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ITERATED REVISION IN DEFAULT LOGIC

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Abstract. *Default logic is supposed to reason with static and consistent default theory, i.e., it can not deal with inconsistencies arising in the situation that an agent receives a sequence of information represented by default theories. To overcome the problem, revision operators for revising default theories have been investigated by many researchers. But none of them has discussed the postulates which are desirable to be satisfied by the operators for revision of default theories, especially the operators for iterated revision. In this paper, we reformulate the existing postulates for belief revision and iterated belief revision to default logic, and show that some of the reformulated postulates are rational to govern the process of revising default theories while others are not. A representation theorem for those reasonable postulates is provided.*

1. **Introduction.** It is crucial for an intelligent agent to gather information about the world and reason with new knowledge based on the information at hand [1, 9]. Therefore, nonmonotonic reasoning [1, 2], which provides formal methods for the agent to withdraw conclusions proved to be wrong, and to derive alternative conclusions instead, is one of the central topics in Artificial Intelligence. It is useful for many practical purposes, such as legal reasoning, medical diagnosis and natural language understanding [1]. Default logic is one of the most widely used nonmonotonic logics and allows one to make plausible reasoning with incomplete information. However, default logic [4] is supposed to reason with static and consistent default theories, in the sense that, it can not deal with the inconsistency between new information and original theory. For example, consider that the agent's original knowledge is made up of a belief $\neg Fly(Tweenty)$ and a default rule $\frac{Bird(x):\neg Penguin(x)}{Fly(x)}$ which means that if x is a bird and there is no evidence that x is a $penguin$, then x can fly. Then if the agent learns that Tweenty is actually a bird and is not a penguin, there is an inconsistency in his knowledge. To make a consistent conclusion, a simple approach for the agent is to abandon some of the original knowledge since new information is usually more reliable.

To handle the inconsistency in default theories with priority, belief revision is a good choice [6, 10, 11, 12]. Belief revision is a formal method which aims to accommodate new information that is possibly inconsistent with existing information. The best known formal approach towards belief revision is the AGM framework [3] which gives a number of postulates to describe how the beliefs of an agent should change upon receiving new information. Since AGM postulates were proved to be overly weak, additional postulates