A matter of trust: Dynamic attitudes in epistemic logic

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Abstract

While propositional attitudes—like knowledge and belief—capture an agent’s opinion about a particular piece of information, dynamic attitudes, as understood in this dissertation, capture an agent’s opinion about a particular source of information, more precisely: they represent the agent’s assessment of (or opinion about) the reliability (or trustworthiness) of the source. The project of this dissertation is to study the latter notion from a general qualitative vantage point. The proposal of the thesis is to formally represent assessments of reliability by means of operations on information states: dynamic attitudes are encoded as strategies for belief change, capturing how an agent plans to “change her mind” once receiving a particular piece of information from a particular (type of) source. In this way, the dissertation establishes a connection to the rich existing literature on information dynamics, which has been a major focus of attention in belief revision theory, dynamic epistemic logic and dynamic semantics. The main focus of the work presented here is a study of the interplay between dynamic attitudes and the more well-known propositional attitudes.

In Chapter 1, we show that (introspective) propositional attitudes naturally arise as fixed points of dynamic attitudes; conversely, dynamic attitudes can be seen as chosen with a specific propositional attitude in mind which constitutes the target of belief change.

Chapter 2 studies various forms of trust and distrust, and intermediate forms of “semi-trust”. More specifically, we identify a number of classes of dynamic attitudes that can be seen as capturing natural ways of assessing the reliability of a source, and typical representatives of each class. Also, we systematically relate them to the class of propositional attitudes using the notion of a fixed point.

Chapter 3 takes on the topic of minimal change that has traditionally played a foundational role in belief revision theory. The approach we suggest allows us to further study the question in which sense the typical dynamic attitudes identified in the previous chapter are really special (and, indeed, in many cases, canonical, that is, uniquely optimal for their fixed point).
In Chapter 4, we shift the perspective, and study the robustness (or preservation) of propositional attitudes under certain classes of transformations, devoting particular attention to preservation under substructures, a form of preservation that has traditionally been important in model theory.

Chapter 5 discusses the link between the static and the dynamic level that has received most attention in the dynamic epistemic logic literature. In this chapter, we study modal languages extended with dynamic modalities and show how the static base language can already define the dynamic part. This allows us to prove generic completeness theorems for our logics.

Chapter 6, finally, studies the formal setting developed here from another angle: we observe that the dynamic attitudes we have worked with so far can be interpreted not only as reliability assessments on behalf of an agent, but also as denotations for epistemic modals in natural language. Our main point is that the results of this dissertation are also of potential interest to the community working on the semantics of natural language.