

Interactive Task Learning: Report on NSF Workshop

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Major contributions by
Shiwali Mohan and James Kirk

Thanks to NSF

Workshop Purpose

Explore *Interactive Task Learning* as a research problem and take the first steps to build a community of researchers interested in pursuing it.

NSF Workshop on Taskability

- May 12-13, 2014: Ann Arbor, MI

Attendees:

John Anderson (CMU), Ken Forbus (Northwestern U),
Kevin Gluck (AFRL), Chad Jenkins (Brown), John Laird (UM),
Christian Lebiere (CMU), Dario Salvucci (Drexel),
Matthias Scheutz (Tufts), Andrea Thomaz (Georgia Tech),
Greg Trafton (NRL), Robert Wray (Soar Tech)

Scribes:

Shiwali Mohan (UM), James Kirk (UM)

Interactive Task Learning

- Agent learns new task specification from natural interaction.
 - Not just a *fixed policy*, but the task formulation: goals, constraints, ...
- Agent comprehends task description, and then attempts task.
- Improves task performance through experience and human interaction.

- Learns new tasks from scratch
- Dynamically extend tasks and customize existing tasks
- Eliminate programming

- Example applications:
 - Robots: Personal, commercial, military robots, ...
 - Virtual agents in immersive training environments
 - Personal assistants
 - Automated cognitive model experimentation

What isn't Interactive Task Learning?

- ~~Interactive~~ Task Learning
 - Offline/batch learning of new tasks:
 - Task specification languages (TAQL, HERBAL, HLSR, GDL)
 - No human in the loop:
 - Learn task definition by exploration or observation
- Interactive ~~Task~~ Learning
 - Learn to improve on task with advice, but don't learn task specification/formulation
- Interactive Task ~~Learning~~
 - Take commands but don't learn new tasks

Desiderata

D1. Learning Competent

D1.1. Reasoning competence in task learning

D1.2. Learning competence in task learning

D2. Task Competent

D3. Task General

D4. Easy to Teach

D4.1 Accessible communication

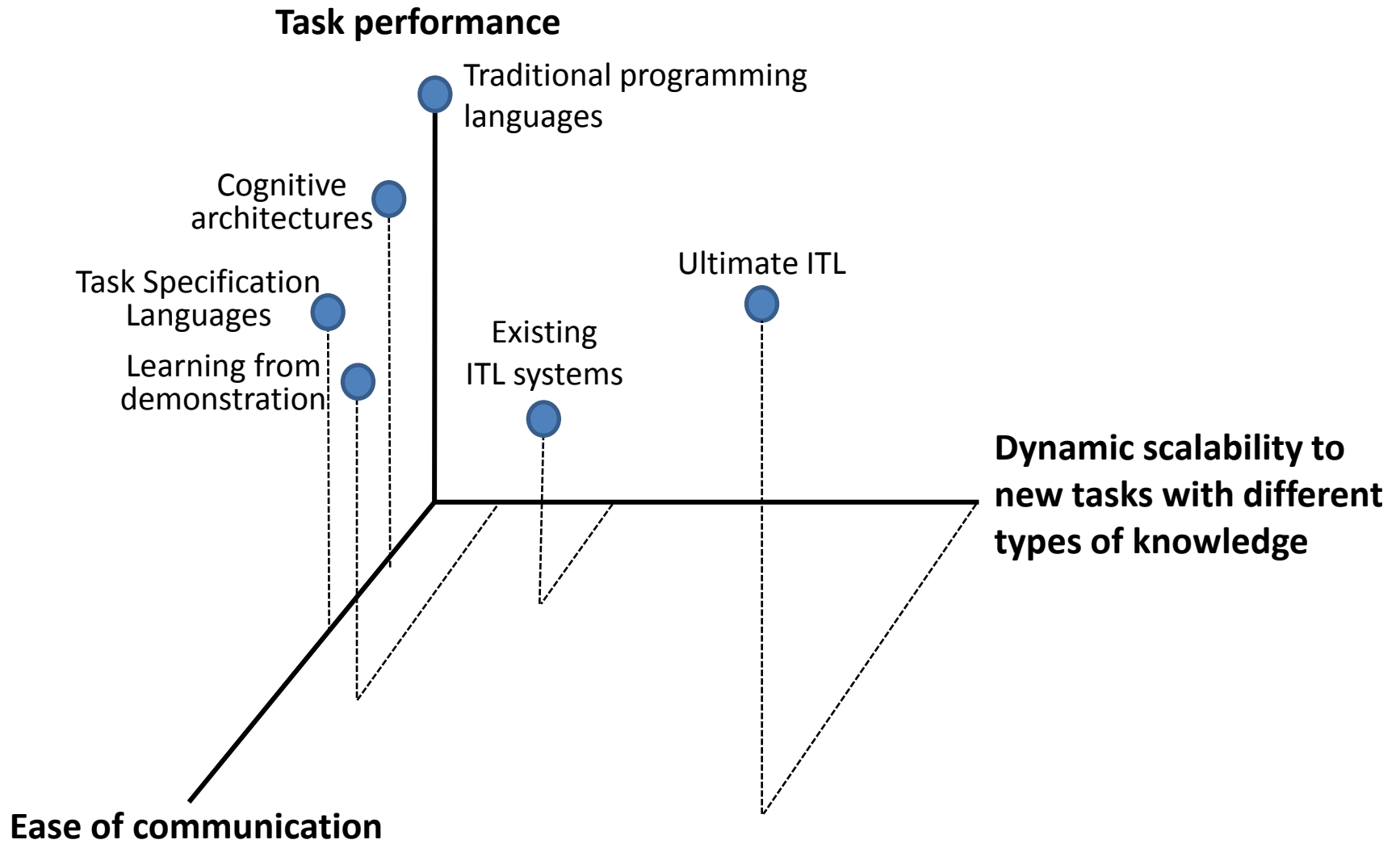
D4.2 Efficient communication

D4.3 Robust to error

D5. Efficient Execution

D6. Integrates well with other Agent Activities

D7. Application-specific desiderata



Possible Research Domains

- [Games and Puzzles](#)
- Collaborative Robotics
 - Personal, medical, industrial, military
- Personal Assistants (Siri)
- Virtual Training Agents
- Cognitive Science Research

Lots of Taxonomies whose Variations Impact Interactive Task Learning

- Types of tasks
- Types of knowledge to be learned
- Types of interaction
- Characteristics of agents
- Characteristics of environments
- Characteristics of teachers

Community Building

- Future workshops
 - Closed: Planning and strategizing – NSF, ISAT, ???
 - Open: Research results – AAI, ICCM, ACS
- Funding opportunities
- Available resources
 - Knowledge bases
 - Domains
 - Simulation/robot environments
 - Games and Puzzles
 - Cognitive architectures
- Publications: Planned article for AI Magazine

Nuggets and Coal

- Nuggets
 - Important problem for AI, Cognitive Science, Robotics
 - Lots of enthusiasm:
 - Many people starting to work on this problem, but still wide open
 - Potential for collaborative efforts
- Coal
 - Funding for large scale projects will be a challenge