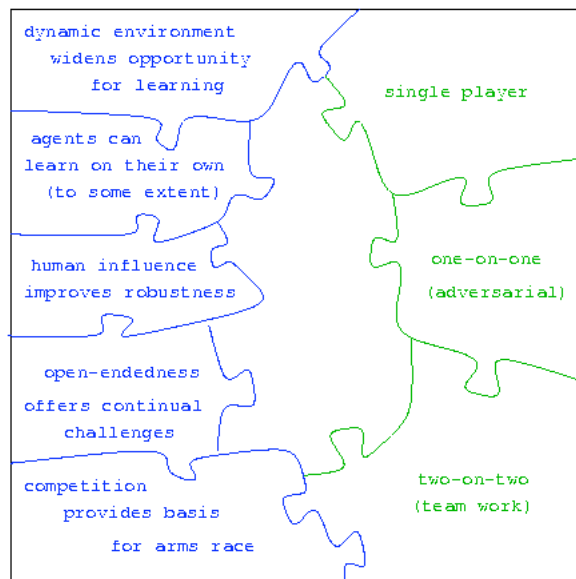
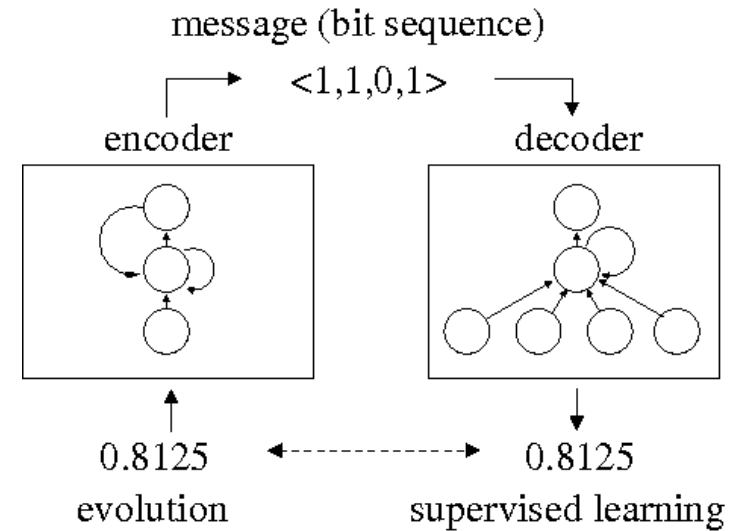


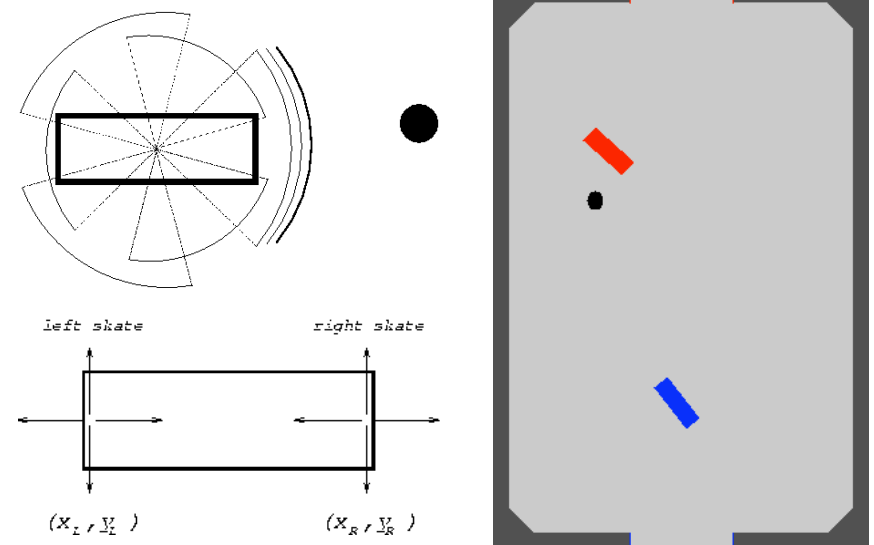
Meta-Game of Learning

- Co-evolution tends to provide an opponent of appropriate ability
- generally helps to escape local optima
- however, can create new “mediocre stable states” (collusion)

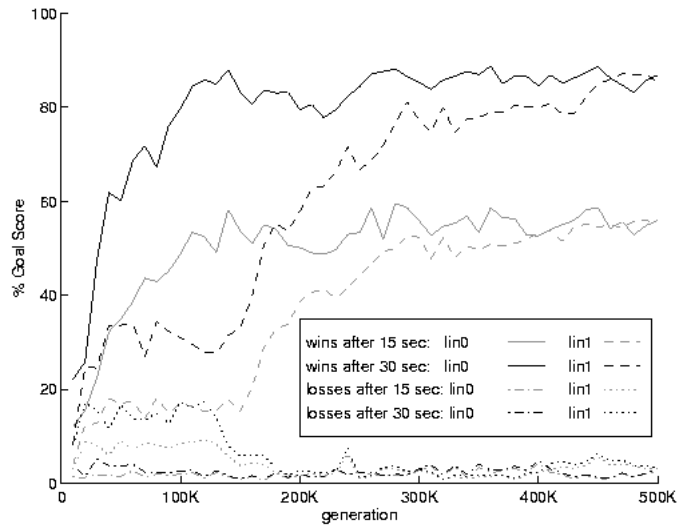
Language Games



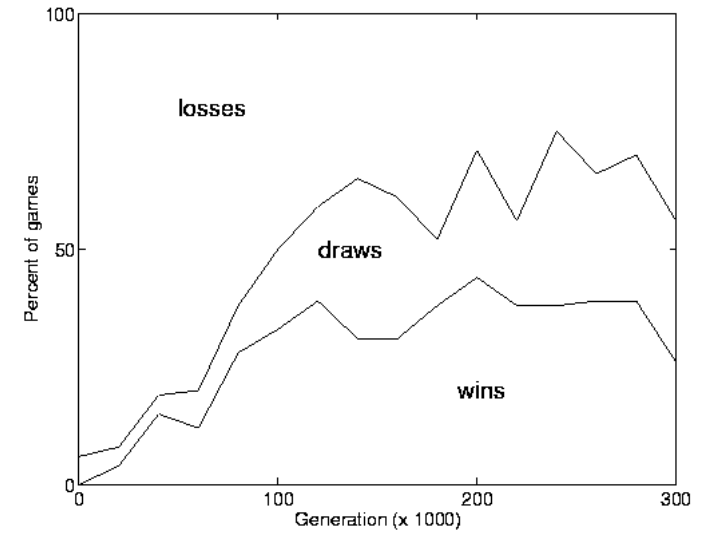
Simulated Hockey



Shock Results (single player)

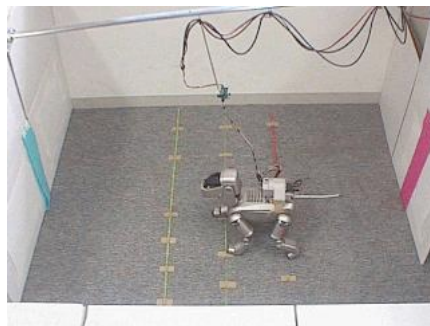


Shock Results (one-on-one)



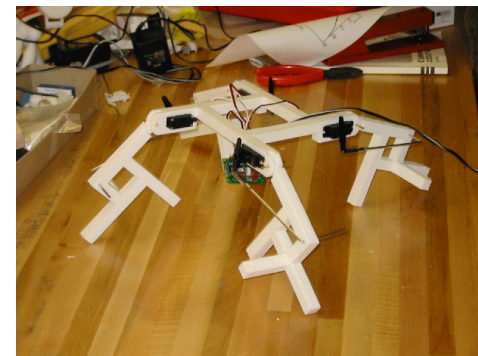
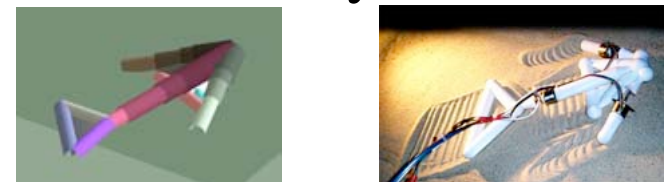
Evolutionary Robotics

- too many generations - robot may get worn out



- start in simulation, refine on real robot

Brain/Body Co-evolution



Biped Walking

- dynamically stable gait
- evolved parameters
- start on fast approximate simulator
- refine on slow accurate simulator

Future Directions

- massive parallelism
- modularity and evolution
- credit-assignment problem
- society / economic models