

FROM THE HISTORY OF COMPARATIVE PSYCHOLOGY IN THE USSR

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Boris Iosifovich Khotin (1895–1950) was one of the first Soviet investigators in the field of comparative psychology. His scientific work began in the middle twenties at the Department of Comparative Psychology of the Herzen Pedagogical Institute in Leningrad and at the Institute for Brain Research in Leningrad headed by V. M. Bekhterev.

Khotin was a pupil and the closest assistant of Professor V. A. Wagner, an evolutionary psychologist, the founder of the Soviet school of comparative psychology. Wagner raised the study of animal behavior to the level of an independent scientific discipline in Russia. Khotin's scientific interests were formed under the influence of the revolutionary ideas of his teacher (Strelchenko, 1975).

Khotin's major work was devoted to the study of imitation in animals. This aspect of his scientific activity has been elucidated in detail in the comparative psychological literature of recent years (Strelchenko, 1975; Malakhovskaya, 1971, 1975; Fabri, 1974, 1976). He was interested in instinctive (inborn) behavior, which in its simplest form is manifested in one individual following another: a child following its mother, a member of a herd following the leader or another member, and so forth (Khotin, 1930a,b,c).

Having adopted Wagner's evolutionary approach to the working out of psychological problems, Khotin turned to the study of imitation in the phylogenesis and ontogenesis of vertebrates. Hence the amazing diversity of the species he used for his experiments: fish (wild carp), birds (doves, hens), and mammals (rats, cats, dogs, wolves, sheep, reindeer, monkeys), studying young animals as well as adults (Khotin, 1930a,b,c, 1946; Roginski & Khotin, 1930, 1934; Viziarykin & Khotin, 1946a,b; Blagoveshchenskaya & Khotin, 1930; Khotin, 1947a; Aronovich & Khotin, 1929; Aronowitsch & Chotin, 1929). Such a wide range of investigation

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deserves profound respect, especially in view of the fact that the experiments were carried out more than half a century ago, when research in science and technology was less sophisticated than at present, and the rat was almost the only experimental animal used in comparative psychology all over the world (Scott, 1973; Adler, Adler & Tobach, 1973).

Khotin was interested not only in imitation, but also in the interaction between this inborn form of behavior and an acquired form of behavior, namely learning. He developed the method of "experimental conflict" in which responses based on imitation were placed in opposition to those that had been learned. For example, two animals were put into a situation in which the positive signal for one individual served as a negative signal for the other and vice versa. The two animals had been conditioned separately. For one animal, for example, a red light was a signal to run and a blue light a signal not to run. The opposite was true for the other animal. Then, after the conditioned reflexes had been firmly established, the two animals were placed together. If one animal followed the other animal irrespective of the given signal, despite its individual experience, one could conclude that in this case imitation predominated over learning. If, on the contrary, each of the animals behaved in accordance with its individual learning acquired in isolation, it was clear that learning prevailed over imitation. This method, in combination with other methods, made it possible to understand the nature of the relationship between imitation and learning in different animals, as well as to make a picture of the development of imitation in ontogenesis and, in part, in phylogenesis.

Aiming at conducting his experiments in a situation similar to the animal's natural environment, Khotin designed a special maze that can be restructured, which allowed a quick change of the experimental conditions, and could, to a degree, model the situation for natural behavior (searching for food, for a sexual partner, for ways to escape, and so forth). Besides the maze, various other devices were used in the experiments: the behavior of carp was investigated in a specially equipped aquarium; sheep and reindeer were observed in a special enclosure; monkeys in a cage of unique construction; dogs in an experimental corridor, and so forth.

On the basis of his investigations Khotin drew a number of general conclusions concerning imitation and learning in vertebrates. After comparing his data for fish, birds, and mammals, he proposed that in the process of phylogenesis imitation describes an inverted "U" curve: on a phyletic continuum, as complexity increases, imitation at first is stronger and then becomes weaker. This is also true in ontogenesis: Imitation first appears at a certain age, gradually increases and eventually, as the individual acquires its own experience, imitation attenuates and disappears altogether.

These concepts apply to altricial animals. In the case of precocial

mammals and birds, the young begin to follow the mother as soon as they come into the world, imitating precisely all her actions. In these young, too, imitation fades away with age and is replaced by individually acquired behavior. All this shows that imitation is a maturing function depending on the stage of development of the central nervous system. In the experiments with puppies it was especially clearly shown that imitation is a factor favoring the elaboration of individual skills in the young, and that it can serve as a foundation for learning. "Without exaggeration, one can say," wrote Khotin, "that all the benefits that accrue to the young by 'tradition,' enabling the offspring to learn from the life experience of their parents, could not be realized if it were not for imitation of the adults by the young."

The data gathered by Khotin proved that increased complexity of the structure of the brain is accompanied by an increase in the plasticity of individual learning and that the peculiarities of the learning process in different species correspond to the life conditions of each of the species (Khotin, 1946, 1947c). In the wolf experiments, for example, the learning process consisted in a number of initiative actions, such as shortening the path in the maze by running diagonally, or suddenly correcting an erroneous path and finding the proper alley. Learning relates to individual behavior and is an important factor in the adaptation of animals. The similarity of the phylogenetic and ontogenetic imitation curves suggested to Khotin the existence of a biogenetic parallelism in the development of imitation (Khotin, 1947b).

Khotin's investigations led him to the conclusion that imitation is a powerful bonding factor in the social and family life of animals leading to biologically valuable consequences. Based upon instincts, imitation at the same time often serves as a basis for the development of individually acquired behavior, or learning. Thus, as far back as the late twenties, investigation of the problem of imitation and learning was conceived and carried out, in its greater part along broad evolutionary lines, with extensive experimental material.

In order to investigate the behavior of animals in their natural life conditions, Khotin organized several expeditions to the Arctic, where he studied habits and instincts of birds in bird colonies. Especially interesting and fruitful was a complex expedition to the Novaya Zemlya Islands, where there were vast bird colonies near the Bezmyanny Cape. Here he observed the social life of two species of birds: plovers and gulls (Khotin, 1934, 1934-35a,b).

As a result, a number of facts were gathered, proving Wagner's thesis of the inverse relation between the parents' instinct of self-preservation and their instinct for the care of their young. In birds, the instinct for the care of offspring seems to reach its maximum intensity by the time of hatching. During that period the instinct of self-preservation is almost

entirely inhibited: Trying to protect their offspring, the parents seem to be neglecting their own safety. As the nestlings grow, the self-preservation instinct in the parents begins to strengthen again, and now, in case of danger the parents fly away, abandoning the more developed, though still helpless, chicks.

A number of experiments were carried out on the substitution of eggs from under the hatching bird, on the transfer of the eggs from the nest to another place, and so forth. The results of the experiments confirmed the popular opinion that instinct is "blind," that is, the range of its effectiveness is limited.

Other experiments included the substitution of one nestling for another, the temporary blinding of the birds by means of capping, etc. Observations were made of the behavior of plovers at the moment of fledging, as well as of the activity cycle of the bird colonies in the conditions of prolonged Arctic daylight (Blagoveshchenskaya, Zaks, Khailovitch & Khotin, 1933; Roginski & Khotin, 1930; Khotin, 1934-35a,b). Khotin concluded that the colonies of plovers and gulls belong to the category of "chance gatherings," according to Wagner's classification. One of the main reasons for the emergence of colonies is the limitation of territory for nesting. The proximity of the common feeding area and the protection of the nesting sites from strong winds are also of great importance.

In 1934-1935, Khotin wrote a comprehensive theoretical paper entitled "Biological Psychology as a Science" in which he set forth his ideas on the essence of comparative psychology and the significance of its applications. Unfortunately, this work was not published until now (Pp. 10-36). A number of other papers has never been published. Khotin's scientific activity was interrupted in 1935, and he was able to resume it only after the end of World War II, when he was discharged from the army. In 1946, while working at the Bekhterev Institute for Brain Research, he summarized the results of his previous work and set them forth in a monograph, "On the Phylogenesis and Ontogenesis of Imitation and Learning in Vertebrate Animals" (Khotin, 1946).

During the last years of his life Khotin was gathering materials for a monograph, "Truth and Invention about Animals in Fiction." Considering the depictions of the behavior of animals in the works of Russian and foreign writers, he observed that in most cases such depictions suffer from anthropomorphism, and came to the conclusion that the writers describing the life of animals should know the biological foundations of their psychology. This work was not finished.

The works of Khotin were innovative for his time. They are indicative of the high level reached by comparative psychology in the USSR in the middle twenties and early thirties, exactly in that period, which, according to Scott (17), was a period of stagnation for comparative psychology

all over the world. In spite of the fact that many years have passed since these works were written, they not only have historical interest, but to a great degree can be useful for those who work in this field now.

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¹ All the papers and books listed here are in Russian, with the exception of those by Scott, Adler, Adler & Tubach, and Aronowitsch & Chotin, that are in English and German, respectively. Both the titles and sources of the Russian publications have been translated into English.

² All the dates of unpublished mss. can be given only approximately.

³ All the unpublished manuscripts listed here are kept in the archives of the Institute of Psychology, Russian Academy of Sciences (the offprints of B. I. Khotin's published papers are also there.)

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