

THEORY OF SKILL ACQUISITION BY HUBERT AND STUART DREYFUS

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One of the major aspects of traditional epistemology, and its manifestation in artificial intelligence research and the philosophy of mind is its emphasis on the formal system of deduction and premises and propositional knowledge. Hubert and Stuart Dreyfus argue that this formal system of deduction is one of the problems with traditional epistemology, since much of our sense of judgment and the process which we go through to form beliefs is not a matter of starting with premises and by plugging them into a formula in order to deduct conclusions. But rather it is a gradual process that involves being embodied in different ways and developing skills that would make it possible for us to deal with the world. By explaining the five stages that an individual goes through in order to become an expert, Dreyfus and Dreyfus justify their point of view on the topic of learning process and skill development.

The main idea behind Dreyfus and Dreyfus's skill development theories is the distinction they make between "knowing that" and "knowing how." They argue that many skills, such as riding a bike or playing chess, could not simply be reduced to "knowing that." The reason that many of us are not conscious of our "knowing how" is possibly because we take our knowing-how for granted. In traditional epistemology, the knowing-how and knowing-that is considered one concept, which is acquired through a formal system of deduction. However Dreyfus and Dreyfus argue that there are five clear stages that an agent goes through in order to evolve from knowing-that, novice, to knowing-how, expert.

Traditional epistemologists have a different way of looking at the stages of learning process. They believe that knowing-that and knowing-how is the same idea, which is a skill one should obtain in order to be able to do anything. They object to Dreyfus and Dreyfus's theory on the learning process by saying that replacing a formal system of deduction which is made of premises and logical conclusion, with a natural process with no premises would result in a set of much less logically accurate results. They argue that knowing-how is just a set of many knowing-that's. For instance they comment on the bike example and how an agent learns to ride a bike. They argue that the idea of knowing *how* to ride a bike itself consists of many knowing that's, such as keeping the balance on two wheels or changing the gear when it's necessary. They argue that these knowing that's combine to construct one knowing-how for one specific task.

Hubert and Stuart Dreyfus have a different way of looking at the concept of learning and skill acquisition. In the article "Five stages from Novice to expert," they state, "As human beings acquire a skill through instruction and experiences, they do not appear to leap suddenly from rule-guided "knowing that" to experience-based knowing-how."¹ Hubert and Stuart believe that there is a gradual process involved for an agent to go through in order for him to reach the stage of expertise or knowing-how. Their skill acquisition process shows that a person goes through at least five stages of different

¹ Page 16, Dreyfus, Hubert and Stuart, *Five stages from Novice to Expert*.

knowledge of a specific task and ways of decision-making as he improves his skill. These five stages are novice, advanced beginner, competence, proficiency, and expertise. Hubert and Stuart do not expect the reader to accept the words, but rather they are asking the readers to find a task that they are good at, and see whether the process by which the readers themselves acquired various skills reveals a similar pattern.

The skill of playing chess would be a great example to use in order to describe the five stages of skill acquisition. The first stage is called novice. A novice has some general ideas and is in the process of learning the rules, such as the movement of the chess pieces or what is counted as check or mate in chess. The second stage is advanced beginner stage. In this stage, the agent's performance improves to a relatively acceptable level only after the novice has had enough experience in copying the real situation.² For instance after playing enough chess, the agent starts to show unique performance through personal experience. During the third stage, competence, the agent starts becoming personally involved with the task. He starts to see more than one option from which he has to choose the best one. For instance, at some point he realizes that he can either take away the opponent's knight, or he can give up his own knight but take the opponent's queen. In the fourth stage or proficiency stage, the performer, while intuitively understanding his task, still thinks analytically about his actions. For instance, despite having so much experience in chess, he might still have to think and consider alternative moves in critical situations by predicting what the opponent is going to play next. The last stage is called expertise. Experts in general know what to do based on mature understanding of the task. An expert has had so much experience with the task that the skill of doing the task is a part of him. He acts upon correct intuitions without analytically thinking about his every move. For instance in chess, he has had so much experience playing that no matter what the arrangement of the chess pieces are, it is highly likely that he has been in the same situation before and is able to decide what the right move is in a real short amount of time. They also emphasize on the fact that practice is required for the agent to maintain the knowing-how. Without practice, the agent will gradually lose his expertise and is most likely to regress as far back as the competence stage.

Even though Hubert and Stuart's theory seems very plausible in the epistemological sense, there are still some isolated cases of knowledge that this theory is bad at handling. For instance consider factual knowledge. For example, "I know that the temperature today is 62 degrees in Fahrenheit." In this example, an agent leaps from not knowing today's temperature to knowing the exact temperature of today. As it appears, there doesn't seem to be any stages of acquisition involved for the agent. If more factual examples such as the one mentioned above were considered, it would become clear that in most of the cases, they do not require the agent to go through the five stages in order to possess the perfect knowledge about those facts. Factual knowledge is the biggest part of the kind of knowledge that Dreyfus and Dreyfus's theory does not seem to apply.

However as it appears in the areas of knowledge that an agent is to learn how to perform a task, Hubert and Stuart Dreyfus have introduced a new idea to the traditional epistemology. In the traditional epistemology, an agent seems to belong to one

² Page 22, Dreyfus, Hubert and Stuart, *Five stages from Novice to Expert*.

of the two distinguished groups; the group that know that (that being a skill to perform a specific task and all the techniques and expertise attached to that field), or the group that does not possess the smallest amount of knowledge on the task. Dreyfus and Dreyfus however have introduced a more realistic model on the issue of possession of knowledge to epistemology of mind. As Hubert and Stuart Dreyfus argue, in reality, there does seem to be stages that a novice goes through in order to change form a slow and new learner of basic ideas to a fast intuitive thinker of complex situations.