

Reusing Cognitive Coping Strategies

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Abstract. This position paper presents ideas on how people’s decisions in critical situations can be analyzed, modeled and reused for predicting an experience-based decision process in the future. Based on discussions on mental models with developmental psychologists we introduce how new scientific findings can be supported by tools and how the outcomes can be transferred to new Artificial Intelligence (AI) methodologies.

1 Motivation

Based on their experiences and their personal development, humans are able to cope with critical situations in various ways. Based on the literature of developmental psychology, there are three groups of coping strategies in which a person’s behavior can be characterized when dealing with a critical situation: assimilation strategy, accommodative strategy, and immunization strategy [2]. A critical situation can be described as a situation where the plan of achieving a certain goal is upset caused by an unexpected event. Following an *assimilation strategy* the person accepts the challenge of the critical situation and tries to fight against it in order to achieve a goal. An *accommodative strategy* would be that the person accepts the new situation and changes the goal so it fits the new situation. Following the *immunization strategy*, a person just ignores the critical situation and continues as nothing ever happened. The questions we would like to answer are:

1. Which factors influence the selection of the strategy?
2. Based on previously handled critical situations: How is the coping strategy implemented dealing with a current problem?

We base our research on the hypothesis that various coping strategies are in some kind of competition and, depending on the available information about

a situation as well as past experiences, the selection is influenced. It can be considered as a market place where supply and demand affect a particular price at a certain time. This scenario can be compared with a critical situation a person has to deal with (demand) and the possible solutions that are available (supply). More precisely, we are describing a monopsony where one buyer faces many sellers. As well as in economy the buyer, in our case the problem of a person, dictates the terms. The terms can be seen as coping strategies that put certain solutions into favor. However, the provided solution must be available on the market, fit the expectations, and successfully compete against other solutions to be selected. We are also looking for approaches how solutions are adapted by humans in order to win the competition.

2 Methodology

Looking back to the roots of Case-Based Reasoning, especially Roger Schank's work [5], psychology always played a major role in further developing (new) ideas in AI. Based on the research conducted by developmental psychologists, we are looking for an approach for modeling and understanding cognitive processes. Our goal is the identification of the driving mechanisms and its resulting behavior. Simulating the coping strategy selection, as in the previously described market place scenario, should be the result of our work. To achieve this we will develop a workbench for psychologists to collect and analyze cases. A psychologist should be able to model a case about a person dealing with a critical situation supported by information technology. Our interest beyond providing the workbench is learning how psychologists analyze people's behavior and transferring the generalized methodologies in algorithms. Following the *Lazy Modeling* [1], we will analyze how the psychologists create cases using general and specific knowledge. During that process we will also acquire new knowledge if there are uncovered areas in our knowledge base. Further we aim at identifying which features influence decisions and how a competitive selection strategy based on experiential knowledge is defined. The implementation of the psychologists workbench is a scientific challenge, because it has to meet the following expectations:

(1) General and situation-aware, context-specific knowledge has to be modeled by experts from a different research area. This *experiential knowledge* is important for dealing with complex examples which will probably comprise many insights in human behavior. Further we think this type of knowledge is varying by example.

(2) The workbench has to support the expert (psychologist) entering cases. Further missing and incomplete knowledge should be identified as well as new knowledge has to be producible (*knowledge acquisition*).

(3) The workbench should be aware of the work flows and processes a psychology scientist does and be able to explain inference processes on demand (*explanation-aware work flows*).

(4) The inference process should be *generalizable* and also be explainable on the generalized level.

(5) We expect a high variation of examples and the level of detail will differ from case to case. The knowledge processing mechanisms have to be flexible to cover both (*interoperability between levels of detail*).

(6) The analogy, which occurs during the discovery and adaption of coping strategies, has to be operationalized, so the findings are reusable in future situations.

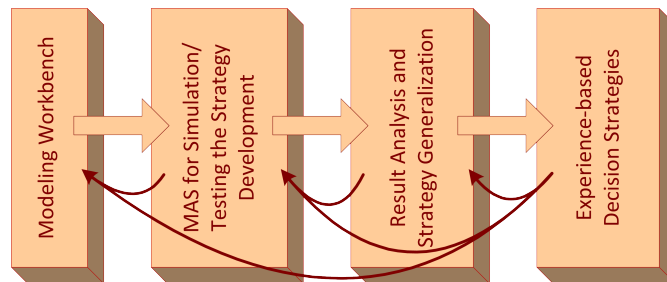


Fig. 1. Strategy Development Process

Figure 1 shows the development steps we are following in order to determine adaptable, experience-based decision strategies on different levels. This bottom-up approach should lead us to transfer human behavior in AI methodologies by providing a *modeling tool* for psychologists, evaluating the created model in a *market place simulation* implemented as a Multi-Agent-System (MAS) from which we plan to *generalize* from the domain dependent strategies in order to create *experience-based decision strategies* which do not depend on the domain.

The ideas presented in this position paper are based on previous works in this area, e.g. [3, 4].

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