Review #1

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:	Fair

REVIEW:

What is the intellectual merit of the proposed activity?

The CMU Soar problem-solving architecture lies at the center of the proposed work. Soar is to be integrated with the schema-based language RS that deals with actions; it is an integral part of NL-Soar, their natural language system; and it is central to their vision system.

And therein lies the principle weakness of the proposal: everything is biased toward looking at the world through Soar spectacles, which means every problem is a problem solving problem. Soar advocates are biased toward answers centered on operators, subgoaling (a widely used idea predating Soar), and chunking (nee macro operators).

To the degree that representations and constraints are addressed, Soar is a programming language, not a model of cognition, and as programming languages go, Soar has little to recommend it.

The discussion of vision, for example, talks about selecting operators when emerging blobs require recognition as if selecting an operator were the essence of the vision problem. In the classic papers of Marr, and in the papers of highly respected contemporary vision researchers, there is no evidence that progress is blocked by unsolved problems in operator selection.

The shepherding example they propose to use for demonstration features a physical Tower of Hanoi variant. It is hard to understand what the Tower of Hanoi aspect has to do with perception and language, so it is hard to understand why it is so prominent in their demonstration goals. And blocks have been pushed around since Shakey pushed them, so it is unclear what is demonstrated by having a robot push blocks around. The connection between performance and the immense pile of mechanism that they proposed to use to produce the performance is so many-to-many it would be impossible to know how to connect success to principle.

What are the broader impacts of the proposed activity?

The investigators focus on contributions toward the

development of interdisciplinary work, on underrepresented groups and women, on helping the handicapped, and on various dissemination mechanisms.

Summary Statement

The investigators propose to develop an architecture in which perception, problem solving, and natural language work together to solve problems. They cite the inability of robots to handle complex tasks and tasks unanticipated by their designers as motivators.

And therein lies the principle strength of the proposal: a realization that flexibility requires problem solving to have intimate connection to vision and language.

Unfortunately, the expectation raised on the first pageùthat the proposal would address the questions asked and answered by vision and languageùbecomes the disappointment of learning that the proposal is about using Soar as a programming language in areas where its value is questionable at best.

Another weakness is the absence of a discussion of specific questions to be addressed in the work. The discussion is too general. They tell us on the first page that they are going to examine the interrelationship between perception, problem solving, and natural language, but leave it to our imagination to determine what might emerge from such an examination

and they leave it to our optimism to suppose that something will.