

# Autonomous Goal Reasoning: Status and Challenges

**David W. Aha**

Head, Adaptive Systems Section  
Naval Research Laboratory (Code 5514)  
Washington, DC; USA  
david.aha@nrl.navy.mil | <http://home.earthlink.net/~dwaha>

Maryland Metacognition Seminar  
Friday, 8 June 2012  
12:00pm

## Abstract

The Navy (and the DoD more generally) seeks to increase the autonomous capabilities of some of its systems (e.g., unmanned air, land, (sea) surface, semi-submersible, and undersea vehicles) while they operate in complex environments with increasingly infrequent human guidance. Steady progress has been made during recent decades; for example, many systems now perform automated path planning and obstacle avoidance, among related tasks. But currently deployed systems act cautiously; they react with default “cease current actions and wait” behaviors whenever unexpected situations arise during their missions, and require operator input for further instruction. These systems would be far more valuable if they could dynamically and competently respond to such situations *without* requiring operator input. In some cases, this requires significant reasoning about the mission being performed (e.g., objectives and their measures of performance/effectiveness), the system’s role within that mission, its environment (including resource availabilities and costs, other agents, and rules of engagement), and the system’s status and its abilities. In short, meta-reasoning is centric to the DoD’s near-future plans, and this is an extraordinarily exciting, ambitious, and worrisome time for AI research pertaining to autonomous UxVs that requires close collaboration with researchers in other disciplines (e.g., HCI, psychology, OR, high assurance systems, ethics). In this talk, I’ll summarize this motivating context and our modest research on what I refer to as *goal reasoning*, which concerns the ability for agents to dynamically self-select their goals. I’ll also discuss some challenges for future research.

*This work is the result of inspiration and collaboration with many researchers, including Michael Cox, Matthew Molineaux, Héctor Muñoz-Avila, Ulit Jaidee, Matthew Klenk, Jay Powell, Mark Wilson, Ugur Kuter, and Ben Weber.*

## Bio

David W. Aha (UCI, 1990) leads the Adaptive Systems Section within NRL’s Navy Center for Applied Research in Artificial Intelligence. His research interests include goal reasoning, case-based reasoning, mixed-initiative interaction, machine learning, planning, text analysis, and related topics pertaining to intelligent decision aids. He was a AAAI Councilor, founded the UCI Repository of Machine Learning Databases, co-founded the AI Video Competitions, and has received three Best Paper awards. David (co)organized 24 international research events, (co)edited three special journal issues on AI topics, participated on 14 dissertation committees, serves on the editorial boards for three journals, and serves annually on the PCs for several conferences, workshops, and doctoral symposiums.