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Giving Up for No Good Reason

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A Task Analysis of Giving Up

Why do we order the extra thick enchilada with double cheese, only to toss half in the garbage? Why would we walk out on a film if we had read its reviews? When do we stop trying to start the car and call the tow truck instead? These are a few examples of *giving up*, which we define as the reasoning surrounding the choice to end one activity and pursue another. Giving up appears to incorporate aspects of discovery, surprise, deliberation, diagnostic reasoning, and exhaustion in the face of unresolved problems, all integrated into a judgment call. Giving up is clearly a multi-faceted phenomenon that can shape our overall behavior, yet it is poorly studied in the psychological literature.

As a first step towards understanding "giving up", we conduct a task analysis in the manner of Newell & Simon (1972). We summarize this analysis in Figure 1.
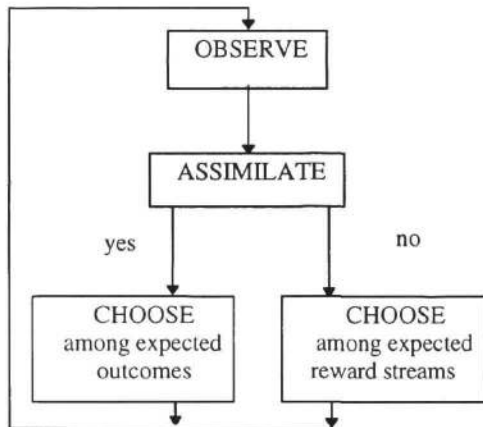

Figure 1: A Task Analysis of Giving Up

The principle representational elements of the analysis are actions and plans, while the operational elements are observation, assimilation, and choice. An action is a rule of the form: "when in situation P, do action A to achieve effects E". It captures the expectation that E will be true once A has been performed. A plan is a set of actions, intended to accomplish some effect. Its most common representation is a goal/subgoal tree. Observation is the act of perceiving the current state of the world. Since there are an infinite number of possible percepts, observation must be selective. Assimilation is the process of interpreting those percepts relative to a plan for action. In artificial agents, assimilation is often a simple indexing function from observed state to relevant action. In people (and in some agents), assimilation includes augmenting the plan to find a response for a novel situation. Assimilation is successful when it identifies one or more relevant actions. It is unsuccessful when it does not yield an action that connects the current situation (via a plan) with the desired objective.

We define giving up as the explicit choice to abandon one course of action in favor of another. If assimilation is successful, the choice can rely on the comparison of anticipated outcomes. Systems like SOAR (Newell 1990) act in this way when giving up on subgoals. If assimilation is unsuccessful the basis for such rational choice is unclear, yet people clearly operate in such circumstances. We identify a mechanism for giving up, called "giving up for no good reason", that bases choice on estimated reward streams and requires only a partial knowledge of future state.

We examine this model of giving up by implementing it within an artificial agent that extends the ICARUS system (Langley 1997). Our design strongly pursues the metaphor of decision theoretic, rational choice, using an adaptation mechanism that adjusts expected values for whole plans given unassimilated (but value laden) observations. We have tested this model in several domains, and conclude that (1) the ability to give up for no good reason improves system performance, and (2) that the tendency to give up is dependent upon the rate of divergence between expected value and received reward. This last point provides a testable prediction regarding human behavior.

References

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