General Problem Solver

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General Problem Solver or **G.P.S.** was a computer program created in 1959 by Herbert A. Simon, J.C. Shaw, and Allen Newell intended to work as a universal problem solver machine. Any problem that can be expressed as a set of well-formed formulas (WFFs) or Horn clauses, and that constitute a directed graph with one or more sources (*viz.*, axioms) and sinks (*viz.*, desired conclusions), can be solved, in principle, by GPS. Proofs in the predicate logic and Euclidean geometry problem spaces are prime examples of the domain the applicability of GPS. of predicate logic theorems. It was based on Simon and Newell's theoretical work on logic machines. GPS was the first computer program which separated its knowledge of problems (rules represented as input data) from its strategy of how to solve problems (a generic solver engine). GPS was implemented in the third-order programming language, IPL.

While GPS solved simple problems such as the Towers of Hanoi that could be sufficiently formalized, it could not solve any real-world problems because search was easily lost in the combinatorial explosion. Put another way, the number of "walks" through the inferential digraph became computationally untenable. (In practice, even a straightforward state space search such as the Towers of Hanoi can become computationally infeasible, albeit judicious prunings of the state space can be achieved by such elementary AI techniques as alpha-beta pruning and min-max.)

The user defined objects and operations that could be done on the objects, and GPS generated heuristics by Means-ends analysis in order to solve problems. It focused on the available operations, finding what inputs were acceptable and what outputs were generated. It then created subgoals to get closer and closer to the goal.

The GPS paradigm eventually evolved into the Soar architecture for Artificial Intelligence.

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See also [edit]

- Solver (computer science)

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