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## The frame problem (268/250 words)

John McCarthy and Patrick Hayes discovered the frame problem in 1969. The problem concerns representing the effects of actions in logic-based artificial intelligence. Formal logic is used to define facts about the world, such as a car can be started when the key is placed in the ignition and turned and that pressing the accelerator causes it to move forward. However, the latter fact does not explicitly state that the car remains on after pressing the accelerator. To correct this, the fact must be expanded to "pressing the accelerator moves the car forward and does not turn it off." However, the fact must be augmented further to describe many other scenarios (e.g., that the driver also remains in the vehicle). Therefore, the issue in logic is about constructing facts without enumerating thousands of trivial effects.

After its discovery in artificial intelligence, the frame problem was adopted by philosophers. Their interpretation of the problem might be better named the world update problem as it concerns updating frames of reference. For example, how do you know your dog (or other pet) is where you last saw them without seeing them again? Thus, in a philosophic sense, the frame problem concerns how well a person's understanding of their surroundings matches reality and when should their notion of their surroundings change. Intelligent agents will need to address this problem as they plan actions in progressively more complex worlds.

Numerous solutions have been proposed to solve the logic version of the frame problem. However, the philosophic problem is an open issue. Both need to be solved for artificial intelligence to exhibit intelligent behavior.

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**See also**: John McCarthy; Patrick Hayes; Daniel Dennett; Jerry Fodor [if in encyclopedia]

**Further Reading**

Shanahan, Murray 2016. "The Frame Problem", *The Stanford Encyclopedia of Philosophy* Edward N. Zalta (ed.).