How Minds Work
IDA and her Architecture

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Who is IDA?

IDA is an intelligent, autonomous software agent that does personnel work for the US Navy
Introducing IDA

An intelligent software agent capable of entirely automating human information agents

• Customer Service Agents
• Travel Agents
• Insurance Agents
• Loan Officers
IDA Negotiates

IDA negotiates with clients in natural language—English
IDA Accesses Databases

IDA locates and understands information from databases
IDA Adheres to Policies

IDA understands and adheres to numerous company policies
IDA Makes Decisions

IDA makes sophisticated decisions involving deliberation and constraint satisfaction
IDA Produces a Product

IDA can produce useful products

- Airline tickets
- Loan papers
- Insurance policies
IDA Generates Hypotheses

IDA generates hypotheses about how minds work to guide cognitive scientists and neuroscientists.
IDA: an Intelligent Distribution Agent

Dialogue with sailors
Read personnel data
Check job requisition lists
Enforce Navy policies
Choose options to offer members
Negotiate with them about jobs
IDA works for the US Navy

• Funded by Office of Naval Research & other Navy sources—$1.5m

• IDA, an intelligent software agent, uses locally developed cutting edge Artificial Intelligence technology to
  – Model human cognition—the science side
  – Negotiate with sailors in everyday English about new jobs—the engineering side
IDA finds jobs for sailors

- Communicates with sailors in English via email
- Selects jobs to offer a sailor, taking into account
  - the Navy’s policies and needs
  - the sailor’s preferences
- Deliberates about feasible dates
- Negotiates with the sailor about job selection over the course of several emails
How does IDA read emails?

- Read sailor emails and extract pertinent data

Date: Tue, 09 Jan 2001 16:53:23 +0000

From: Robert A. Valens <rvalens@navy.mil.us>

Subject: new job

IDA,

I am approaching my 9 month PRD window. Please find me a job. My SSN is 545769801. It would be just great if you can find something in Norfolk.

Thanks,

AK3 Valens
How does IDA gather data?

• Gather necessary data from Navy formatted databases
  - Personnel
  - Job Requisitions
  - Training
  - Rollovers
  - AutoCost (PCS cost calculator)
How does IDA rate jobs?

- Evaluate jobs for sailors
  - Fitness values from IDA’s workspace

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How does IDA deliberate?

• Create and Adjust Job Transition Timelines

  Detach date, Take up month, and Training (if needed) are put in first
  Next, Leave time is put in
  If Training is needed, then travel time to the school is added
  Finally, Travel time to the job is calculated to determine when the sailor will arrive.

  Timeline is displayed as dates are adjusted
IDA: a ‘conscious’ software agent

- Autonomous Agent
- GW Theory
- Conceptual Model
- Computational Model
## IDA’S Modules and Mechanisms

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<th>Mechanism</th>
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IDA’s Architecture

Metacognition

- Database Perception
- Constraint Satisfaction
- Deliberation
- Negotiation
- Problem Solving

Behavior Net

- Perception
- ‘Consciousness’

- Working Memory
- Episodic Memory
- Emotions

- Expectation & Automatization

- Running code
- In Development
- Designed

HMW: IDA and her Architecture
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Cognitive Cycle Processing

• Hypothesis— Like IDA’s, human cognitive processing is via a continuing sequence of Cognitive Cycles

• Duration— Each cognitive cycle takes roughly 200 ms with steps 1 through 5 occupying about 80 ms

• Overlapping— Several cycles may have parts running simultaneously in parallel

• Seriality— Consciousness maintains serial order and the illusion of continuity

• Start— Cycle may start with action selection instead of perception
IDA Project Accomplishments

• Funding - ~$1.5m from ONR & Navy sources
• Publications—past five years
  – 12 Journal articles or book chapters
  – 15 Refereed conference presentations
• Degrees completed—past five years
  – 10 Masters
  – 5 Ph.D.’s
• Numerous invited & contributed presentations
## Current IDA Projects

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Is IDA Conscious?

IDA is functionally ‘conscious’, but what about subjective experience?

Is IDA the world’s first conscious artifact?
Readings in *Artificial Minds*

- Pandemonium Theory
  pp. 234-244
- Copycat Architecture
  pp. 347-362
- Schema Mechanism
  pp. 314-324
- Sparse Distributed Memory
  pp. 330-344
- Behavior Networks
  pp. 244-258

*MIT Press, 1995*
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