ARTIFICIAL INTELLIGENCE

An Overview

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Albuquerque Retired Lispers

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Chomsky Says

Chomsky makes a similar distinction between competence and performance grammars.

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2. Science is an endeavor that produces testable and falsifiable hypotheses about the world then performs the experiments.
   - One must define the world and testable.
   - The tests for competence and performance AI are different.
   - To be fair, we don't know enough today to define intelligence or test for it, thus, psychology, educations, neurology, etc., are in the same boat as AI.

Associated Science Areas

Psychology	education, cognitive, hermeneutics
Philosophy	epistemology, ontology, logic
Education	learning, organization of knowledge
Operations Research	algorithms, goal formation, search
Mathematics	models, proof theory, symbolization
Linguistics	communications, models, representations
Mechanical Engineering	effectors, adaptation, etc.
Control Theory	feedback, adaptation, approximation
Physiology	sensors, effectors, infrastructure
Neurology	natural models, fusion, organizations
Computer Science	everything

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- Practical Stuff — sensors, effectors, etc.

Some Limited Successes

Areas where AI has done well:

- Computer Vision
- Speech Understanding
- Diagnostic Systems
- Robotics
- Game Playing

- Symbol Manipulation
- Expert Systems
- Scheduling/Automation
- Language Understanding
- Chemical Structures

Status

AI did not solve these problems; Rather it provided new insights, methods, and novel tools that are used in other's homerooms were progress continues.

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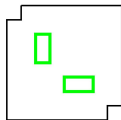
The Aler's Lament

When we finally know how to do it better, it's no longer AI.

Representation Makes a Big Difference

A Tough Problem

Remove two diagonally opposed corners from an 8×8 board. Can it be completely covered by 1×2 and 2×1 tiles?

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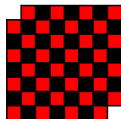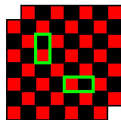Color it as a checker board—alternating red and black squares.

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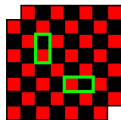Color it as a checker board—alternating red and black squares.

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Conclusion

Insights about proper representations can make huge differences in the easy with which problems in a domain are solved.

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Satisficing

Find sharp enough needle: Need statistics on density of sharp enough needles in areas of the haystack

Attribution of Intelligence

Observation

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Question/Agenda

Does complex behavior, even that which we believe requires intelligence, need an esoteric explanation or will simple rules applied in a complex environment provide an adequate explanation?

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Reality Check

To what degree do you know calculus, politics, English grammar, chess, or company policy? Would you require more/less of an artifact to attribute knowledge?

A View of Computation

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Payroll Package	Question Answering
Knowledge of employees, tax laws, organizations, salary, etc.	Knowledge of grammar, meaning, domain rules, etc.
Objects to represent the above and current/next state.	Objects to represent language, parses, entities, domain rules.

Both examples are systems that represent external objects, perform operations on the interior objects inside the computation, then communicate facts about the interior representation—basically, a simulation.

Almost Hierarchical Organizations

Simon Says

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- It is necessary to deviate from strict hierarchy to provide efficient functionality. (Parable of the new pencil.)
- AI provides a large repertoire of tools to build almost hierarchical systems. This is one of its most interesting contributions.

Learning

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- A truly intelligent artifact could be educated.
- Can we be its mentor/evauator?

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Moore asked, "Who is Merlin's mommy?"

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McCarthy — Lisp

Systems that can inspect and reason about there own state.

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Berliner — Chess and Backgammon

The father of computer chess and creator of an automation that won an international backgammon tournament.

AI Time Line and Focus

Early Days

Strong AI
Ignore limitations
Everything in play

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Today
Military relevance
Power, $\neg$ knowledge
Math based

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- Much if not most of current progress is based on cycle exploitation, not theoretical breakthroughs. It's been a long time since a single dissertation has made a large competence statement. How long since you've read a dissertation?

The Final(?) Word

Dan Cohen Says

AI is a very promising technology. It always has been and always will be!

Jeff Says

Amen! Oh, wait a minute.