Review #2

Proposal Number:	0705154
Performing Organization:	Pace University
NSF Program:	Robust Intelligence
Principal Investigator:	Benjamin, David P
Proposal Title:	RI: Collaborative Research: Cognitive Robots: Integrating Perception, Language and Problem Solving in Behavior-based Robots
Rating:	Good

REVIEW:

What is the intellectual merit of the proposed activity?

The authors propose to build a unified cognitive architecture for mobile robots by combining three elements: a schema-based language called RS, the Soar system, and methods from algebraic linguistics that exploit self-similarity. A detailed implementation plan is given.

A major problem with this proposal is the symbolic nature of the representations and computations. The authors propose that linguistic structure unifies perception, action and problem solving. This is questionable with regard to perception and action. Most animals on the planet have well-developed perception and action systems while humans are the only species known to use linguistic representations. Furthermore, humans with damage to language-related brain areas are still perfectly capable of perceiving and acting. The modern approaches to perception and action are continuous in nature, and rely on probabilistic inference and control theory respectively.

The innovation in this proposal is unclear. Both RS and Soar already exist. It seems that most of the work being proposed involves software implementation, with limited research component. The proposal to exploit self-similarity sounds interesting in principle, but without concrete examples and more formal explanation it is hard to tell if it is just a vague idea or something more substantial. In general, the proposal suffers from lack of concrete examples and preliminary results. Given the poor scaling of traditional AI systems, I would like to see some encouraging preliminary

results to be reassured that the present system will not suffer the same fate. The authors discuss a vision system (which did not sound as original as advertised). Computer vision systems are very advanced these days, and it is unacceptable to propose a new one without detailed comparison to the state-of-the-art.

What are the broader impacts of the proposed activity?

The authors will develop new interdisciplinary courses. A number of women are involved in their research. The development of robots with cognitive abilities can benefit society, in particular by assisting disabled people. Software modules will be developed.

Summary Statement