

The General Problem Solver (GPS)

- 1957

A milestone in AI history
By Rebecca Borski



The inventors Allen Newell and Herbert A. Simon

(<https://www.informit.com/articles/article.aspx?p=3100062&seqNum=3>)

History of GPS

- Invented by Herbert Simon, J.C. Shaw and Allen Newell in **1957-1959 (RAND Cooperation)**

Milestone:

- First program that was intended to solve any general problem

What is GPS?

The General Problem-Solver (GPS) is a computer program being used for explorations both into the general mechanisms involved in problem-solving and into the way humans solve problems. As its name indicates, there is both an aspiration that GPS should be capable of handling a wide range of tasks and the fact the GPS's organization is task independent in many respects.

Source: [A GUIDE TO THE GENERAL PROBLEM-SOLVER PROGRAM GPS-2-2](https://stacks.stanford.edu/file/druid:zk239tp3547/zk239tp3547.pdf), Allen Newell
(<https://stacks.stanford.edu/file/druid:zk239tp3547/zk239tp3547.pdf>)

How does GPS work?

- **PSSH: physical symbol system hypothesis**

- symbols are the key to general intelligence
- a crucial component of human understanding: connecting symbols
- our language, ideas, and concepts are really large collections of connected symbols

- **Means-ends analysis (Code)**

- **define the goals:** e.g., take my son to nursery school
- **define preconditions for the goals:** e.g., the precondition for dropping my son off at nursery school is that my son is at home and the car works
- **define the means ("operators") for turning one set of conditions into another:** e.g., to ensure the car repair shop has my money, we can define an operator "give shop money" that changes the world so that "shop has money" is true and "I have money" is false.

Criticism & Outcome

Peter Norvig, *Paradigms of artificial intelligence programming*, (1992):

- It can suffer from a "combinatorial explosion" of possibilities.
 - **E.g.: jump off cliff, land safely:** first find a way to achieve "jump off cliff," but only once achieved, figure out how to "land safely."

John Searle (1980):

- intelligence could not be defined as the mere act of connecting symbols
 - As response to the assertion that computers think he developed the chinese room experiment

Sources:

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<https://stacks.stanford.edu/file/druid:zk239tp3547/zk239tp3547.pdf>

<http://web.cse.ohio-state.edu/~stiff.4/cse3521/gps.html>

<https://www.slideshare.net/RahatUllah13/lecture-3-general-problem-solver>