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The influence of pets on infants' processing of cat and dog images☆

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ABSTRACT

We examined how experience at home with pets is related to infants' processing of animal stimuli in a standard laboratory procedure. We presented 6-month-old infants with photographs of cats or dogs and found that infants with pets at home ($N = 40$) responded differently to the pictures than infants without pets ($N = 40$). These results suggest that infants' experience in one context (at home) contributes to their processing of similar stimuli in a different context (the laboratory), and have implications for how infants' early experience shapes basic cognitive processing.

Despite the fact that experience is a factor in every theory of development, only recently have developmental psychologists set out to empirically understand *how* experience shapes development and to specify how infants' responding in the laboratory reflects early experiences. For example, work has examined how experience with certain types of faces (e.g., Caucasian faces, female faces) influences infants' preferences for and processing of particular types of faces (Bar-Haim, Ziv, Lamy, & Hodes, 2006; Quinn, Yahr, Kuhn, Slater, & Pascalils, 2002). It is not surprising that given the vast experience infants have with their caregiver that the gender and race of that caregiver would have a profound effect on their face processing (see Ramsey-Rennels & Langlois, 2006, for a discussion). Here we extended this previous work and examined how frequent exposure to and experience with a pet is related to infants' looking behavior toward images of animals in the laboratory.

Experience with pets may be an especially important aspect of infants' experience on development. About 50% of North American families have pets at home (Melson, 2003), and therefore it is a dimension of difference in experience. Thus, not only is it relatively easy to compare infants with and without pets, this is a real difference in experience among infants in North American homes. Any differences we observe in the laboratory as a function of pet experience therefore reflects actual differences in the experience during the daily lives of infants.

Experience and relationships with companion animals can have a profound effect on psychological functioning in older children and adults. For example, across the lifespan, relationships with animals have benefits for self-concept and self-esteem (Melson, Peet, & Sparks, 1992; Poresky, 1997; Van Houtee & Jarvis, 2002), empathy (Vizek-Vidovic, Lidija, Kerestes, Kuterovac-Jagodic, & Vlahovic-Stetic, 2001), and dealing with loneliness and bereavement (Sable, 1995). School-aged children report that their pets are among their closest companions and that they receive comfort and support from them (McNicholas & Collins, 2001; see also Myers, 1998). Moreover, mere exposure to animals may influence psychological func-

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tioning. One study revealed that preschoolers were more compliant on a modeling task in the presence of a dog (Gee, Sherlock, Bennett, & Harris, 2009).

Less is known about how pet exposure contributes to cognitive development. In general, content knowledge does impact cognitive development (Chi & Ceci, 1987). Experience with animals in particular does translate to deeper understanding of animals in school-aged children. Children who have pets demonstrate more sophisticated knowledge about and conceptions of similar animals (Prokop, Prokop, & Tunnicliffe, 2008). Hatano and Inagaki (1993) found that young children who had raised goldfish showed more advanced reasoning about other animals than did children who had not raised goldfish. Therefore, experience with pets may contribute to emerging conceptions of animals even in infancy.

Here we ask how infants' pet experience contributes to visual behavior in the laboratory when presented with images of cats and dogs. We modeled this work after studies revealing differences in infants' visual behavior toward images of faces as a function of their experience with particular types of faces. For example, Quinn et al. (2002) found that 3- to 4-month-old infants with female caregivers both prefer and better remember female faces than male faces, while infants with male caregivers apparently prefer the more familiar male faces. Similarly, by 3 months infants prefer (i.e., look longer at) faces from their own race (Bar-Haim et al., 2006), and by 9 months demonstrate better discrimination of faces matching their own race compared to faces of a different race (Kelly, Quinn, et al., 2007). One explanation for such findings is that experience with particular types of faces contributes to a developmental process of perceptual narrowing, similar to the development of phoneme discrimination in the domain of language development (Nelson, 2001). Support for this perspective comes from cross-species discrimination tasks in which 6-month olds, but not 9-month olds, can discriminate individual monkey faces (Pascalis, de Haan, & Nelson, 2002). Importantly, experience with monkey faces can extend infants' ability to discriminate individuals (Pascalis et al., 2005; Scott & Monesson, 2009).

Kovack-Lesh, Horst, and Oakes (2008) recently reported results suggesting that daily experience with a pet similarly influences infants' processing of images of animals. Specifically, Kovack-Lesh et al. found that 4-month-old infants with and without pet experience remembered and categorized images of cats differently (see also Kovack-Lesh, Oakes, & McMurray, 2010). In the present experiment, we extend this previous finding by comparing how 6-month-old infants who do and do not have dogs or cats at home look at images of dogs or cats. The results reported by Quinn et al. (2002) described earlier would predict that infants prefer—or look longer—at images of cats and dogs if they have pets at home than if they do not. This extension is important because although Kovack-Lesh et al. (2008) examined the effect of pets on infants' categorization and memory formation, the current methods allow us to examine the effect of experience during active processing of animal images.

It its worth noting that previous studies have not revealed strong relations between experience and behavior such as overall looking duration or decreases in looking across trials (Kelly, Quinn, et al., 2007; Kovack-Lesh et al., 2008; Kovack-Lesh et al., 2010; Quinn et al., 2002). But, these studies did not have as a primary goal to understand how infants' experience may have contributed to visual behaviors as they inspect and learn about images. Thus, the measures used and the analytic strategies adopted in previous studies may have masked subtle influences of experience on infants' responding. Therefore, here we more extensively examined, with more and more subtle measures, infants' visual behavior during a series of trials with images of cats or dogs to establish how infants' experience over a long timescale (i.e., their experiences during extensive casual exposure to a pet at home) contributes to behavior during such trials.

We presented 6-month-old infants with and without pets a series of pictures of cats or dogs and measured their looking behavior. We measured several aspects of infants' looking: duration of looking on each trial, number of looks on each trial, number of glances between the two images presented on each trial (or *switches*), duration of individual looks, and duration of looking between switches. Each of these measures is thought to reflect some aspect of infants' processing of visual stimuli. For example, infants look longer when shown stimuli that present more information to process than when shown stimuli that present less information to process (Cohen, 1998). The number of individual looks has been argued to be related to infants' control of attention—infants who can sustain attention to a stimulus longer will have fewer, longer looks (Jankowski, Rose, & Feldman, 2001). The number of switches between two simultaneously presented stimuli is thought to reflect the level of infants' comparison of the two stimuli (Rose, Feldman, & Jankowski, 2003; Ruff, 1975).

We predicted that infants who have pets at home would exhibit different patterns of looking than would infants who do not have pets at home. For example, based on findings that infants look longer at more familiar stimuli, such as faces that are the same gender or race as their caregivers compared to faces of different genders or races (Bar-Haim et al., 2006), we predicted that infants with pets would look longer at images of cats and dogs than infants without pets. We did not have specific predictions about the other measures. On the one hand, infants may be able to sustain their attention better to more familiar images, being less distracted by the presence of another image. In this case, we may observe that infants with pets had fewer looks than infants without pets. On the other hand, infants may be able to compare images presented side-by-side more effectively when they have more knowledge related to those images. In this case, infants with pets may have more looks and more switches than would infants without pets.

We also did not know *a priori* whether such effects would have the same level of specificity as the effect of experience with human faces on infants' looking—that is, we did not have *a priori* expectations about whether infants with cats would look longer at images of cats than at images of dogs or infants with dogs would look longer at images of dogs than at images of cats. Although older children and adults report that they have close relationships with pets that are an important part of their life (Melson, 2003), it is likely that on average infants' relationships and interactions with their household pets are qualitatively different than their relationships and interactions with the people in their lives. Thus, it would not be surprising