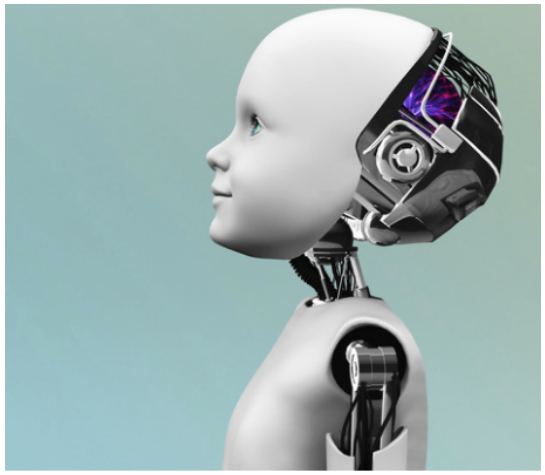
I have the best job…

- I get to get up in the morning and think about whatever interests me
- Smart interests me
- Since people are the best model we have for that, I watch people a lot
- And then I use the best of what they have to offer… to build minds



I work by asking questions…

- What does it mean to be an expert?

  An expert does things faster and better than the rest of us [D'Andrade 1990]

- Where do experts come from?

  They are not born that way [Ericsson 1993]

  Learning is the hallmark of human intelligence

- If you want a computer to be an expert, is it enough to just build it with what we know?

  No

Real-world problems are filled with uncertainty, noise, and change

- Can you be a real expert at more than one thing?

  Sometimes

Here's what I think about expertise

- The way to become an expert is by solving problems
- The way to prove you are an expert is to solve both hard and easy problems
- My intuition is that expertise
  - Capitalizes on a synergy among many good reasons for taking actions
  - Requires multiple useful descriptions of the world
  - Requires multiple clever ways to learn

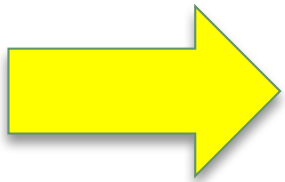
What does it take to build an expert?

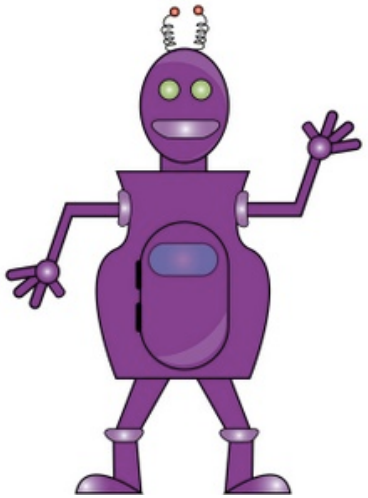
- Find good problems
- Start simple
- Run lots of experiments
- Analyze the results carefully
- …and repeat

Fun problems

Good reasons

Learning algorithms





Experts that learn

- Hoyle plays board games as well or better than the best humans
- Ariadne travels in mazes too hard for people
- FLO creates layout designs for urban parks
- ACE solves constraint satisfaction problems
- FORRSooth helps patrons find library books
- SemaFORR guides robots

Want to know more?

- SCI 110 Brains, Minds, and Machines = cognitive neuroscience + cognitive psychology + AI
- CSCI 350 Artificial intelligence
- CSCI 353 Machine learning

- ...and then there's my lab, where workstations run 24/7, developing expertise

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Intelligent agents

- Given a set of possible actions, an intelligent agent makes a decision
- An intelligent agent exists in a sense-decide-act loop
- Smart artifacts don't just make good decisions, their behavior improves with experience = learning

Do forever
    Sense the world
    Select an action
    Execute that action