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Children's Preferences for Infantile Features in Dogs and Cats

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A number of authors suggest that children exhibit a natural interest towards animals, and different intervention programs have shown the presence of an animal being able to increase children's attentiveness and motivation levels. Nonetheless, few research efforts have been devoted to the identification of specific animal characteristics able to attract and engage children. It has been hypothesized that the presence of infantile features in the most common pets (and their appeal for humans) is involved in our motivational drive to pet-keeping and pet-caretaking. This study was aimed at assessing children's preference for faces of pets with presence (or absence) of infant features and the generalization of this response to an inanimate object, a teddy bear. Children (n = 272) aged 3 to 6 years participated in the study and were tested on a forced-choice task, using paired photographic stimuli. Children's preferences for different species (dogs and cats) and for animal over non–animal stimuli were also obtained and the effects of sex, age, and pet ownership analyzed. Overall, children showed a preference for more infantile cats, but no differences were found when they were asked to choose between dog faces. Moreover, children showed a preference for animal over non-animal stimuli and for dogs over cats. Factors such as sex, age, and familiarity with animals (i.e. ownership) were able to modulate their responses. Results and their implications for the child-animal bond are discussed.

Keywords: baby schema, children, pets, forced-choice task

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As first suggested by ethologist Konrad Lorenz, the mechanisms through which human adults become attracted to infants of their own species involve a response to a specific configuration of facial and bodily features, commonly found both in human and animal infants and defined as *Kindchenschema* (*baby schema*) (Lorenz, 1943). A large head and a round face, a high and protruding forehead, large and low-lying eyes, bulging cheeks, and a small nose and mouth are some of the components of the quality referred to in the literature as *babyness* which is perceived as attractive and cute by humans (Alley, 1981;

Berry & McArthur, 1985; Fullard & Reiling, 1976; Glocker et al., 2009a; Hildebrandt & Fitzgerald, 1979; Little, 2012; Lobmaier, Sprengelmeyer, Wiffen, & Perrett, 2010; Lorenz, 1943; Luo, Li, & Lee, 2011; Sternglanz, Gray, & Murakami, 1977). Together with behavioural traits, such morphological characteristics combine to elicit the following responses from adults: increased attention, positive affect, and protective behaviour as well as decreased likelihood of aggression towards the infant (Alley, 1983a, b; Brosch, Sander, & Scherer, 2007; Glocker et al., 2009a; Lorenz, 1943; Sternglanz et al., 1977). Several empirical studies have employed the use of pictures/drawing to analyze the appeal of baby schema for humans. In these studies, both children and adults have shown to consistently prefer images depicting subjects of baby-like appearance, particularly pictures of infants over those of adults (Berman, 1976; Berman, Cooper, Mansfield, Shields, & Abplanalp, 1975; Fullard & Reiling, 1976; Luo et al., 2011; Sanefuji, Ohgami, & Hashiya, 2007; Sternglanz et al., 1977).

Lorenz (1943) hypothesized that the human response to infantile features is not restricted to conspecifics (belonging to the same species), but can also be elicited by heterospecifics. A number of studies have demonstrated the generalization of the human attraction to infant-like stimuli, including animals (Archer & Monton, 2011; Fullard & Reiling, 1976; Little, 2012; Maestripieri & Pelka, 2002; Sanefuji et al., 2007), comic characters (Gould, 1979), and objects (Archer & Monton, 2011; Hinde & Barden, 1985; Miesler, Leder, & Herrmann, 2011). Recent findings on the neural basis of the baby schema response, and its extension beyond the mother-infant relationship context, may explain why we feel the urge to care for anything that resembles a baby. Using functional magnetic resonance imaging, it has been found that the baby schema activates a key structure of the mesocorticolimbic system mediating reward processing, suggesting its role in providing motivational drive to caretaking behaviour (Glocker et al., 2009b).

It is well known that some animals, such as the most common pet species (i.e., dogs and cats), exhibit both morphological and behavioural infantile characteristics (*neotenic features*), which may have been retained into adulthood as a by-product of the domestication process (Clutton-Brock, 1981; Frank & Frank, 1982; Hare & Tomasello, 2005; Lorenz, 1943; Morey, 1994; Price, 1999). Infantile characteristics have also been emphasized during human selection of certain breeds (e.g., lapdogs) for aesthetic reasons, and it has been hypothesized that such features (and their appeal for humans) combine to elicit emotional/affiliative responses towards pets and are involved in our motivational drive to pet-keeping and pet-caretaking (Archer, 1997; Archer & Monton, 2011). Previous studies have shown that infantile features present in images of young animals and in those of infant-like adults are able to affect both adults' and children's preferences for those images and their perceived cuteness (Archer & Monton, 2011; Fullard & Reiling, 1976; Little, 2012; Maestripieri & Pelka, 2002; Sanefuji et al., 2007). Sex and familiarity with animals may modulate such a response, as was shown in Archer and Monton's (2011) study in which women showed higher preference scores for pets with infant features than men, and pet owners rated pet faces as more attractive than non-pet owners, regardless of whether the faces had infant features (Archer & Monton, 2011). Analyses of age effect on preference for human and animal infantile stimuli produced conflicting results (Feldman, Nash, & Cutrona, 1977; Fullard & Reiling, 1976; Maestripieri & Pelka, 2002), and most previous studies that involved children as participants used stimuli not objectively quantified according to the baby schema content. Moreover, to our knowledge, no attempts have been made to analyze the response to both animate and inanimate infantile stimuli in children younger than 5 years.

The present study was aimed at assessing 3-6 year-old children's preference for infantile features using responses to a set of images depicting human babies, dogs, cats, and teddy bears. These pictures had been independently validated in adults and classified on the basis of an objective index of one aspect of the baby schema (i.e., *Facial index*, Archer & Monton, 2011). We used an experimental paradigm - a forced-choice task (Fisher et al., 1992) - in which two stimuli are simultaneously presented and participants are allowed to choose one since it is well suited to evaluate explicit preferences in young children (Schanding, Tingstrom, & Sterling-Turner, 2009). We assessed children's preference for faces of pets with presence (or absence) of infantile features and the generalization of this response to an inanimate object, a teddy bear. Children's preferences for different species (dogs and cats) and for animal over non–animal (i.e., human and inanimate) stimuli were also obtained, and the effects of sex, age, and presence of animals at home analyzed because these variables are likely to moderate preferences for infant features.

Following earlier findings on human adults' reaction to baby-like stimuli, we would expect a general preference for faces with infantile features over those without, girls to show greater preferences for infantile stimuli than boys, and pet owners to show greater preferences for pet faces than non-owners (Alley, 1983a, b; Archer & Monton, 2011; Feldman et al., 1977; Fullard & Reiling, 1976; Glocker et al., 2009a; Lobmaier et al., 2010). Owning cats or dogs may influence preferences, both for cat or dog faces with infant features and for cat or dog faces in general. A species-specific preference was shown in adult cat owners in Archer and Monton's (2011) study. Moreover, previous studies have shown an overall preference (i.e., look more and show more positive emotional responses) for animal over inanimate stimuli in infants as young as 4 months (DeLoache, Pickard, & LoBue, 2011), and different authors have suggested that children exhibit a natural interest in, and are particularly attracted to animals (Kahn, 1997; Kellert, 1985). According to this assumption, we would also expect a general preference for animal over non animal stimuli.

We therefore compared children's preferences either for particular classes of photographs, or preferences shown by different categories of participants, according to demographic information (sex and age), and information on presence of animals at home collected through teachers' and parents' collaboration.

Method

Participants

Participants were 272 children recruited in a public kindergarten in Ladispoli (Rome, Italy). Children's ages ranged from 2.9 to 6.3 years (M_{age}=53 months). The gender distribution was close to even with 50.4% (n=137) girls and 49.6% (n=135) boys. All children, with the exception of 10, had Italian nationality; 34% of children had one parent with a different nationality (mostly Rumanian and Polish). Exclusion criteria consisted of certified developmental disability, visual impairment, or an unwillingness to participate spontaneously. Parents of participating children gave written informed consent and filled in a questionnaire comprising children's demographic information and presence of animals at home. The authors, as well as the teachers, distributed the questionnaires to parents. Questionnaires were returned to school in a closed envelope to guarantee privacy.

Photographic stimuli

Eighteen colour photographs (originals courtesy Prof. Archer, University of Central Lancashire; Archer & Monton, 2011) served as stimuli (Figure 1). They portrayed frontal shots of the face of dogs, cats, babies, and teddy bears, reduced or enlarged so that they were equal in size. They comprised two each of the following categories: (a) puppy, (b)

adult dog with infant features, (c) adult dog without infant features, (d) kitten, (e) adult cat with infant features, (f) adult cat without infant features, (g) teddy bear with infant features, (h) teddy bear without infant features, and (i) human infant. Pictures of young individuals (human infants, puppies, kittens) and those of adult pets and teddy bears with infant features (for simplicity hereafter all called *Infantile* stimuli) had a relatively higher Facial Index (i.e., a measurement of the centre of the eye to the crown of the head divided by the centre of the eye to the base of the chin) than those of adult pets and teddy bears without infant features (for simplicity hereafter all called *Non Infantile* stimuli) (Archer & Monton, 2011).

Pictures were matched in order to have different comparisons, as shown in Table 1. In the *Infantile Condition,* two pictures (Infantile vs. Non Infantile) of the same subject (dog or cat or teddy bear) were matched (Comparisons 2-3; 5-6; 7). Moreover we compared children's preferences for young animals (i.e., puppies and kittens) with preferences shown for adult dogs and cats with infantile features (both Infantile stimuli; Comparisons 1 and 4). In the *Interspecies Condition* two pictures of different subjects (both of them Infantile or Non Infantile) were matched: dogs vs. cats and animal vs. non-animal (i.e. human infants and teddy bears) stimuli (Comparisons 8-16).

Figure 1. Photographs used: (in order): 1–2) human infants; (3–4) puppies; (5–6) kittens; (7–8) adult dogs with infant features; (9–10) adult cats with infant features; (11–12) adult dogs without infant features; (13–14) adult cats without infant features; (15–16) teddy bears with infant features; (17–18) teddy bears without infant features.

From "Preferences for Infant Facial Features in Pet Dogs and Cats", J. Archer and S. Monton, 2011, *Ethology, 117, 217–226.* Copyright (2011) by Wiley. Reprinted with permission.

Table 1

Criteria for stimuli matching

Infantile Condition		
Subject	Category	Comparisons
Cat	CK: kitten CW: adult cats with infant features CO: adult cats without infant features	1. CK-CW 2. CK-CO 3. CW-CO
Dog	DP: puppies DW: adult dogs with infant features DO: adult dogs without infant features	4. DP-DW 5. DP-DO 6. DW-DO
Teddy bear	TW: teddy bears with infant features TO: teddy bears without infant features	7. TW-TO
Interspecies Condition		
Subject	Category	Comparisons
Dog vs. Cat	DP: puppies CK: kitten	8. DP-CK
	DW: adult dogs with infant features CW: adult cats with infant features	9. DW-CW
	DO: adult dogs without infant features CO: adult cats without infant features	10. DO-CO
Human vs. Animal	H: human infants DP: puppies	11. H-DP
	H: human infants CK: kittens	12. H-CK
Teddy bear vs. Animal	TW: teddy bears with infant features DW: adult dogs with infant features	13. TW-DW
	TO: teddy bears without infant features DO: adult dogs without infant features	14. TO-DO
	TW: teddy bears with infant features CW: adult cats with infant features	15. TW-CW
	TO: teddy bears without infant features CO: adult cats without infant features	16. TO-CO

Note. CK=kittens; CW=adult cats with infant features; CO=adult cats without infant features; DP=puppies; DW=adult dogs with infant features; DO=adult dogs without infant features; TW=teddy bears with infant features; TO=teddy bears without infant features.

Procedure

Participants were tested during school hours in a dedicated familiar room. One experimenter tested all children. Each child followed the experimenter after being asked if he/she would like to leave the classroom to go to play with a laptop. Only in those cases when children were not comfortable following the experimenter was the teacher asked to help take the child outside the classroom. The test started when the child was ready. Each child was tested individually. He/she was asked to sit in front of a monitor (screen size: 15.4'') and the experimenter sat next to him/her. Pairs of stimuli (16 different comparisons shown in Table 1) were presented in sequence. Since each category is represented in the original study (Archer & Monton, 2011) with 2 different pictures, 4 pairs of pictures were possible for each comparison. Picture pairing and left-right position of each picture was counterbalanced between subjects, with the constraint that each child could not be presented with the same picture more than twice. Order of pairs' presentation (serial

position) was randomized between subjects. Once each pair of images was presented, the experimenter asked "*Which one do you like more?*" (if the child did not answer, the experimenter asked again "*Which one do you prefer?*") and preferences were collected in a check-sheet. Both verbal and non-verbal (i.e., pointing gesture) responses were accepted (Figure 2). The study took place from November 2011 to May 2012. Testing sessions occurred in the morning (from 9am to 1pm).

Figure 2. Gestural (i.e. pointing) response during a testing session

Statistical Analysis

The data were analyzed using Stata/SE 12.1(StataCorp, College Station, Texas, USA). Since children were asked to choose between two photographs, there were only two possible outcomes. Children's preferences for one of the two images presented were recorded and stored as 0-1 data (0=not chosen, 1=chosen). Children's preferences were evaluated with the binomial probability test of the null hypothesis that the two outcomes have equal probabilities (the two images are equally chosen). When other variables were involved (i.e., age, sex, pet ownership, cat/dog ownership), logistic regression was used, a statistical method for analyzing a dataset in which there are one or more independent variables that may determine a dichotomous outcome. A p-value ≤ 0.05 was accepted as statistically significant.

Results

Preference for infant features

In the Infantile Condition, children's preferences for two pictures (Infantile vs. Non Infantile and young vs. adults with infantile features) of the same subject (dog or cat or teddy bear) were assessed (see Table 1).

In the case of cats, children showed a preference for kittens and for more infantile stimuli in every comparison. Pictures of kittens were preferred to those of adult cats with and without infant features (Binomial test, $p<0.0001$, $n=272$ for both comparisons) and children preferred adult cats with infant features to those without (Binomial test, $p<0.0001$, $n=272$). When children were asked to choose between two photographs portraying dogs, they did not show preferences either for puppies or for more infantile adult dog in any comparison (dog puppies vs. adult dogs with infant features: Binomial test, $p=0.3026$; dog puppies vs. adult dogs without infant features: Binomial test, $p=0.9516$; adult dogs with vs. adult dogs without infant features: Binomial test, $p=0.7618$, $n=272$). When presented with pictures of an inanimate object, children showed a preference for teddy bear faces with infant features over those without (Binomial test, $p<0.0001$, $n=272$).

Preference for dog over cat faces

In Interspecies Condition, preferences for pictures of dog vs. cat faces were assessed. Children showed a preference for dog faces in every comparison: Children preferred faces of puppies to faces of kittens (Binomial test, $p=0.0003$, $n=272$), faces of adult dogs to those of adult cats with infant features (Binomial test, $p=0.0062$, $n=272$), and faces of adult dogs to those of adult cats without infant features (Binomial test, $p<0.0001$, $n=272$) (Figure 3).

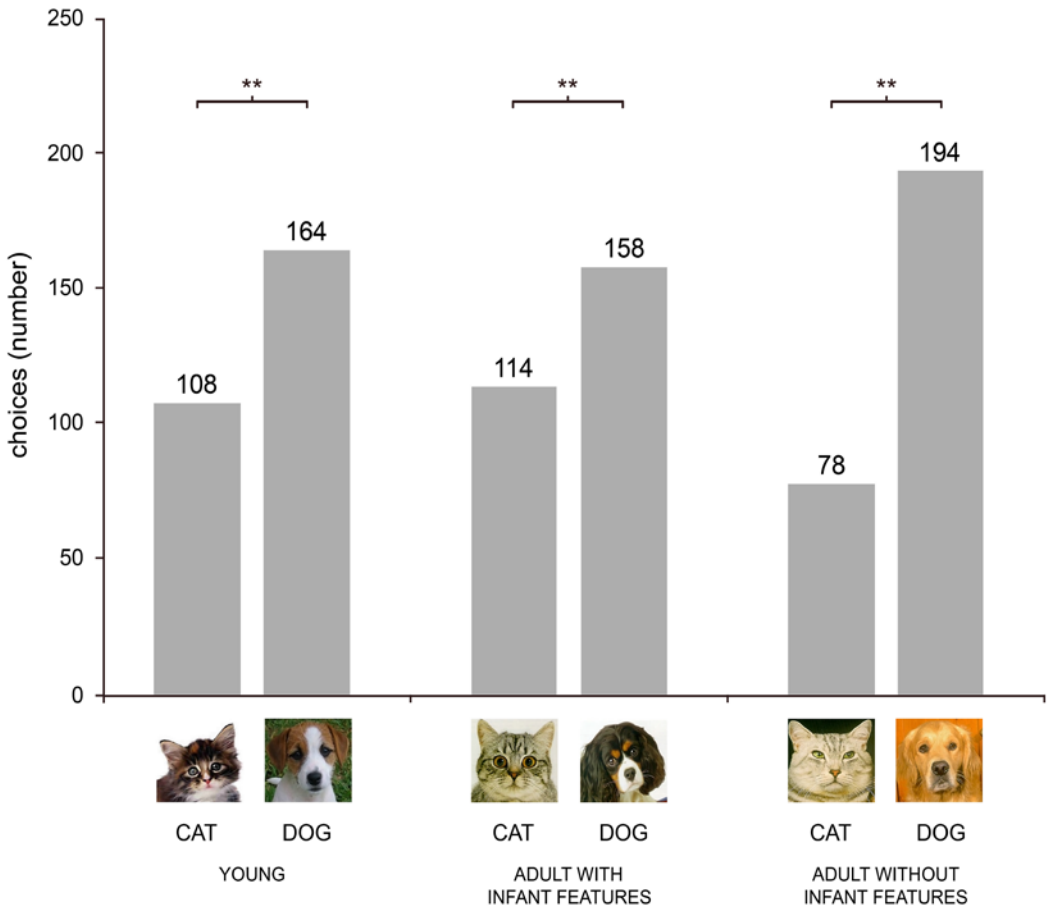

Figure 3. Interspecies Condition. Children's preferences (number of choices = number of children) between dogs and cats.
** Binomial test, $p<0.01$. (n=272).

Preference for animal over non animal faces

In Interspecies Condition, children's preferences for pictures depicting animals over non-animal (i.e. human infants and teddy bears) images were assessed.

Children showed a preference both for faces of dog puppies (Binomial test, $p<0.0001$, n=272) and for faces of kittens (Binomial test, $p<0.0001$, n=272) over human infants (Figure 4).

When choosing between dogs and teddy bears, children showed a preference for faces of dogs (both with and without infant features) over those of teddy bears (Binomial test, $p<0.0001$ for both comparisons, n=272; Figure 5a). Moreover children preferred faces of cats to faces of teddy bears with infant features (Binomial test, $p<0.0001$, n=272), but no preference was shown when they were asked to choose between faces of cats and teddy bears without infant features (Binomial test, $p=0.7618$, n=272) (Figure 5b).

Effect of sex and age

We obtained demographic information (sex and date of birth) from all participants (n=272). In order to assess the effect of sex and age on children preferences for infantile features, for different species (dogs and cats) and for animal (over non-animal) stimuli, a two-predictor logistic model was fitted to the data. The two predictors were sex and age (above and below mean: Group 1 < 53 months, Group 2 > 53 months).[1]

[1] Group 1 (n=136): girls n=68, boys n=68; Group 2 (n=136): girls n=69, boys n=67)

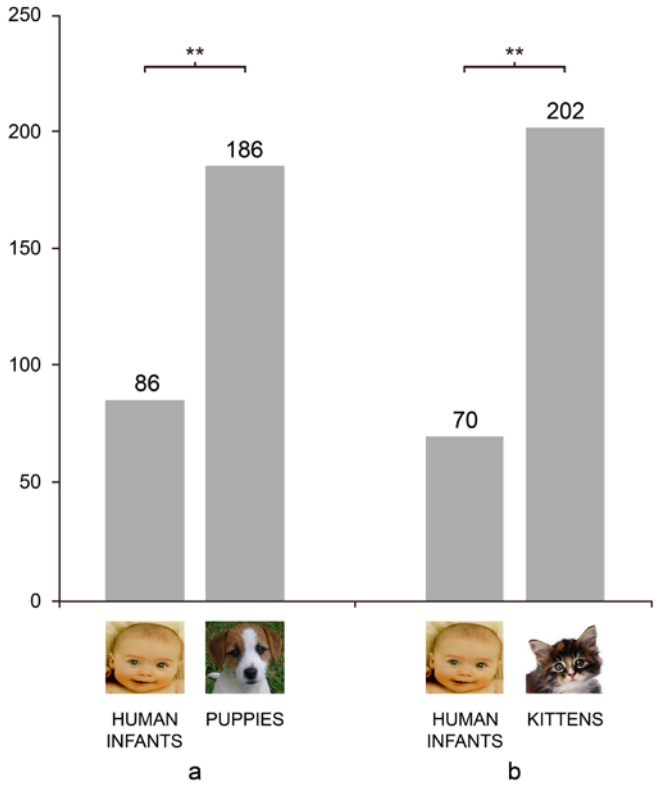

Figure 4. Interspecies Condition. Children's preferences (number of choices = number of children) for human infants and puppies (a) and for human infants and kittens (b).
** Binomial test, $p<0.01$. (n=272).

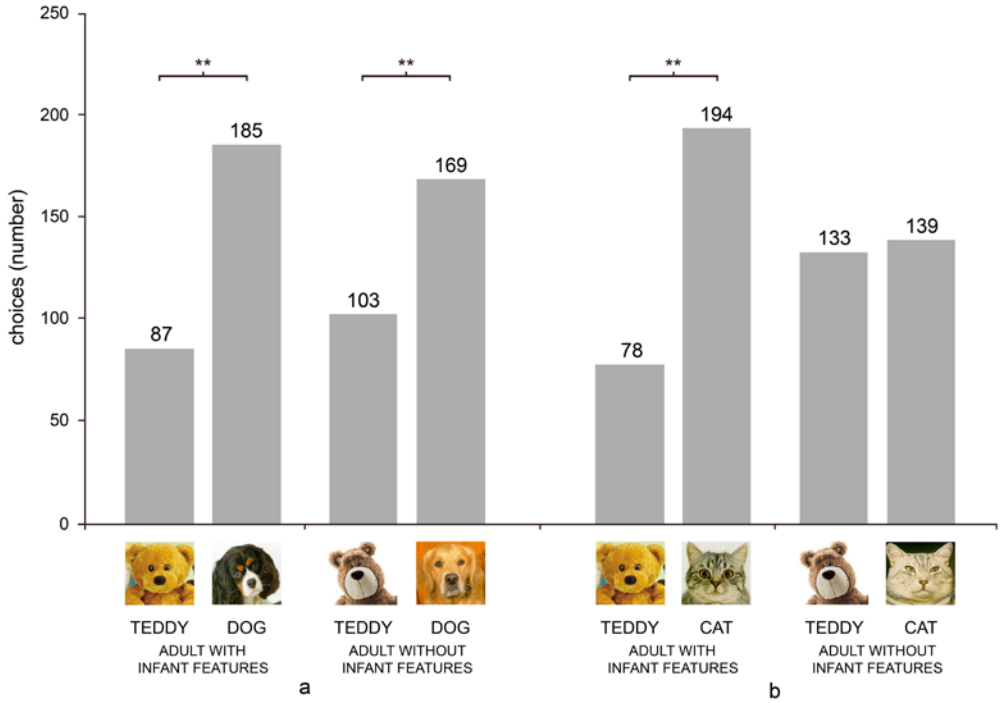

Figure 5. Interspecies Condition. Children's preferences (number of choices = number of children) for teddy bears and dogs (a) and for teddy bears and cats (b).
** Binomial test, $p<0.01$. (n=272)

Table 2

Logistic Regression Table. Effect of sex and age on children's preferences (Infantile Condition), n=272

Comparisons	Predictor	Odds Ratio	Std. Err	z	p>|z|	[95% Conf.	Interval]
a. CK (*vs.* CW)	Sex	1.475155	.6006605	0.95	0.340	.6641124	3.276679
	Age	1.514493	.6043171	1.04	0.298	.6928167	3.310671
	Sex*Age	.4019139	.2252605	-1.63	0.104	.1339863	1.205606
	constant	2.421053	.6602451	3.24	0.001	1.418643	4.131762
b. CK (vs. CO)	Sex	1.103909	.3923534	0.28	0.781	.5500446	2.215486
	Age	1.363248	.478982	0.88	0.378	.6847028	2.714236
	Sex*Age	2.255855	1.184895	1.55	0.121	.8057766	6.315499
	constant	1.241379	.3097497	0.87	0.386	.7612235	.024402
c. CW (*vs.* CO)	Sex	.6216006	.2216894	-1.33	0.182	.3089844	1.250508
	Age	**.3356643**	**.1239412**	**-2.96**	**0.003**	**.1627819**	**6921564**
	Sex*Age	1.304562	.6928	0.50	0.617	.4607083	3.694055
	constant	1.03125	.2558519	0.12	0.901	.6341352	1.67705
d. DP (*vs.* DW)	Sex	1.09899	.3874592	0.27	0.789	.550674	2.193274
	Age	1.087236	.3748727	0.24	0.808	.5531392	2.137043
	Sex*Age	.9837043	.4788238	-0.03	0.973	.3789111	2.553829
	constant	1.03125	.2558519	0.12	0.901	.6341352	1.67705
e. DP (*vs.* DO)	**Sex**	**2.230415**	**.8131305**	**2.20**	**0.028**	**1.09161**	**4.557258**
	Age	1.868726	.66773	1.75	0.080	.9276747	3.764398
	Sex*Age	1.02633	.5155327	0.05	0.959	.3834622	2.746955
	constant	.4772727	.1265865	-2.79	0.005	.2837942	.8026566
f. DW (*vs.* DO)	**Sex**	**2.192593**	**.7876996**	**2.19**	**0.029**	**1.084325**	**4.433597**
	Age	1.347368	.4717056	0.85	0.394	.6784	2.676005
	Sex*Age	.8704226	.4304558	-0.28	0.779	.3302022	2.29446
	constant	.625	.1593444	-1.84	0.065	.3791974	1.030136
g. TW (*vs.* TO)	Sex	1.72859	.6218639	1.52	0.128	.854025	3.498755
	Age	1.219941	.4216343	0.58	0.565	.6196522	2.401762
	Sex*Age	1.937889	1.017527	1.26	0.208	.6924504	5.42337
	constant	1.03125	.2558519	0.12	0.901	.6341352	1.67705

Note. CK=kittens; CW=adult cats with infant features; CO=adult cats without infant features; DP=puppies; DW=adult dogs with infant features; DO=adult dogs without infant features; TW=teddy bears with infant features; TO=teddy bears without infant features.

Infantile Condition. Children's preference for images of more infantile cats was not affected by sex, but was negatively related to age for one comparison (Table 2a-c): The odds of a child choosing pictures of adult cats without infant features (over those with) was more likely to occur in Group 2 (Table 2c). When children were asked to choose between two dogs, the likelihood of choosing infantile dog pictures (both puppies and adult dogs with infant features over those without) was higher in girls than in boys and was not affected by age (Table 2d-f). No effect of sex and age was found on children's preferences for teddy bears with infant features over those without (Table 2g). No interaction effects between sex and age were found.

Interspecies Condition. Sex and age had no effect on children's preferences for dogs

(over cats) and for animal (over non-animal) stimuli (all p> 0.05).

Effect of having animals at home

We obtained information on the presence of animals at home from 162 of 272 children tested, whose parents filled out the questionnaires (completion rate of 59.5%). There were 57 dog and cat owners (*pet owners*), 22 *other animal owners* (most of them owned turtles, birds, rabbits, and other small mammals) [2] and 83 *non-owners*. [3] Of the pet owners, 34 owned dogs, 12 owned cats, and 11 owned both dogs and cats.

Infantile Condition. In order to assess if having pets at home modulated children's preference for infantile characteristics present in the faces of pets, as well as in teddy bears, we analysed the effect of pet ownership (and its possible interaction effects with sex and age) using a logistic regression model with pet ownership, sex, and age as predictors. Having pets at home did not influence children's preferences for infantile features: neither effects of pet ownership nor interaction effects between pet ownership and sex and age were found (all p> 0.05). In order to investigate possible species-specific preferences for infantile features, a logistic regression was also performed with cat ownership and dog ownership entered as independent variables. No significant effects were found.

Interspecies Condition. One of our hypotheses was that owning cats or dogs may influence preferences not only for cat or dog faces with infantile features, but also for cat or dog faces in general. Our analyses showed a species-specific effect in children's preferences for different species (dogs and cats). Although overall children preferred images of dogs over those of cats (see above), the likelihood of choosing images of cats was higher in children who had cats at home than in those who had not (Logistic regression, Predictor cat ownership: DW, adult dogs with infant features vs. CW, adult cats with infant features: odds ratio=0.305, Std. Err=0.1919, z=-1.90, p=0.057; DO, adult dogs without infant features vs. CO, adult cats without infant features: odds ratio=0.3349, Std. Err=0.1600, z=-2.29, p=0.022). No effect of dog ownership was found in children's preferences for dog over cat faces (all p> 0.05).

Neither cat ownership nor dog ownership influenced children's preferences for animal over non-animal (human and teddy bear) stimuli.

Discussion

In this study, we analyzed children's preferences for photographic stimuli showing both inanimate and animate (humans and animals) subjects. Our working hypothesis was that children would show a general preference for faces with infantile features over those without. Moreover, we expected girls to show greater preferences for infantile stimuli than boys and pet owners to show greater preferences for pet faces than non-owners. Following earlier findings on children' reaction to animal stimuli, we also expected a general preference for animal over non-animal stimuli. To our knowledge this is the first study to analyze preferences for infantile features present in faces of pets (i.e., dogs and cats), as well as in inanimate objects (i.e., teddy bears) shown by children as young as 3 years. The experimental procedure (i.e., forced-choice task) appeared well suited for assessing preferences in young children, all of whom completed the testing session and appeared to enjoy it.

Results from this study partially support our initial hypotheses. Overall, children showed a preference for more infantile cats, and were able to discriminate the presence of infant features also in an inanimate stimulus, suggesting the generalization of children's response to an infantile configuration. These

[2] Respondents who owned both pets and other animal species where considered pet owners.

[3] Pet owners: M_{age}=53 months, 49.1% girls, 50.9% boys; Other animals owners and Non owners together: M_{age}=52 months, 47.1% girls, 52.9% boys

results are consistent with those obtained by Archer and Monton (2011) through the analysis of adults' preferences based on the same set of stimuli. By contrast, in our study, children showed no specific preferences for more infantile dogs. Together with preferences shown by children for dog over cat faces in every comparison and with the failure of dog ownership in predicting preferences, this result suggests that children are particularly attracted to dogs (and prefer them over cats), regardless of whether the dogs have infantile features and regardless of participants' familiarity with them. However, it should be taken into account that there is a strong sex effect found for dog preferential choices, indicating that girls are more likely to prefer infantile dogs than boys. In Archer and Monton's (2011) study, women showed higher attractiveness scores for pets with infantile features than men. In our study, girls showed a higher preference for infantile traits than boys only when they had to choose between dogs (children's favorite species). By contrast, boys and girls equally preferred pictures of more infantile cats. Although data are still conflicted (Parsons, Young, Kumari, Stein, & Kringelbach, 2011), a number of behavioural studies have shown women to be more responsive to the baby schema: they not only tend to be more attracted to and prefer baby-like stimuli, but they also appear more motivated to exhibit nurturing behaviour towards infants than men (Alley, 1983a,b; Berman, 1980; Feldman et al., 1977; Glocker et al., 2009a; Hildebrandt & Fitzgerald, 1979; Lobmaier et al., 2010; Maestripieri & Pelka, 2002; Sprengelmeyer et al., 2009; Sternglanz et al., 1977). Early attraction to infants might facilitate the acquisition of mothering skills prior to the onset of reproductive activity. However, further studies are needed to definitively answer the question as to whether a tendency towards nurturing behaviour is already present in children, particularly in girls, at an early stage of development (from 3 years of age), and if such predisposition could be extended to include the human-animal bond. Gender differences in cultural conditioning and experiences, such as exposure to media and toys, which encourage caring behaviours in girls, are well-known. The possibility that such factors may also influence our relationship with pets (especially when they are puppies or kittens) from an early stage of development remains unexplored (Melson & Fogel, 1996). It would also be important to assess whether girls' preferences for infantile traits is caused by differences in the motivation to care for young animals, or by perceptual differences. In this context, the analysis of children's perceptions of cuteness as well as their responses when questioned about caretaking tasks - in which participants are asked to rate the extent of their motivation to take care of the subject in the picture – might help elucidate this issue and could be particularly useful (Glocker et al., 2009a).

Interestingly, when we analyzed the effect of age and familiarity with pet animals (i.e., pet-ownership) to explore the role of experience in modulating individual responses to stimuli presented, we found that pet ownership had no effect on children's preferences for infantile features present either in dogs or in cats; although, familiarity with a species was able to modulate species-specific preferences. In fact, overall children showed a preference for images of dogs over those of cats, but the likelihood of choosing images of cats (independently from infantile features) over those of dogs was higher in children who had cats at home than in those who did not. Moreover, the likelihood of a child choosing pictures of adult cats without infant features - which represented the least favourite stimulus and not preferred over an inanimate object (teddy bear) – was more likely in older children. These results seem to suggest that children learn to appreciate non-preferred animals through age and familiarity. However, this notion should be treated with caution, especially in consideration of the small number of cat owners enrolled in this study. Future studies should consider not only

information on the presence/absence of animals at home, but also children's attachment to pets, which may better inform about the effects of growing with animals on children attitudes (Daly & Morton, 2009; Zasloff, 1996). Moreover, since home environment seems to impact children's perspectives, the effects of living with siblings (in particular infant siblings) should be taken into account in future studies.

Overall, children showed a preference for animal over non-animal (i.e., human and teddy bear) stimuli. In Archer and Monton's (2011) study, when asked to rate photographs for their attractiveness, adult participants showed a preference for faces with infantile features but, differently from children in our study, they found photographs of puppies and kittens to be as attractive as those of human infants. It has been hypothesized that children exhibit a strong interest towards animals (Kahn, 1997; Kellert, 1985) and a greater attraction to animal stimuli has been shown in children as young as 4 months (DeLoache et al., 2011). Results from the present study seem to confirm this notion and represent further evidence that there are not individual differences in children's strong preference for animals as a function of either sex/age or prior experience with animals (DeLoache et al., 2011). Nonetheless, more research is needed to investigate human preferences and attitudes towards animals and their change during development. In children, this consideration is of particular importance since the positive contribution of growing up with animals on emotional development, attentiveness, motivation levels, and sense of responsibility are well recognized (for a review see Cirulli, Borgi, Berry, Francia, & Alleva, 2011; Endenburg & van Lith, 2011). Nonetheless, few research efforts have been devoted to the identification of specific animal features able to attract and engage children. The analysis of specific animal characteristics able to elicit emotional/affiliative responses in children could ultimately help develop interventions for children with difficulty in the social/emotional domains by providing salient and emotionally relevant stimuli (Berry, Borgi, Francia, Alleva, & Cirulli, 2013). This also may have implications for some of the questions raised about the inclusion of animals in Animal Assisted Interventions (AAI) (Marino, 2012).

Although results from the present study may represent a further step towards understanding those factors underlying human preference for other animal species and its development, a note of caution must be offered. The original set of pictures has been classified only on the basis of the Facial Index, which gives one objective aspect of the baby schema; it does not measure other characteristics such as large eyes (Archer & Monton, 2011). Moreover, pictures were subjectively selected by the authors, have different backgrounds (as well as colouration and expression), and the set was limited to two images per category, so that pictures might not be highly representative of each category. Although we used this set of images in order to compare and contrast our data with previous results, future studies should utilize stimuli with objectively quantified baby schema that retain all the characteristics of the portrait (Glocker et al., 2009a). This standardization could be of help in future systematic research of this subject. For example, comparative studies of different breeds of dogs in terms of their possession of baby facial features and its association with behavioural neoteny are lacking (Coppinger et al., 1987).

Conclusions and Future Prospects

Overall, the present study suggests that the ability to identify and prefer selected infantile features may emerge during early development. Preferences for baby schema appear to be species-specific and more pronounced in girls. Familiarity with an animal seems able to modulate preferences, particularly for less popular species (i.e., cats), a notion that underlines the importance of educational programs to promote child-animal relationships. Studies are currently in progress

to better standardize stimuli and take into account other baby schema features (both morphological and behavioural). More research will also be needed to explore the possibility that factors such as experience and learning may influence our relationship with pets from an early stage of development. A major discrepancy between results obtained using measures of behavioural interest and those obtained using picture preference measures can occur (Berman, 1980). Therefore, both behavioural (direct observations) and questionnaire-based studies (to assess children's roles and responsibilities in caring for pets at home) as well as gender differences in attachment to pets should be encouraged to address this issue (Herzog, 2007).

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