalter Fountain

7:30 pm – 9:00 pm  **ALife Opening Reception, ICDL Farewell Reception**  
IU Art Museum, Showalter Fountain

9:00 pm  
End of Day 4  
End of Conference
ALife X Workshops – see www.alifex.org and www.alifex.org/program/

9:00 am – 5:30 pm Full Day Workshops

**Morphologies, Motion and Cognition**
Organizers: Fernando Almeida e Costa, Ian Macinnes

**Evolution of Complexity**
Organizers: Carlos Gershenson, Tom Lennaerts

**Neurodynamic Methods for Analysis and Control of Cognitive Behaviors**
Organizers: Robert Kozma, Anil Seth, Jun Tani

9:00 am – 12:30 pm Half Day Workshops and Tutorial

**Artificial Autonomy**
Organizer: Xabier Barandiaran, Kepa Ruiz-Mirazo

**Modeling Environment Construction**
Organizer: Peter Todd

**Computational Chemistry for Self-Organization (Tutorial)**
Hideaki Suzuki

2:00 pm – 5:30 pm Half Day Workshops and Tutorial

**Machine Self-Replication**
Organizer: William Buckley

**Molecular Information Processing in Nature**
Organizer: Peter Willis

**The Complete Idiot’s Tutorial to In Theorio, In Silico, and In Vivo Computation (Tutorial)**
Christof Teuscher

For more detailed information please consult the ALife X program.
**Poster Session I**

**Thursday, June 1, 8:30 am – 5:00 pm**

“Feature Discovery in Object Individuation”  
Shohei Hidaka, Jun Saiki

“The Effects of Practice on Limb Segment Dynamics in a Whole-Body Task”  
S. Lee Hong, Karl M. Newell

“Neocortical Self-Structuration as a Basis for Learning”  
René Doursat, Elie Bienenstock

“Development of Language: The Role of Early Negative Parenting Beliefs”  
Zohreh Yaghoub Zadeh, Nancie Im-Bolter

“Adaptive Responance Situtated for Speech-Like Pattern Learning and Synthesis”  
Michael Brady

“Speed of Processing, Time, and Inference in the Attentional Blink: Application to Children”  
Nicholas A. Badcock, Mike Anderson, Janet Fletcher, & John Hogben

“Symbol Emergence by Combining a Reinforcement Learning Schema Model with Asymmetric Synaptic Plasticity”  
T. Taniguchi, T. Sawaragi

“Developmental Construction of Intentional Agency in Communicative Eye Gaze”  
Takeshi Konno, Takashi Hashimoto

“The Role of Motion in Maternal Bimodal Naming to Preverabal Infants”  
Dalit J. Matatyaho, Lakshmi J. Gogate

“The Perceived Intentionality of an Audience Influences Action Demonstrations”  

“How Adults Acquire Children’s Representation of Numerical Magnitude”  
John. E. Opfer, Jeffrey M. DeVries

“REM-II: A Model of the Developmental Co-Evolution of Episodic Memory and Semantic Knowledge”  
Shane T. Mueller, Richard M. Shiffrin

“Sensory-Motor Development in Early Robot Learning”  
M.H. Lee, Q. Meng
“Toddler’s Understanding of Others’ Intentions during Pretense: How it Shifts from Following the Action to Actively Sharing Make-Belief Objects”
Miki Kakinuma

“Determining Infant Fricative Discrimination across Test Sessions: Is Memory a Wrench in the Works?”
Jonathan Ting, Joseph P. Smith, Derek M. Houston

“Taking a Parallel Approach to the Development of Sociality”
Jennifer L. Miller, Andrew P. King, Meredith J. West

“Learning Transitive Argument Structure”
Nitya Sethuraman, Linda B. Smith

“Imitation Learning for Reaching in Virtual Reality Environments”
Nigel Singh, Emanuel Todorov

“The Role of Prelinguistic Vocalizations in Vocal and Social Development”
Julie Gros-Louis

The Role of Number, Similarity, and Individuation in Children’s Acquisition of the Plural”
Jennifer A. Zapf

“Beyond Association: Social Cognition in Word Learning”
Magdalena Bugajska, Nicholas Cassimatis

“Activation of Sensory-Motor Areas by Sentences”
Rutvik Desai, Jeffrey R. Binder, David A. Medler, Lisa L. Conant, Mark S. Seidenberg

“Social Interaction Contributions to Visual Spatial Performance in Preschool Children”
Yvette R Harris, Lin Ye, Jessica Prescod

“Post-it Power: Using Non-Linguistic Labels to Help Children Notice Relations”
Ji Y. Son, Linda B. Smith

“Research on Robot Learning and Development in China”
John Weng, Wengqiang Zhang, Xiangyang Xue, Min tan, Zhiqiang Cao, Shuo Wang, Daxue Liu, Xiangjing An, Henping Sun, Hangen He, Quixin Cao, Yanwen Huang, Jingliang Zhou, Leibin Yu, Jianda Han, Yuechao-Wang
Poster Session II

Friday, June 2, 8:30 am – 5:00 pm

“Assessment of Mental Models in Cognitive Disability: Use of Fuzzy Cognitive Mapping Techniques”
Michael D. McNeese, Karl Perusich

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