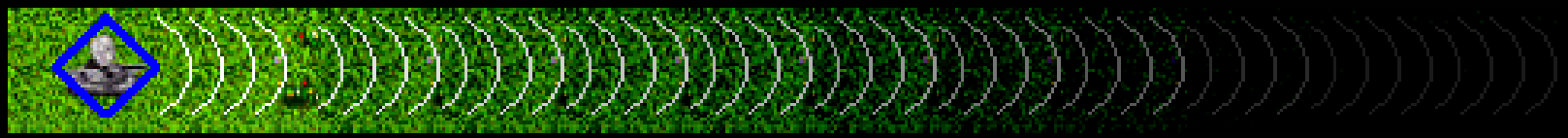
Status of Long-Term Learning in Soar



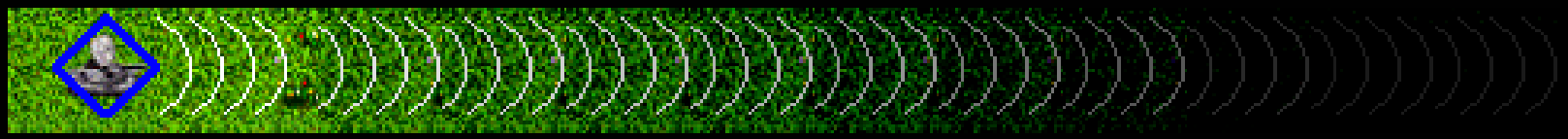
Bill Kennedy

George Mason University

20th Anniversary Soar Workshop

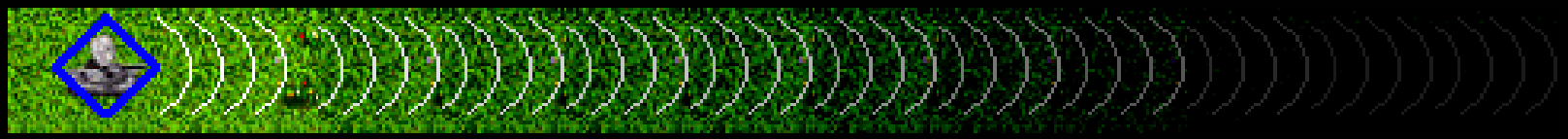
Friday, June 27, 2002

Long-Term Learning Fundamental Questions



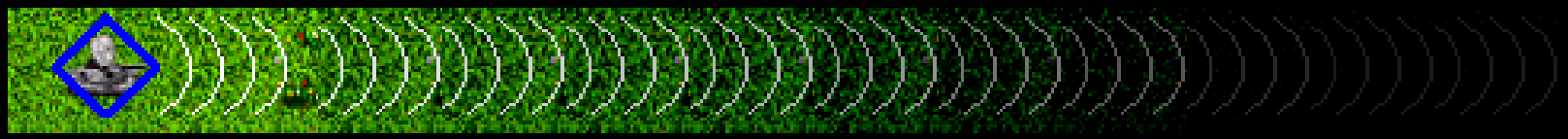
- Will learning go on forever?
- How much of learned knowledge is used?
- Can we use understanding of chunk use to improve performance?

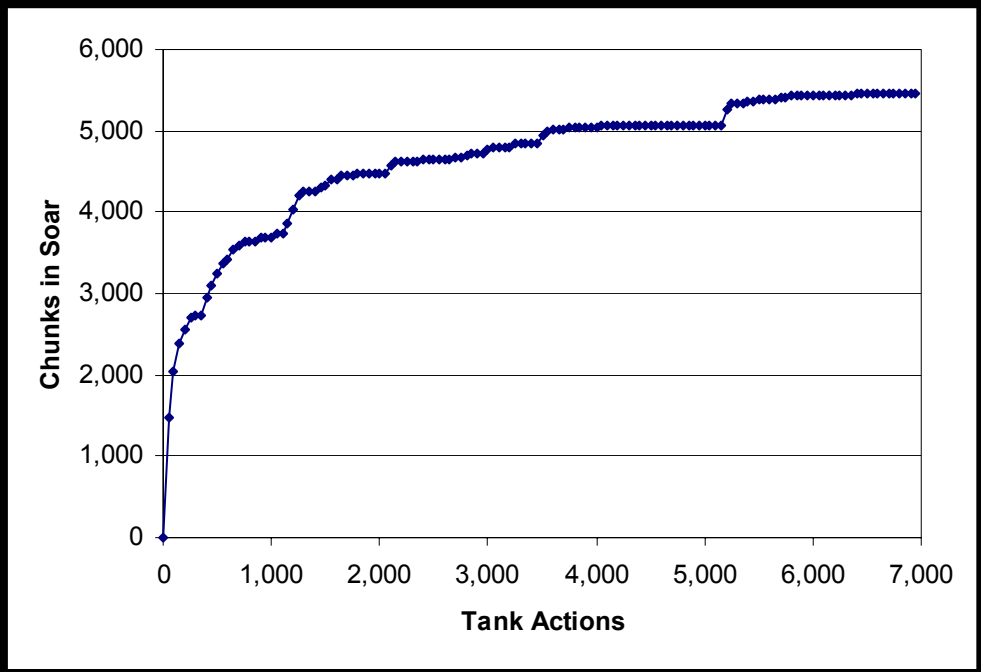
Experimenting with John Laird's Planning Bot



- Experimental design:
  - John's planning bot vs. a simple bot, run for twice the default period
  - Excise chunks based on the gap between uses
  - Monitor performance . . .

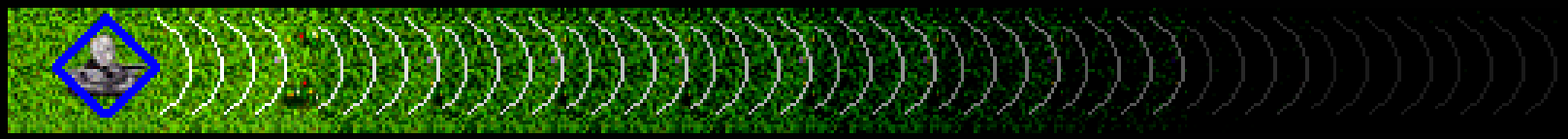
Experiments with Planning Bot over the long-term

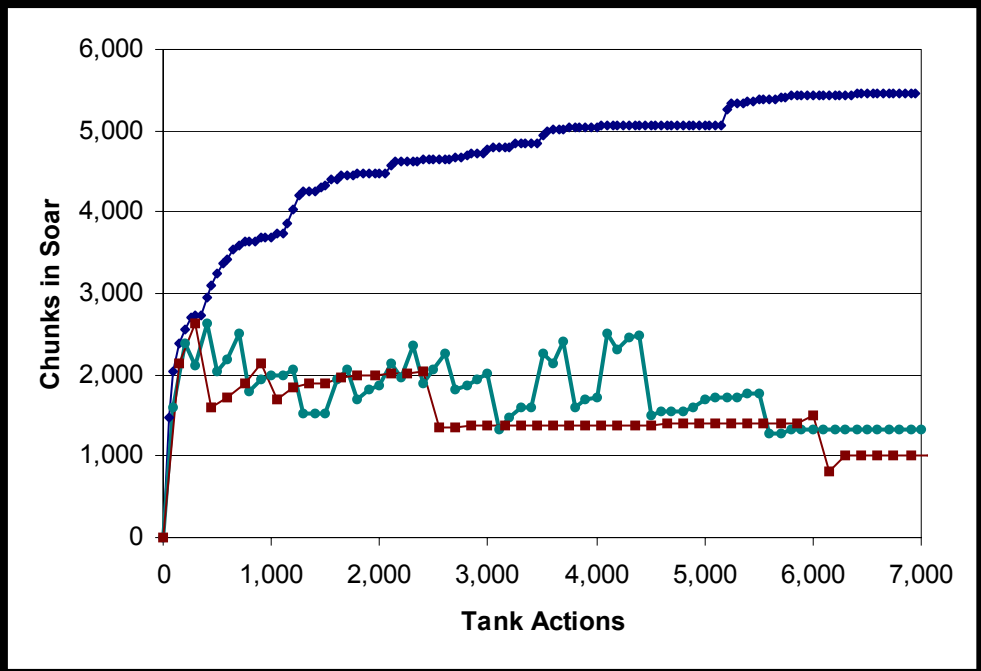




Learning continues, but it's slowing. . .

Experiments with Planning Bot over the long-term



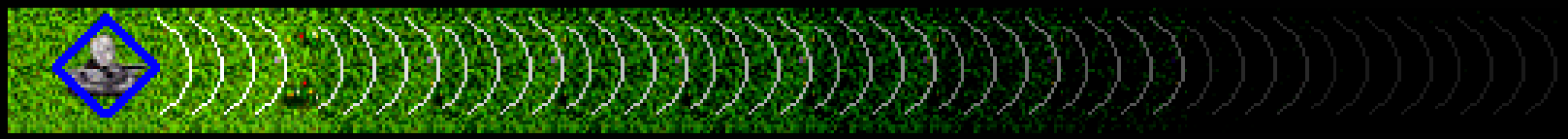


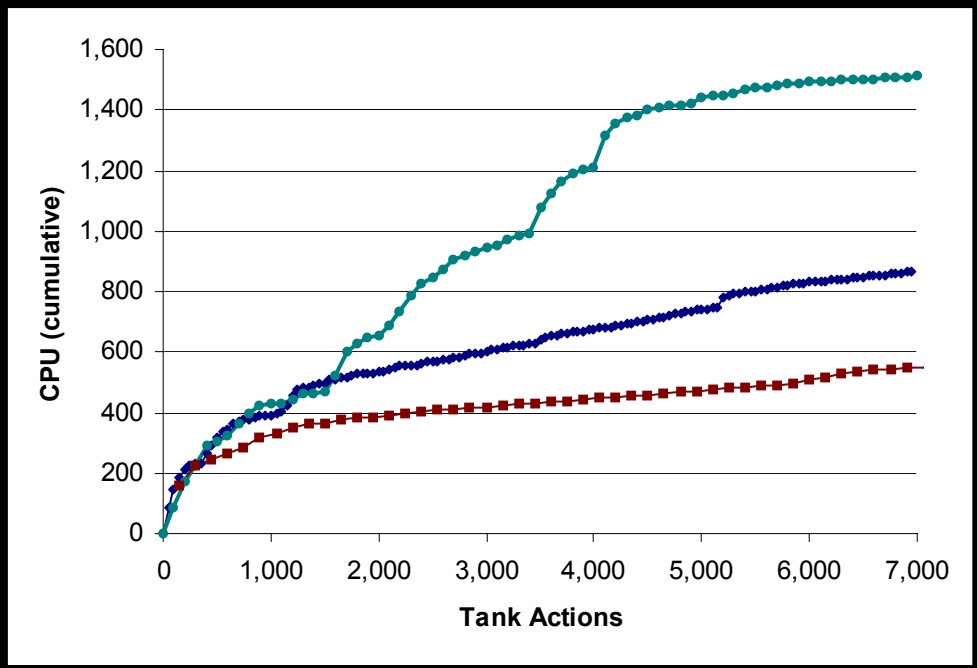
🡐 Learning without excising

🡐 Excising with 500DC gap

🡐 Excising with 5,000DC gap

Experiments with Planning Bot over the long-term

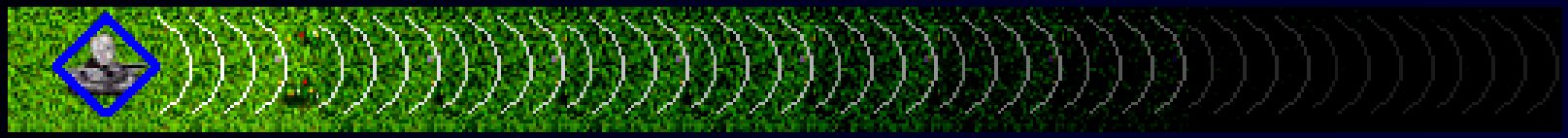


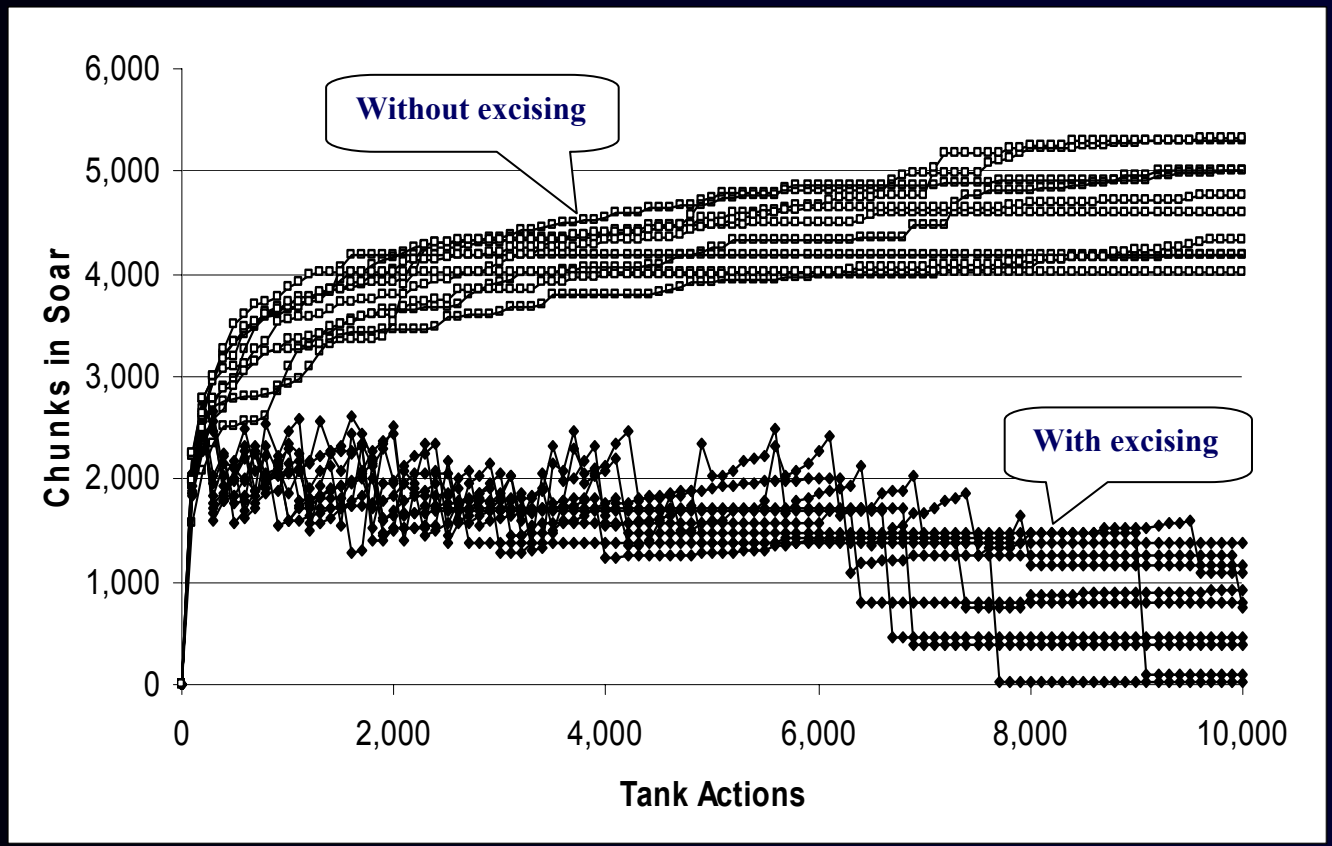


- Excising with 500DC gap
- Learning without excising
- Excising with 5,000DC gap

Chunks in TankSoar

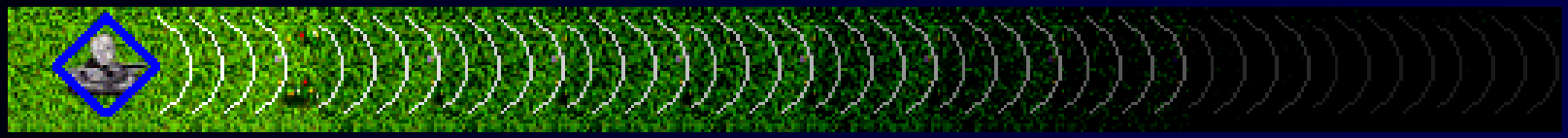
(10 runs with same environmental seed)

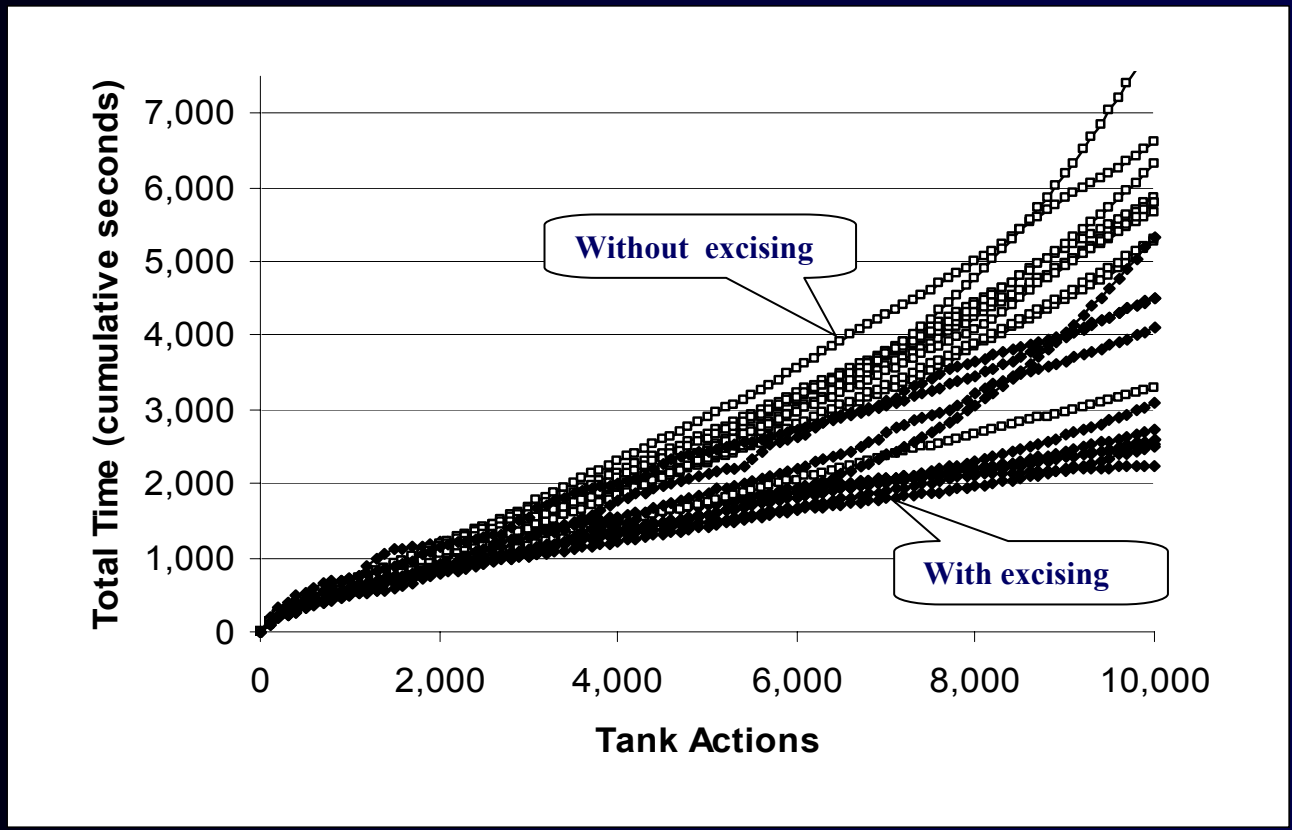




Total CPU Time

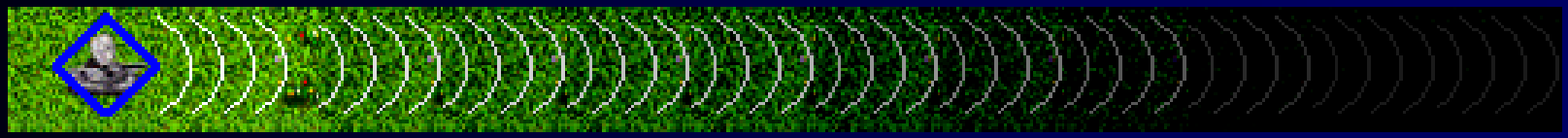
(10 runs with same environmental seed)

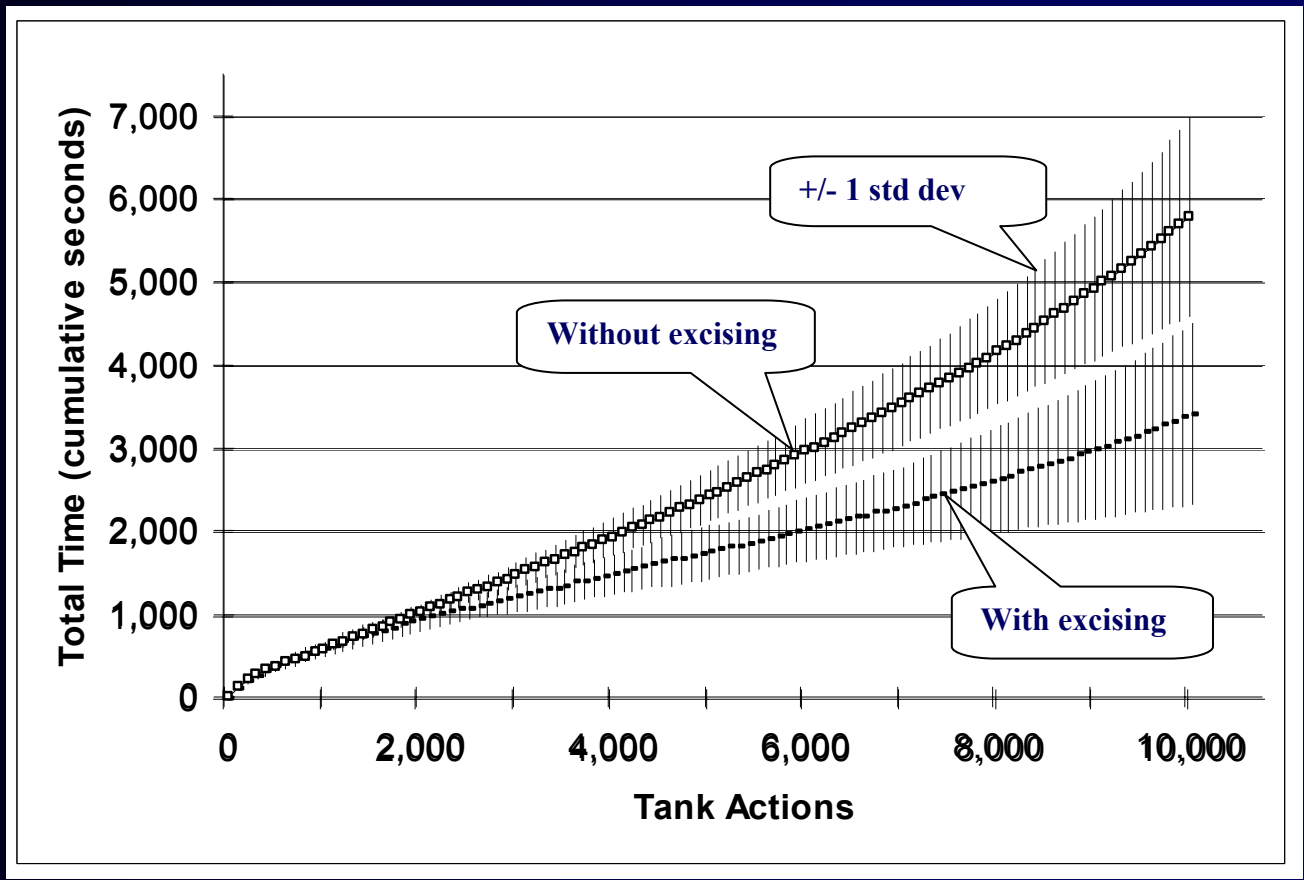




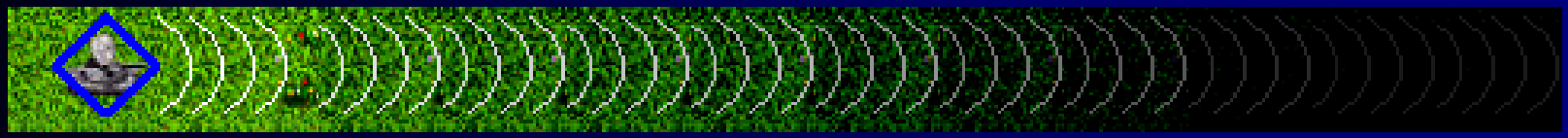
Significant Difference in CPU Time

(10 runs with same environmental seed)



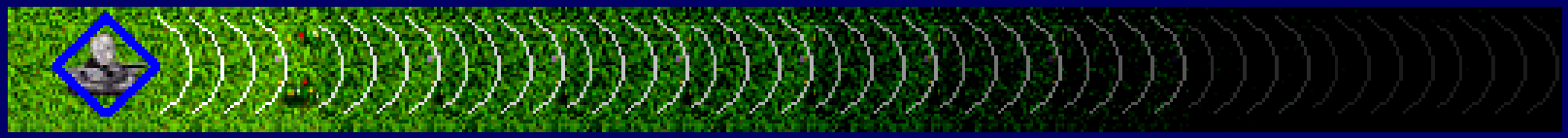


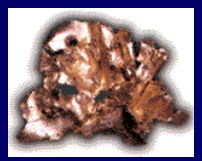
Implications for Soar and the Unified Theory of Cognition



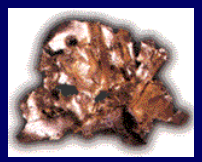
- Why does Soar learn low-use chunks?
- What/why are the patterns in chunk use?
- Do other symbolic learning systems exhibit similar behavior?
- Is forgetting a necessary part of a theory of cognition?

Nuggets & "Lump of Coal"

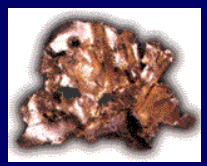




Publishable: Phinally Done



Publishable: ICML paper with Soar in title



Soar in Windows is very portable

Excising chunks in Soar not easy