Insight

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Synonyms

Insightful behavior; Rule extraction

Definition

Insight can be attributed to animals' ability for fast integration of behaviors gained from their past experience and effectively applying this experience for solving a problem as a meaningful whole, in the context of a situation. W. Thorpe (1963) defined "insightful behavior" as "the sudden production of a new adaptive response not arrived at by trial behavior" and "the solution of a problem by the sudden adaptive reorganization of experience".

Introduction

Wolfgang Köhler (1924) first revealed experimental evidence of insight in chimpanzees basing on ideas of Gestalt psychology. His experiments showed chimpanzees as using planning and foresight, that is, cognitive reasoning to solve a problem. Köhler devised an arrangement in which all of the elements necessary for the solution of the problem were in full view of the animal. One of the most often referred-to examples of problem solving by insight concerns Sultan, a chimpanzee, whom Köhler regarded as the brightest of a number of apes he worked with. Sultan sat in his cage, in which there was also a short stick. Outside the cage there was a longer stick, which was beyond Sultan's reach, and even further away was a reward of fruit. Sultan first tried to reach the fruit with the smallest of the sticks. Not succeeding, he tried a piece of wire that projected from the netting in his cage, but that, too, was in vain. Then he gazed about him and after a long pause suddenly picked up the short stick once more, came to the bars directly opposite to the long stick, dragged it towards him with the auxiliary, seized it, and went with it to the point opposite the objective which he secured. From the moment that his eyes fell upon the long stick, his procedure formed one consecutive whole.

However, in his late publications, Köhler considered a notion of insight rather fuzzy and was frustrated about not understanding the nature of subject's awareness about relations between things that he called insight. In particular, Köhler distinguished two kinds of mistakes related to the problem solving in chimpanzees, that is, "good mistakes" and "bad mistakes". If the chimpanzee tried to affix a box to a wall in order to reach a banana from the top of the wall, it is a "good

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mistake" that can serve as evidence of the animal's understanding about dimensions; the chimpanzee is simply unaware of box's properties. But chimpanzees in Köhler's experiments also demonstrated a lot of "bad mistakes". For instance, in one setup, chimpanzees could only get bananas by removing a box. Here was something, Köhler expected, that even his awkward chimpanzees could "do at once." And yet, to his astonishment, the chimpanzees had difficulties in solving such problems; they often drew into the situation the strangest and most distant tools and adopted the most peculiar methods, rather than removing a simple obstacle which could be displaced with perfect ease. Many years later, Elisabetta Visalberghi (2002), referring to her observations on adult male capuchin pounding an unshelled peanut with a boiled potato, raised a question why capuchins were doing something smart in a silly way, or something silly in a smart way.

Insightful behavior in Human- and Non-Human Animals

The concept of insight introduced by Köhler has been immediately appreciated in human studies. Psychologists identified this phenomenon as "aha!" ("Eureca"!) solutions referring to the well known Archimedes legend. Maiers (1931) suggested problems for studying human insight similar to those that were solved by apes, for example, the two-string problem: two strings hanging at two arm-span widths apart need to be tied together, and the items in the room may help. Many human studies are based on human-specific skills such as solutions of Checkerboard problems (Kaplan and Simon 1990) and verbal problems (Jung-Beeman et al. 2004). At the same time, many modern comparative studies of insightful behavior are performed simultaneously on animals and human infants.

In modern cognitive ethology, insight is considered a part of rule extraction, that is, of the learning class which includes casual reasoning and concept formation. Insightful behavior is based on the animals' capacities for formation of "what-leads-to what" expectancies which, in turn, are closely connected with their exploratory activity (for details see: Reznikova 2007).

Currently experimental paradigms for studying insight in animals are often based on "folk physics" of animals, that is, their common-sense understanding of how the world works, as well as why it works in the way it does. For example, many experiments testing birds' abilities to use a physical object to obtain food that is out of reach have involved the string-pulling task known since ancient times. In experiments of Heinrich (1995) with common ravens, it is required that the bird repeats the following sequence several times: reaching down from the perch, grasping the string with the beak, pulling the string up, placing the pulled-up loop of string on the perch, then pressing a foot down on the loop and letting go with the beak, so that the bird can reach down to pull up another loop. Keas (New Zealand parrots) completed the first trial within a few seconds, by showing only goal-directed behavior, thus executing the solution in a manner that could not be improved upon in further trials (Werdenich and Huber 2006). Hooded crows could successfully solve tasks in which the strings did not cross each other but were arranged in such a way that the bait was opposite the end of an "empty" string. They also solved a task in which the bait was attached to each of two strings but one string was broken, preventing it from pulling the bait (Bagotskaya et al. 2012). All these results demonstrate birds of several species as understanding of means–end relationships, i.e., the apprehension of the cause–effect relation between strings, food, and certain body parts.

Another problem also known from ancient times which is involved in insight studies comes from the Aesop's fable in which a thirsty crow threw stones into a pitcher to raise and drink the otherwise inaccessible water. In the experiment of Bird and Emery (2009), the rooks solved a similar problem: they dropped stones into a tube of water in order to bring a floating worm within reach. Orangutans (Mendes et al. 2007) and chimpanzees (Hanus et al. 2011) also have insightfully solved an analogous version of the problem. Apes were presented with a tube quarter-filled with water. Floating on the surface of the water

was a peanut. To solve the problem, the apes needed to collect water from a drinking container in their mouths and spit it into the tube in order to raise the water level and gain the peanut. After trying to reach the peanut with their fingers or mouths, animals spat water into the tube in order to raise the level and so gain the reward on the first trial. Chimpanzees and orangutans performed better than 4-year-old children and worse than 6- and 8-year-olds in the same experiments.

Conclusion

Insight can be considered a part of the mental process that relates to understanding relationships. In problem solving, the experience need not be directly associated with the problem at hand. Sometimes, when presented with a new problem, an animal will solve the problem on the first attempt using the previous experience in dealing with the component parts of the problem, although they were never met together in just such a way before. There is much work to be done to extend our understanding of whether at least some species can take into account imperceptible physical forces or they are only capable of reasoning about perceptible things. To clear up this problem to a lesser or greater extent, developmental studies are needed that will allow a distinction to be made between inherited and acquired behavior.

Cross-References

- ▶ Conception Rates
- ▶ Evolution of Tool Use
- ▶ Innate and Learned Tool Use
- ▶ Innovation and Creativity
- ▶ Intelligence Testing
- ▶ Non Human Tool Use
- ▶ Occam's Razor
- ▶ Primate Tool Use
- ▶ The Smarties Task
- ▶ The Technical Intelligence Hypothesis
- ▶ Tool Manufacturing
- ▶ Tool Play
- ▶ Tool Use in Captivity

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