Discussion Topics from the Twenty-Ninth Soar Workshop June 25, 2009

I. Topics Discussed

A. *Potential use cases for Soar-SMem*

B. *Extensions to Soar's infrastructure to encourage and facilitate use*

C. *Extensions to the Soar architecture*

II. Potential Use Cases for Soar-SMem

A. Natural language problem (NLP)

1. Instruction taking
2. Narrative generation/narrative understanding

B. Object identification and induction

- More generally, perception tasks requiring the storage and recall of symbolic representations

C. Reasoning systems (declarative reasoning)

1. Knowledge intensive tasks (KLONE)
2. E.g., medical prognosis (RN-Bot)

D. Creating a Soar submission for the Turing test

E. Ontology Tasks

1. Ontology mapping and schemas
2. Ontology generation

F. Develop a Chat-Bot for a simplified game world (e.g., WOW)

1. Explore summarization and knowledge generation from texts
2. Potentially explore a twitter application

G. Developing agents capable of explicit analogical learning and reasoning

H. A cooking task (Iron Chef-Soar)

III. Extensions to Soar's infrastructure to encourage and facilitate use

A. Extension types discussed

1. *Extensions for experts*
2. *Extension for novice and intermediate developers*
3. *Extensions and initiatives to generate excitement and interest in Soar*

B. Extensions meant to support experts

1. Support the development of data based rules from activation tables that map automatically
2. Create an editing environment that allows for the direct control of objects (Alice/Kodu for Soar).
3. Develop an "undo" function in Soar
   a) Snapshot/rollback
   b) Chunking, RL, and GDS functionalities, however, pose challenges to a basic capture/replay approach
4. Develop an o-supported add/remove function
5. Develop simple meta-commands for debugging.
6. Incorporate block comments into Soar

C. Extensions for novice and intermediate developers

1. Make the Soar engine available online for users to upload, run, and test models without installing the kernel.
2. Incorporate features into the High Level Symbolic Representation language (HLSR) that support social modeling—in other words, help model other people and their goals
3. Further incorporate HCI principles into future versions of HLSR's and Herbal's user interfaces
4. Release more integrated/inclusive packages that support applied research areas such as robotics

D. Extensions and initiatives to generate excitement and interest in Soar

1. Develop a 1 to 3 week teaching module for undergraduates
    a) Featuring an exciting environment and agent (e.g., Mario-Soar)
    b) Or, a Soar agent tailored for a simple off-the-shelf robot to show students what Soar can do in the physical world
    c) Essentially the goal being, "After only a week, I can already do this very cool thing with computers. Wow!"
2. Attempt to establish an undergraduate Soar (maybe Soar/ACT-R) workshop built around simple/exciting projects, like developing a Mario agent or developing an agent for a simple robot (Robby the Robot)
    a) Collaborate with multiple universities to attract students and funding
    b) Serve as another way to foster collaboration and interest in Soar
3. Sponsor an exploratory interdisciplinary workshop that illustrates how cognitive architectures generally and Soar specifically might offer insights to a range of problems related but not exclusive to cognitive science

IV. Extensions to the Soar architecture

A. Develop a data mining function that pulls from episodic memory to support semantic memory

B. Allow Soar to automatically generate predictions/expectations from episodic memory, and inferences in SM and EpMem.

C. Develop analogy boxes

1. Analogy detection
2. An episodic memory match algorithm that would include more than episodic memory, and be capable of mapping relationships between concepts
3. Support Bayesian like networks (conditional beliefs)

D. Model Attention

E. Incorporate probabilistic/partial rule matching

1. Probabilities associated with working memory elements
2. SM/WME/PAction

F. Add support for T of M

G. Develop a (non-speech) auditory interface

H. Develop and refine default RL rules

1. Consider if these rules are sufficient to support semi-appropriate actions without an extensive series of state changes arising from an initial random choice
2. Consider if this human capacity is better captured through elaborations to the architecture or through rules

I. Incorporate working memory decay

J. Revisit EPIC-Soar to better model embodiment

1. Incorporate visual attention
2. Implement Fitts Law

K. Bounding Soar—guaranteed response times for real time applications