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## **BUMBLEBEES-FOOTBALL PLAYERS: THE COGNITIVE ABILITIES OF BUMBLEBEES**

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Nowadays, scientists are interested in the emergence of a complex nervous system. First and foremost, insects with complex behavior are studied, and Hymenoptera (bees, bumblebees, ants) particularly. Experimentally the researchers managed to teach bumblebees to play football. It demonstrated that animals with tiny brains could be trained.

During the first part of the experiment, a ball was placed on a round «football field» with a specified location at the centre of the platform where a portion of sweet syrup was hidden. Scientists manipulated a plastic model bumblebee to show the bumblebees what to do. Trained bumblebees were able to complete this task and get the reward, unlike untrained ones.

After that, there were several balls on the field, the ones closest to the field were glued. Trained bumblebees took the furthest ball and rolled it into the hole, which the untrained looked at. When watching bumblebees released, they first took up the nearest balls, believing that because they quickly will be rewarded. That is, the insect's brain does not just copy actions, but estimates labor costs and chooses the most economical way.

Scientists have found that some animals successfully demonstrate two necessary factors for evolution. Firstly, they can learn a skill from a demonstrator, a human for example. Secondly, they can demonstrate the acquired skill to their relatives themselves. New knowledge can persist in a population for several generations.

Bumblebees can learn quite complex and unnatural new skills by observing other bumblebees. Also, some gifted bumblebees can master these skills on their own. The experiment has shown that the presence of gifted bumblebees is important only at the first stage. Having mastered the skill, ordinary bumblebees normally pass it on from generation to generation, in the absence of innovators.

In conclusion, it supports the hypothesis that directed skills imparting by the more advanced ones contribute to the faster spread of skills in the colony than the independent mastery of skills by self-taught innovators.

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