

# Developing EBDI agents

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## ABSTRACT

BDI (Belief Desire Intention) cognitive framework has become a popular tool to design intelligent agents. Particularly, EBDI (Emotional BDI) agents have emerged strongly in the last years. Its affective modeling usually includes emotions, mood, personality and also some affective capacities. Despite this, there are affective aspects that are not considered when modeling affection and a proposal that integrates them in an efficient way is still missing. We propose an EBDI framework that integrates affection and affective capacities taking into account the emotional influence in the cognitive process.

## 1 INTRODUCTION

Intelligent Agents, also known as Autonomous Agents or Artificial Agents, are a strong research topic in the IA area. They present cognitive capacities such as perception, reasoning, communication, planning, learning and decision-making. Cognitive architectures and cognitive frameworks have been developed to support intelligent agents, but the BDI (Belief Desire Intention)[1] cognitive framework is the most widespread and developed. Its success lies on that it has a strong philosophical basis and is based on three fundamental mental aptitudes: beliefs, desires and intentions that provide a simple and efficiently way of modeling reasoning in intelligent agents. The agents implemented with this framework are known as BDI agents.

Currently the development of BDI agents is aimed at including affective aspects that influence the cognitive process. These are known as EBDI agents or Emotional BDI agents. The main affective aspects that have been modeled in the EBDI agents are emotions, mood and personality. Of these, the most studied have been the emotions, since they play a key role in the cognitive process. Despite the increasing development of EBDI agents, there are aspects that are still not considered when modeling affection, such as the dysfunctional or functional nature of the emotions that is a therapeutic concept used to classify emotions (whether positive or negative) according to the content (irrational and rational) of the beliefs or cognitions where they emerge from. Another issue that has been scarcely addressed is the regulation of emotions, and in the case of regulation of mood, even less.

Several proposals have been developed that integrate many of these aspects, but there is still missing a proposal that integrates them in an efficient way.

## 2 PROPOSED ABC-EBDI FRAMEWORK

We propose an EBDI framework named ABC-EBDI, that integrates affect (emotions, mood, and personality) and affective capacities, taking into account the influences of the affective process in the BDI cognitive process. For the emotional modeling, a therapeutic model that has not been used in BDI agents affective modeling, named ABC model[2] is used. The model argues that emotions and conduct are the result of an appraisal process of the individual's beliefs (cognitions) when an event occurs. This model allows to deal with the dysfunctional/functional nature of emotions, either negative or positive, and the mal-adaptive/adaptive conduct nature. Our framework uses the PANAS[3] model for mood modeling and the well-known OCEAN[4] model for personality. Regarding affect regulation, we propose not only the emotional regulation but also mood regulation, scarcely seen it in EBDI agents. For modeling affect regulation, we propose the Gross model[5] for emotional regulation and the Larsen model[6] for mood regulation.

## 3 FUTURE WORK: USE CASE

To test the feasibility of our framework we propose a Virtual Patient (PV) application for the training of healthcare students. The PV will be an intelligent agent that through role-playing will be able to interact with the student showing several emotions, mood and communicating patterns.

## REFERENCES

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