Ontogeny of Observational Learning in the Dog (*Canis Familiaris*)

LEONORE LOEB ADLER
Department of Psychology
Adelphi University
Garden City, N. Y.

HELMUT E. ADLER
Department of Psychology
Yeshiva University
New York, N. Y.

A split-litter technique was used to test observational learning in 4 litters of Miniature Dachshund puppies, 21, 28, 38, and 60 days old at the beginning of the experiment. In one side of a duplicate cage, one puppy of a litter, the demonstrator, learned to pull in a food cart on a runner by means of a ribbon, while another puppy, the observer, watched from an adjacent compartment, separated by a wire screen. Observational learning was demonstrated by the saving in time for the 1st trial when the observer was given the same problem to solve. Maturation, particularly the development of visual function and motor coordination, set a lower age limit for the emergence of observational learning.

Observational learning is clearly adaptive. Individuals can learn a new response without having to undergo lengthy and possible hazardous periods of trial and error. Crook and Goss-Custard (1972) mentioned that observational learning allows the group to benefit from the experience of one of its members, both with respect to positive factors, such as finding sources of food, water, and safety, and in avoiding dangerous situations or enemies.

Informal observation of dogs in small groups indicates that many of their behavior patterns appear to be acquired by learning from one another. Such conditions are found either during the time before puppies in a litter are separated or in situations where a number of dogs are kept together. The realization that social learning plays an important role in the acquisition of behavior (Adler, 1973, 1977) has given rise to a new interest in this topic (Adler, 1955; Bandura, 1962, 1965, 1971; Hall, 1963; Robert, 1970).

If dogs can be shown to learn by observation, the unsolved problem of the ontogeny of this behavior still remains (Barnett, 1968). Learning abilities in young animals, as measured by improvement in performance, increase with age. Generally,

---

Send reprint requests to Dr. L. L. Adler, Department of Psychology, The College of Staten Island, City University of New York, 715 Ocean Terrace, Staten Island, New York 10301, U.S.A.

Received for publication: 5 March 1976
Revised for publication: 25 June 1976
Developmental Psychobiology, 10(3): 267-271 (1977)

the earliest appearance of learned behavior is limited by growth and differentiation of the nervous system, the receptor organs, and the effectors. These age-dependent functions should not be interpreted in terms of unitary learning capacity but should be analyzed in terms of the developmental history of each type of learning. Observational learning is here defined as the ability of an individual to profit from seeing another animal, the demonstrator, solving a problem by trial and error. If observers consistently perform a task faster than the demonstrators, particularly on the 1st trial, the saving is presumed to be due to observational learning.

This investigation reports the results of tests of 4 litters of puppies, 21-60 days of age at the beginning of the experiment. It was designed (1) to demonstrate the capacity for observational learning in young dogs and (2) to fix the earliest age at which such learning occurs.

Method

Subjects

Four litters of home-raised, pure-bred Miniature Dachshunds (*Canis familiaris*) served as subjects. One dog from each litter was picked at random to serve as demonstrator. Its litter-mates were assigned roles as observers. (See Table 1.)

Apparatus

The duplicate apparatus employed in this experiment had previously been used to test observational learning in monkeys (Warden and Jackson, 1935) and cats (Adler, 1955). It consisted of 2 compartments, 90.6 cm x 75 cm x 90.6 cm, separated by a 1.25-cm wire mesh screen. A glass window at one end of each compartment allowed the subjects to view a 60-cm wooden runner. A baited food-cart (5 x 5 cm), sliding on the runner, could be pulled within reach of the animal by means of a ribbon attached to it and passed through a small opening at the bottom of the window.

Procedure

Prior to being tested, the puppies were given 3 days of acclimatization to the apparatus, except for the Litter E which received 13 days. During this period the hungry puppies were placed in both sides of the apparatus for 15 min and were fed a paste of liverwurst and milk. No ribbon was available during this phase. The degree of food deprivation was adjusted according to the subject's age and feeding schedule. Litter C had received no food for 12 hr; Litter D, for 6 hr; Litter G, for 3 hr, and Litter E, for 1.5 hr. These times generally represented one missed feeding period.

On the 10th day the ribbon was placed under the window of the demonstrator's side of the duplicate cage. Each puppy was allowed no more than 5 trials per day to learn to pull in the food cart by means of the ribbon. Timing by stopwatch

commenced when the ribbon was made available and a trial was terminated when the food cart had been pulled all the way up to the window, at which time the puppy was allowed to eat the food. Following Adler's (1955) procedure, we gave each observer 15 observations of another puppy working in the adjacent compartment. All observers watched the demonstrator learn the task by trial and error. A time limit of 15 min was placed on the learning trials. A puppy was removed and trials terminated for that day if the problem was not solved within this time limit.

Immediately following the last demonstration, the ribbon was made available to one of the observers. If 2 observers were in one compartment, 1 of them was removed, except in Litter G where, after the last demonstration, the demonstrator G1 was removed and G2 placed in its compartment. Timing started as soon as the ribbon had been placed under the window.

The demonstrator of Litter E, E1, did not reach a smooth performance level. Training was terminated on the 5th day, when E1 again failed to pull in the ribbon. Because E1 made only 4 successful solutions of the problem and did not show any improvement, the sessions were broken off at this point. Consequently, E2, the observer, did not perform at all and the data obtained from E1 were eliminated from subsequent analysis.

Results

All puppies of the 3 older litters were able to learn the task. Evidence for observational learning was dependent on a comparison of the 1st trials of demonstrators and observers. The observers apparently profited from their experience to the extent that their performance times bettered those of the demonstrators. A summary of the results of the 1st 5 trials is shown in Table 1. The performances of the 2 groups did not

TABLE 1. Time in Seconds for 1st 5 Trials.

	Age (days) at Start	Trials				
		1	2	3	4	5
Demonstrators[a]						
C1 (♂)	60	595	19	29	6	8
D1 (♂)	38	697	57	47	6	3
G1 (♀)	28	360	120	600	300	180
Mean		550.7	65.3	225.3	104.0	63.7
Observers						
C2 (♀)	60	40	8	6	11	5
D2 (♂)	38	9	72	16	6	3
D3 (♂)	38	44	20	5	5	4
G2 (♂)	28	120	5	600	180	720
G3 (♀)	28	5	720	360	–	–
Mean		43.6	165.0	197.4	50.5	183.0

[a]One additional puppy in each of Litters C and G died before the experiment started. An additional Litter E, 21 days old at the beginning of the experiment, was not capable of solving the problem and was eliminated from the experiment. (For details see text.)

overlap on the first trial, the difference being significant when tested by the Mann-Whitney U test ($p = .018$, 1-tailed).

Discussion

Observational learning appeared to depend on copying the correct response, which was to pull in the ribbon, so that the food cart was accessible from the window. In some cases the observer ran to pull the ribbon as soon as it was made available, with frantic activity continuing although the food was already within reach. Persistence in working and skill in manipulating the ribbon had to be learned by practice.

The maturity of the subjects played an important role as a limiting factor in the ability to take advantage of the demonstrations. Puppies open their eyes at about 2 weeks of age, although their vision is not yet fully functional at this time. Maturity of neocortical, neuronal, and spinal-cord development is complete at 4 weeks, but myelinization of the major association areas continues even after this time (Fox, 1970). These maturational changes then, could be the bases of the poor performance of the 21-day-old puppy and the very unstable times of the 28-day-old group. Lack of sufficient motor development, resulting in poor coordination, affects the skill with which the puppy learns to manipulate the ribbon. Thus, puppies apparently become capable of observational learning soon after their eyes have become functional.

Notes

An earlier version of this study was presented at the 134th Annual Meeting of the American Association for the Advancement of Science (Adler & Adler, 1967) and reported to fanciers of this breed of dogs in *The American Dachshund* (Adler & Adler, 1968).

Dr. Leonore Loeb Adler is currently also affiliated with The College of Staten Island of the City University of New York.

References

Adler, H. E. (1955). Some factors of observational learning in cats. *J. Genet. Psychol., 86*: 159-177.

Adler, L. L. (1973). Contributions of C. Lloyd Morgan to comparative psychology. *Ann. N.Y. Acad. Sci., 223*: 41-48.

Adler, L. L. (1977). Comparative social psychology. In B. B. Wolman (Ed.), *International Encyclopedia of Neurology, Psychiatry, Psychoanalysis, and Psychology.* New York: Van Nostrand.

Adler, L. L., and Adler, H. E. (1967). Age as a factor in observational learning in puppies. *Amer. Zool., 7*: 415. (Abstract)

Adler, L. L., and Adler, H. E. (1968). Age as a factor in observational learning in puppies. *Am. Dachshund, 30*: 13-14.

Bandura, A. (1962). Social leraning through imitation. *Nebraska Symp. Motiv., 10*: 211-269.

Bandura, A. (1965). Vicarious processes: A case of no-trial learning. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology*, Vol. 2. New York: Academic. Pp. 1-55.

Bandura, A. (1971). Analysis of modeling processes. In A. Bandura (Ed.), *Psychological Modeling: Conflicting Theories.* Chicago: Aldine-Atherton. Pp. 1-62.

Barnett, S. A. (1968). The "instinct to teach." *Nature (Lond.), 220*: 747-749.

Crook, J. H., and Goss-Custard, J. D. (1972). Social Ethology. *Ann. Rev. Psychol., 23*: 277-312.
Fox, M. W. (1970). Neurobehavioral development and the genotype-environment interaction. *Q. Rev. Biol., 45*: 131-147.
Hall, K. R. L. (1963). Observational learning in monkeys and apes. *Brit. J. Psychol., 54*: 201-226.
Robert, M. (1970). Apprentissage vicariant chez l'animal et chez l'humain. *Ann. Psychol. (Paris), 70*: 505-542.
Warden, C. J., and Jackson, T. A. (1935). Imitative behavior in the rhesus monkey. *J. Genet. Psychol., 46*: 103-125.