Novel flexibility of social learning in dog puppies

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Summary

Social learning has a large impact on fitness by reducing the costs and dangers associated with independent learning but little research has been conducted to investigate the ontogeny or individual development of this type of learning. Recent research indicated that puppies demonstrate social learning to both conspecific and human demonstrators, but were also more likely to learn better from an unfamiliar conspecific compared to their mother.

Keywords Social learning · Ontogeny · Conspecifics · Retention · Dog puppies

The process by which individuals learn from others rather than through direct experience is referred to as social learning. Social learning has been demonstrated in a wide range of species (Heyes, 2012), suggesting that the ability to learn socially may have adaptive advantages that apply to a range of ethological niches. In addition to the focus on adaptive value, the study of social learning has been focused on determining the mechanisms that account for social learning, specifically by ruling out learning that might be attributed to non-social mechanisms (Zentall, 2012). Within this framework, many researchers very carefully design experiments to control for non-social learning mechanisms such as local and stimulus enhancement and social facilitation, i.e., the mere presence of another individual.

It is widely accepted that social learning has an impact on fitness, thereby reducing the costs and dangers associated with individual learning. This may be particularly advantageous to young individuals, especially in species that have relatively long-term parental care. However, research on the ontogeny and development of social learning has been limited. In one study (Adler and Adler, 1997) puppies observed a demonstrator puppy pull a food cart by means of a ribbon toward a window. Observer puppies were 21, 28, 38, and 60 days old at the beginning of the experiment. The findings showed that puppies in the three oldest groups were able to copy the correct response and this learning presumably paralleled

neurological development. Slabbert and Rasa (1997) tested 6-month-old puppies that were exposed to seeing their mothers search for and retrieve an odor-producing narcotic sachet. Pups that were able to watch their mothers perform this skill only 14 times between the ages of 6 and 12 weeks had significantly higher scores for performance of the same response in later life compared with pups lacking this exposure. Pups that only had a naïve mother as a model or those of trained mothers that were not given the opportunity to observe her retrieving narcotics had low scores for narcotics retrieval when tested for this ability at 6 months of age. Together, these studies indicate that social learning may be acquired at a relatively early age, at a time when the nervous system is still developing.

More recently, Fugazza, Moesta, Pogany, and Miklosi (2018) investigated the transfer of social information in 8-week-old puppies and whether any social learning that occurred would be retained. Observer puppies watched conspecific and human demonstrators open a puzzle box baited with food. The findings indicated that, similar to previous studies (Slabbert & Rasa, 1997), dogs as young as 8 weeks old developed social learning and they retained this information in their memory after an hour's delay. Consistent with previous research (see Zentall, 2012 for review), Fugazza et al. (2018) controlled for social facilitation processes in which the presence of another individual increases exploration and/or motivation, thereby increasing the likelihood of the correct response. They found that control puppies that were exposed to the demonstrator (conspecific or human), eating food near the apparatus, failed to acquire the correct response. Thus, they adequately controlled for social facilitation.

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Fugazza et al. (2018) also included two forms of the correct response, similar to the two-action method (Zentall, 2012). The two-action method allows for two distinct behaviors to be observed and copied to test for specificity of the copied response. It has been used to rule out non-social learning factors such as stimulus enhancement, which is drawing the attention of the observer to the stimulus by the demonstrator. In Fugazzi et al.'s study, puppies could use their paw or muzzle to lift a lid to a puzzle box or their muzzle to push the lid. Demonstrators varied between the use of their paw and muzzle, yet observer puppies invariably used their muzzle to open the puzzle box. The researchers suggested that the paw movement to open the box may have required more precise manipulative actions that were not yet developed in the puppies. However, the authors acknowledged that they could not rule out stimulus enhancement.

The crux of the research by Fugazza et al. (2018) appears to lie in what entities puppies learn from. For example, consistent with previous findings, they found that puppies learned the task, not only from a conspecific but also from a human demonstrator. The authors predicted this outcome because of the variable and complex nature of the social environment between dogs and humans. For example, dogs attend to certain cues given by humans, such as eye contact and vocal signals, and these cues were used by the human demonstrator. Also, the ability of dogs to acquire social information from humans develops early in ontogeny. This also demonstrates the flexibility of dogs to acquire information from heterospecific partners.

Unexpectedly, and perhaps the most novel finding of the study was that observer puppies appeared more likely to learn from an unfamiliar conspecific than their mothers. This is contradictory to the results obtained in other species. One potential explanation was that because the puppies may have been paying more attention to the unfamiliar (i.e., novel) dog compared to their mother, they may have had a greater opportunity to learn from the unfamiliar conspecific's demonstrations. Alternatively, the authors suggested that puppies may use different strategies to obtain food from their mothers and unfamiliar conspecifics and this may depend on their

interactions with them. For example, social learning may not be an optimal means of puppies to acquire food from their mothers. Regardless of the mechanism, the more complex nature of the social environment of conspecifics, their mothers, and humans appears to play a critical role in whether/how puppies learn socially from different models.

In summary, the findings of Fugazza et al. (2018) replicated previous findings with dog puppies. While the authors noted that their focus was on the ontogeny or development of social learning in puppies, they did not manipulate age as a variable to implicate ontogenetics as a factor of social learning per se. However, their hypothesis that the ability to learn socially develops early in dog puppies was supported. They also included at least one important control to demonstrate that their results were not due to social facilitation. However, they could not rule out other non-social learning processes such as stimulus enhancement. Their finding that dog puppies may learn better from unfamiliar conspecifics rather than their mother is interesting and suggests the need for further investigation about the role of the social environment of dog puppies in the acquisition of social learning. Future research in this area should focus on specifically controlling for and manipulating the social environment within the context of development.

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