

A Dialogical Semantics for Bonanno's System of Belief Revision

Abstract

Belief revision is the process of changing ones beliefs when taking into account new pieces of information. The logical formalization of belief revision began in the 1970's. The dominant theory of belief revision is the AGM model, so-called after its three originators Alchourrón, Gärdenfors and Makinson. They wrote a paper that provided a formal framework for the study of belief change that was published in the *Journal of Symbolic Logic* in 1985. The AGM model postulates properties that an operator of belief change has to satisfy in order for the process of belief revision to be considered rational.

In an article written in 2007 Giacomo Bonanno provides a characterization of the AGM theory within a multimodal temporal framework. Since belief revision deals with the interaction of belief and information over time, temporal logic seems to be a natural setting for a theory of belief revision. Bonanno formulates a semantics and an axiomatic for belief revision. He adds five operators to his logical language: the next-time operator F and its inverse P , the belief operator B , the information operator I and the "all state" operator A . Bonanno studies three logics of increasing strength: the first logic considers only cases where new information confirms the initial beliefs of an agent; the second logic considers cases where new information is not surprising, i.e. compatible with the initial beliefs of the agent; the third logic is an axiomatic characterization of AGM theory. It is the strongest logic because it considers also cases where new information is surprising, i.e. incompatible with the initial beliefs of the agent.

Our aim is to provide a dialogical semantics for Bonanno's logics. We will focus on the third logic because it is the most interesting logic for belief revision. First, we present Bonanno's semantics and axiomatic for belief revision. In a second part we present our dialogical reconstruction of his systems. In a third part we give several examples to illustrate our dialogical system.