ABSTRACT. This paper argues that questions concerning the nature of concepts that are central in cognitive psychology are also important to epistemology and that there is more to conceptual change than mere belief revision. Understanding of epistemic change requires appreciation of the complex ways in which concepts are structured and organized and of how this organization can affect belief revision. Following a brief summary of the psychological functions of concepts and a discussion of some recent accounts of what concepts are, I propose a view of concepts as complex computational structures. This account suggests that conceptual change can come in varying degrees, with the most extreme consisting of fundamental conceptual reorganizations. These degrees of conceptual change are illustrated by the development of the concept of an acid.

1. INTRODUCTION

According to Ian Hacking (1975), current analytic philosophy is the "heyday of sentences". Whereas seventeenth-century thinkers talked of ideas, contemporary philosophers take sentences to be the objects of epistemological investigation. Knowledge is true justified belief, so increases in knowledge are additions to what is believed. Epistemology, then, consists primarily of evaluating strategies for improving our stock of beliefs, construed as sentences or as attitudes toward sentence-like propositions.

In the cognitive sciences, however, the intellectual terrain is very different. In cognitive psychology, the question of the nature of concepts receives far more attention than the question of belief revision. Researchers in artificial intelligence often follow philosophers in discussing belief revision, but they also pay much attention to how knowledge can be organized in concept-like structures called frames (Minsky 1975; for reviews see Thagard 1984b, 1988). Nevertheless, even a philosopher like Alvin Goldman (1986), who takes cognitive science very seriously, places belief revision at the center of his epistemology, paying scant attention to the nature of concepts and the question of conceptual change. Gilbert Harman has written both on epistemic change (1986) and on the nature of concepts (1987), but has not much discussed the relevance of the latter topic to the former. Historically
oriented philosophers of science such as Kuhn (1970) have suggested the importance of conceptual change but have not provided accounts of conceptual structure that are sufficiently developed for epistemological application.

I shall argue that the nature of concepts and conceptual change is in fact an important epistemological topic and that drawing on ideas from the cognitive sciences can provide an account of conceptual change adequate for epistemology and the philosophy of science. After considering an argument that there is nothing more to conceptual change than belief revision, I contend instead that belief revision cannot be understood without paying attention to questions of conceptual change. I survey some recent proposals about what concepts are and outline a view of concepts as complex computational structures. Finally, the relevance of this account of concepts to epistemological issues is shown by reviewing the changes that have taken place in the history of the important scientific concept of an acid.

First a note to prevent terminological confusion. Researchers in cognitive psychology and artificial intelligence tend to use the terms 'knowledge' and 'belief' differently from philosophers who often characterize knowledge as true justified belief. Their use of 'knowledge' is closer to philosophers' use of 'belief'. Cognitive scientists have also taken to using the term 'epistemology' very broadly to cover anything having to do with knowledge in a diluted sense that does not have anything to do with justification. In this paper I generally use 'knowledge' and 'epistemology' in their traditional philosophical senses that presuppose questions of justification.

2. BELIEF REVISION AND CONCEPTUAL CHANGE

The central question in current epistemology is when we are justified in adding and deleting beliefs from the set of beliefs judged to be known. Without denigrating this question, I propose that epistemology should also address the question: What are concepts and how do they change? Concepts are relevant to epistemology if the question of conceptual change is not identical to the question of belief revision. But maybe it is; consider the following argument.

The issue of conceptual change is a red herring. Whenever a concept changes, it does so by virtue of changes in the