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The Emotional Lives of Companion Animals: Attachment and Subjective Claims by Owners of Cats and Dogs

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ABSTRACT There is a growing body of scientific evidence supporting the existence of emotions in nonhuman animals. Companion-animal owners show a strong connection and attachment to their animals and readily assign emotions to them. In this paper we present information on how the attachment level of companion-animal owners correlates with their attribution of emotions to their companion cat or dog and their attribution of mirrored emotions. The results of an online questionnaire, completed by 1,023 Dutch-speaking cat and/or dog owners (mainly in the Netherlands and Belgium), suggest that owners attribute several emotions to their pets. Respondents attributed all posited basic (anger, joy [happiness], fear, surprise, disgust, and sadness) and complex (shame, jealousy, disappointment, and compassion) emotions to their companion animals, with a general trend toward basic emotions (with the exception of sadness) being more commonly attributed than complex emotions. All pet owners showed strong attachment to their companion animal(s), with the degree of attachment (of both cat and dog owners) varying significantly with education level and gender. Owners who ascribed human characteristics to their dog or cat also scored higher on the Pet Bonding Scale (PBS). Finally, owners who found it pleasant to pet their dog or cat had a higher average PBS score than those who did not like to do so. The relationship between owners' attributions of mirrored emotions and the degree of attachment to dogs was significant for all emotions, whilst for cats this relationship was significant only for joy, sadness, surprise, shame, disappointment, and compassion.

Keywords: attachment, cats, companion animals, dogs, emotions

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Companion-animal owners express strong emotional connections to their animals (Hall et al. 2004), often considering them part of the family and providing them with levels of affection, comfort, and support similar to that of another human family member (Wrobel and Dye 2003; Donohue 2005; Zilcha-Mano, Mikulincer and Shaver 2011). Additionally, companion animals can fulfill "basic social needs" of their owners, such as emotional closeness (attachment), social integration, reassurance of worth, reliable alliance, guidance, and the opportunity for nurturance (Enders-Slegers 2000; Kurdek 2009; Wang et al. 2013).

Emotions can act as a process to mobilize behavioral and physiological processes in response to stimuli that subsequently allow animals to avoid harm or approach resources, functioning to improve their chance of survival (Rolls 2000; Boissy et al. 2007). Electrical stimulation of the brains of both human and nonhuman animals has evidenced that all mammals have similar brain structures and similar unconditioned emotional responses (Panksepp 2011). It is therefore plausible that both intra and inter-species understanding and mirroring of emotions may occur (Rizolatti, Fogassi and Gallese 2001). Emotion contagion is a phenomenon that causes animals, upon perceiving other animals in a particular emotional state (e.g., fear), to shift their own affective state in the same direction (Špinka 2012). In human-to-human attachment relationships, participants "attune" to each other's emotions and behavior (Fogel 1993; Van Geert and Steenbeek 2005). This social referencing is well documented in children, who look to their parents in unfamiliar situations to "mirror" their parent's appraisal of the situation (Feldman 2003). Additionally, animals have been evidenced to both emit and detect emotional signals; for example, in cattle undergoing stressful events, the social group can lower an individual's arousal level (Veissier and le Neindre 1992; Bouissou et al. 2001; Merola, Prato-Previde and Marchall-Pescini 2012). In the case of inter-species social referencing, dogs have been repeatedly documented to refer to their owners' appraisal and portrayed emotional messages to seek information about a situation and determine their behavior (Merola, Prato-Previde and Marchall-Pescini 2012; Hare and Woods 2013; Wang et al. 2013).

A recent fMRI study demonstrated that companion-animal owners report parallel emotional ratings when presented with an image of their child and their companion dog, and that these images elicit greater positive emotional (neural) responses than pictures of unfamiliar children and unfamiliar dogs (Stoeckel et al. 2014). Research carried out by Costa et al. (2014), which asked humans to identify the facial expressions in pictures of (unfamiliar) dogs, showed that professionals and dog owners recognized emotions significantly better than people who did not have experience with dogs.

It is obviously unknown as to whether animals experience emotions in the same way as humans. There is a fundamental difficulty in measurement (and determination of existence) of animal emotions because animals are unable to vocalize their experiences in the same way as humans. However, there is general agreement that basic (or primary) emotions such as anger, joy, sadness, surprise, disgust, and fear can be found across a wide range of (vertebrate) species (Panksepp 1982; Le Doux 1996; Boissy et al. 2007). Complex (or secondary) emotions such as shame, jealousy, disappointment, and compassion are often restricted to humans and other primates (Preston and De Waal 2002), with relatively sparse claims that they exist in (non-primate) animals (Bekoff 2002). A notable exception is the recent work of Steiner and Redish (2014) who evidenced that rats are capable of experiencing regret.

Companion animal–owner relationships, lasting for several years in most cases, provide owners with a unique perspective (Reddy and Morris 2006), potentially providing a source of

enquiry into animal emotions that is not readily available to the outside observer. Rather than being confounded by anthropomorphic interpretations, owner reports have been demonstrated to provide reliable and consistent interpretation of their animal's behavior (Morris, Doe and Godsell 2008; Mariti et al. 2012). Additionally, owners are the primary source of information regarding companion-animal behavior problems (Bennett and Rohlf 2007; Blackwell et al. 2008; Arhant et al. 2010), and are able to identify overt behavioral indicators of stress (e.g., trembling, crying, or excessive barking), indicative of reduced welfare (Mariti et al. 2012). In detailed reviews the value of observer assessments (when used in careful experimental design) in investigating animal welfare are described (Wemelsfelder 1997; Meagher 2009). Of particular interest are studies correlating human assessment of an animal's emotional experience with physical and physiological measures of stress in animals (Minero et al. 2009; Stockman et al. 2012), inferring some verisimilitude in human assessment of animals' emotional experiences.

A large body of literature documents how demographic variables influence attitudes toward animals (for a summary, see Walker et al. 2014b), yet the amount of research investigating the correlation between demographics (both owner and animal) and the attribution of emotions to animals is limited. Recent research by Walker et al. (2014a,b) demonstrates that experience (in the form of animal ownership) and gender (female) are positively correlated with attributions of grief, anxiety, and depression to animals, and Morris, Knight and Lesley (2012) demonstrated that owners of a particular species report a greater range of emotions for that species than for species they do not own. Additionally, previous research has demonstrated that increased attachment levels result in the increased use of emotive terms to describe animal behavior (Kiesler, Lee and Kramer 2006). Other studies have shown that owners attribute advanced human capabilities and emotions to their own animals but not to animals owned by others (Sanders 1993; Fidler, Light and Costall 1996; Bahlig-Pieren and Turner 1999), which may be the result of differing attachment levels. In this study we aimed to extend the knowledge of demographic variables that underpin owner attribution of emotions to companion animals for six basic emotions: anger, joy (happiness), fear, surprise, disgust, and sadness, and four complex emotions: shame, jealousy, disappointment, compassion. Additionally, we investigated how owner attachment influences the attribution of (mirrored) emotions to animals.

Methods

Questionnaire

Research into owners' perceptions of their companion-animals' (dog or cat only) emotional experiences, and levels of attachment to their companion animal, was conducted in the period February–May 2014. During this period, an online survey (in Dutch) was distributed via the networks of the authors of this paper. By means of snowball sampling (Goodman 1961) amongst cat and/or dog-owners, 1,023 questionnaires were completed and returned. The group of respondents that filled in the questionnaire owned a dog and/or cat (or several of them). Owners were asked to respond for only one companion animal. Where an owner had more than one pet, they were asked to fill in the questionnaire for the animal which they had owned the longest. The majority of the respondents lived in Belgium and The Netherlands (95.7%). Fifty-seven percent of the questionnaires were completed pertaining to dogs and 43% pertained to cats.

The questionnaire consisted of four sections. In the first section, respondents were asked about the basic characteristics of their pet (species, breed, age, size, sex, neuter status, and health status) and husbandry practices (How often do you go to the vet? How often do you

feed your dog/cat (and how much)? How often do you brush you dog/cat? Can your dog/cat stay alone at home? Where does your dog/cat sleep? Who is taking care of your dog/cat when you are not around? How often and how long do you go for a walk with the dog? Is your dog friendly toward strangers? How often does your cat go outside? How often is the litter changed? Does your cat sit frequently on your lap?). Respondents were also asked why and where they got their pet, if they were the main caregiver of the pet, and how many years they owned their pet.

In the second section, the Pet Bonding Scale (PBS) (Angle 2007) was used to measure an owner's attachment to their companion cat or dog. Over the past four decades a number of scales designed to measure this attachment have been developed, validated, and reported in peer-reviewed literature (Anderson 2007). Although, like most measures of the human–animal bond, the PBS can be susceptible to social desirability and the "halo effect" (Anderson 2007), we chose it for its conciseness of design, which allowed us to arrive at a single aggregated outcome. In brief, the PBS includes 25 questions that each owner is requested to answer using one of five possible values: (0) strongly disagree, (1) somewhat disagree, (2) neutral, (3) somewhat agree, or (4) strongly agree. A high score on a question indicates strong attachment and the sum of the scores provides a measure of the overall strength of the owner's attachment to their companion animal. Examples of questions are: "I have warm feelings when I think about my pet" and "My pet makes me feel important; I like to talk to my pet about things that are important to me." Additionally, we asked respondents how they communicated with their companion animal (e.g., talking, petting) and how their pet communicated with them (e.g., meowing/barking, body language, touching, looking, scratching, sniffing).

In the third section, the respondents were given a list of six primary (anger, joy [happiness], fear, surprise, disgust, and sadness) and four secondary emotions (shame, jealousy, disappointment, compassion) as described by Ekman (2003). Respondents were asked if they had witnessed any (or all) of these emotions in their companion animal, and if they thought that these emotions had been influenced by their own behavior (mirroring emotions [attunement of the emotions of the owner and the pet]), by choosing one of the following response options: "never," "sometimes," "often," and "no idea."

Finally, in the fourth section, the questionnaire collected information on respondent demographics, including gender (9% male; 91% female), nationality (17.5% Belgium; 78.2% Netherlands, 4.3% other), age (mean 43.1 years, SD = 12.8), highest level of education (51.8% higher education or university diploma), composition of household (48.3% couples without children; 20.7% couples with children; 19.1% single without children; 5.1% single with children; 6.8% other), and housing (22.3% apartment; 29.6% detached house; 48,1% semi-detached house).

Statistical Analysis

The relationships between demographic variables and respondents' attributions of emotions to their pet were analyzed using IBM SPSS 20 (Armonk, NY, USA). A t-test was carried out to determine if there was a significant difference between the mean scores of two groups. For the differences between three or more groups we used a one-way ANOVA test. For both, a sequential Bonferroni correction was applied to control for type I errors due to repeated testing. Pearson correlations between various variables (see results section) were performed. Results are based on two-tailed tests assuming equal variances, with a significance level of $p < 0.05$.

Table 1. The attribution of emotions to dogs and cats. Emotions were scored on a 3-point scale: 1 (never); 2 (sometimes); 3 (often).

	Dog	Cat			
	Mean (*SD*)	Mean (*SD*)	*df*	*t*	*p*
Anger	1.7 (0.55)	1.8 (0.55)	955	–3.74	< 0.01
Joy	3.0 (0.13)	2.7 (0.50)	1,006	11.16	< 0.01
Sadness	1.7 (0.52)	1.5 (0.55)	809	5.34	< 0.01
Disgust	1.7 (0.59)	1.8 (0.58)	896	–3.15	< 0.01
Fear	2.1 (0.49)	2.1 (0.48)	1,012	–2.36	0.02
Surprise	2.0 (0.56)	2.0 (0.64)	892	1.41	0.16
Shame	1.4 (0.54)	1.3 (0.51)	809	3.44	0.01
Jealousy	2.0 (0.67)	2.0 (0.72)	952	2.09	0.04
Disappointment	1.8 (0.53)	1.6 (0.58)	869	6.80	< 0.01
Compassion	1.5 (0.63)	1.3 (0.53)	759	5.37	< 0.01

To investigate variables that significantly influenced attachment levels (measured using the PBS), stepwise linear regression was used. This was conducted using backward elimination; non-explanatory variables were removed until the optimum model was found (see results section) (McDonald 2014).

Results

Which Emotions Did Owners Attribute to Their Companion Cats and Dogs?

Joy was the most commonly attributed emotion by the respondents, followed by fear, jealousy, and surprise. Shame and compassion were the least common. Anger and disgust were more frequently attributed to cats than dogs. In contrast, joy, sadness, shame, disappointment, and compassion were more frequently attributed to dogs than cats (Table 1).

Does Sex, Age, Size, or Breed of the Animal Influence the Attribution of Emotions?

Respondents who owned a female dog were more likely than those who owned a male dog to attribute sadness, jealousy, and disappointment to their dog (Table 2). Furthermore, respondents who owned small-sized dogs (less than 10 kg), compared with those who owned larger dogs (not presented in Table), were more likely to attribute sadness, fear, jealousy, and compassion to their companion animal. Anger, sadness, and disappointment were more commonly attributed to older dogs than younger dogs (Table 2).

For cats, disgust was more commonly attributed to females than males (Table 2). Joy and surprise were more commonly attributed to young cats than older cats (Table 2).

Do Respondent Demographics Influence the Attribution of Emotions to Companion Animals?

Male respondents were more likely to attribute surprise and shame to their companion animal than female respondents (Table 3). Furthermore, young people attributed anger, fear, surprise, and compassion to their pet more often than older people (Table 3). Joy, jealousy, and compassion were increasingly attributed by less educated people comparative with educated people (not in Tables). Other demographic variables showed less clear results. For example, respondents who considered spirituality important attributed some

Table 2. Sex and age of companion animals and the attribution of emotions by their owners. Emotions were scored on a 3-point scale: 1 (never); 2 (sometimes); 3 (often).

SEX

	Dog					Cat				
	Male	Female	*df*	*t*	*p*	Male	Female	*df*	*t*	*p*
Anger	1.70	1.63	544	1.40	0.07	1.76	1.84	409	–1.47	0.14
Joy	2.98	2.99	580	–0.45	0.65	1.75	2.73	424	0.55	0.58
Sadness	1.65	1.76	484	–2.31	0.02	1.54	1.46	323	1.37	0.17
Disgust	1.64	1.72	509	–1.42	0.16	1.73	1.88	385	–2.52	0.01
Fear	2.07	2.07	577	–0.12	0.91	2.12	2.16	433	–0.83	0.41
Surprise	2.02	2.04	520	–0.39	0.70	1.94	2.00	370	–0.85	0.40
Shame	1.41	1.47	479	–1.19	0.24	1.30	1.32	328	–0.52	0.61
Jealousy	1.99	2.11	551	–2.14	0.03	1.91	2.01	399	–1.39	0.17
Disappointment	1.76	1.88	518	–2.66	0.01	1.56	1.55	349	0.10	0.92
Compassion	1.50	1.55	441	–0.69	0.49	1.29	1.30	316	–0.01	0.93

AGE

	Dog						Cat					
	Less than 5 years	5–10 years	10 years and over	*df*	*F*	*p*	Less than 5 years	5–10 years	10 years and over	*df*	*F*	*p*
Anger	1.59	1.73	1.73	545	4.31	0.01	1.79	1.85	1.76	410	0.95	0.39
Joy	2.98	2.99	2.98	581	0.69	0.51	2.85	2.67	2.69	425	6.09	< 0.01
Sadness	1.63	1.75	1.81	485	4.43	0.01	1.45	1.54	1.52	324	0.90	0.41
Disgust	1.62	1.74	1.70	510	2.23	0.11	1.72	1.84	1.86	386	2.57	0.08
Fear	2.09	2.06	2.02	578	0.76	0.47	2.11	2.18	2.14	434	0.79	0.45
Surprise	2.09	1.98	1.97	521	2.67	0.07	2.08	1.98	1.82	371	5.34	0.01
Shame	1.41	1.46	1.48	480	0.55	0.58	1.33	1.25	1.36	329	1.31	0.27
Jealousy	2.01	2.10	2.04	552	0.97	0.38	2.01	1.92	1.92	400	0.64	0.53
Disappointment	1.75	1.82	1.99	519	6.77	< 0.01	1.58	1.54	1.55	350	0.12	0.89
Compassion	1.50	1.52	1.59	442	0.52	0.60	1.34	1.27	1.27	317	0.65	0.52

Table 3. Companion-animal owners' attributions, by their sex and age, of emotions to their pets. Emotions were scored on a 3-point scale: 1 (never); 2 (sometimes); 3 (often).

Sex of Owner					
	Male	Female	*df*	*t*	*p*
Anger	1.77	1.72	938	0.79	0.43
Joy	2.85	2.88	989	–0.81	0.42
Sadness	1.72	1.61	795	1.72	0.09
Disgust	1.78	1.72	880	0.82	0.41
Fear	2.05	2.11	995	–1.10	0.27
Surprise	2.19	1.98	877	2.98	< 0.01
Shame	1.55	1.37	793	2.78	0.01
Jealousy	1.99	2.01	936	–0.27	0.70
Disappointment	1.67	1.71	853	–0.66	0.51
Compassion	1.47	1.42	744	0.65	0.52

Age of Owner								
	18–29 years	30–39 years	40–49 years	50–59 years	60 years and older	*df*	*F*	*p*
Anger	1.80	1.76	1.69	1.74	1.55	917	3.49	0.01
Joy	2.93	2.87	2.89	2.86	2.86	964	1.34	0.25
Sadness	1.57	1.62	1.64	1.63	1.65	774	0.50	0.74
Disgust	1.77	1.75	1.69	1.72	1.70	858	0.58	0.68
Fear	2.18	2.12	2.09	2.08	1.97	970	3.28	0.01
Surprise	2.13	2.02	1.96	1.98	1.91	855	2.83	0.02
Shame	1.46	1.42	1.31	1.37	1.35	773	2.07	0.08
Jealousy	2.08	2.05	1.98	1.96	1.95	914	1.15	0.33
Disappointment	1.67	1.65	1.76	1.74	1.73	831	1.34	0.25
Compassion	1.56	1.40	1.37	1.37	1.47	729	2.97	0.02

emotions (anger and shame) to their pet more frequently than other respondents (not shown in Tables).

What Are the Most Important Determinants of the PBS?

The participants in this study showed a mean attachment score of 78.6 (out of 100) on the PBS. The majority of owners reported that they liked to look at their pet (99.8%) and to caress it (99.4%). Respondents reported that their pet communicated with them "verbally" (44.5% sometimes and 46% often), by touching them with their head or their paws (18.2% sometimes and 80% often), by body postures (9.9% sometimes and 88.6% often) and by looking at them (13.2% sometimes and 84.1% often). Additionally, owners reported that their pet provided them with an opportunity for nurturance, with 99.7% of them indicating they liked to care for their pet.

We identified a number of dog-owner demographic variables that influenced PBS scores (see Table 4). These were: education level—the PBS scores of people with higher education (college, university) were on average 9.9 points lower than the PBS scores for people with lower education (primary school, etc.); gender—women displayed a degree of attachment 6.3 points higher than that of men; age—the older the person, the lower the PBS score

Table 4. Important determinants of the Pet Bonding Scale scores regarding dogs and cats.

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	Beta	*t*	*p*
Pet Bonding Scale for Dogs (*df* = 480)					
(Constant)	49.99	7.19		6.96	< 0.01
Do you sometimes attribute human characteristics to your pet? yes (0), no (1)	5.77	1.06	0.23	5.44	< 0.01
Sex of owner: male (1), female (2)	6.32	1.61	0.16	3.92	< 0.01
Age of owner (in years)	–0.09	0.04	–0.10	–2.24	0.03
Level of schooling of owner*: low (0), middle (1)	–5.58	1.81	–0.23	–3.08	< 0.01
Level of schooling of owner*: low (0), high (1)	–9.90	1.77	–0.42	–5.60	< 0.01
Do you belong or donate to an organization or charity involved in or concerned with improving the welfare of animals? yes (0), no (1)	2.40	1.07	0.09	2.24	0.03
Go for a walk less than 1 hour/day (0), more than 2 hours/day (1)	2.77	1.26	0.09	2.20	0.03
Where does your dog sleep? Bedroom: no (0), yes (1)	2.88	0.99	0.12	2.92	< 0.01
How many years have you owned your pet? Less than 1 year (0), 5 years or more (1)	2.60	0.99	0.11	2.63	0.01
Do you like touching your pet? no (0), yes (1)	11.50	5.42	0.09	2.12	0.03
Does your pet communicate with you – by touching you (with head/legs)?	2.48	1.08	0.10	2.30	0.02
Does your pet communicate with you - by scratching?	1.47	0.65	0.09	2.25	0.03
Pet Bonding Scale for Cats (*df* = 326)					
(Constant)	48.06	5.46		8.81	< 0.01
Do you sometimes attribute human characteristics to your pet? yes (0), no (1)	5.29	1.43	0.18	3.71	< 0.01
Sex of owner: male (1), female (2)	10.56	2.31	0.23	4.58	< 0.01
Level of schooling of owner: low (0), high (1)*	–3.96	1.32	–0.15	–3.01	< 0.01
Does your pet communicate with you - by touching you (with head/legs)?	2.24	0.86	0.13	2.59	0.01
What is the sex of your cat? male (1), female (2)	–2.55	1.30	–0.10	–1.96	0.05
How often does your cat go outside? always (0), never (1)	3.93	1.37	0.14	2.88	< 0.01
Does your cat sleep in the kitchen? yes (1), no (0)	4.47	1.81	0.12	2.47	0.01
Does your cat sleep in the bedroom? yes(1), no (0)	4.34	1.40	0.16	3.09	< 0.01

*Low = No education/Less than grade 12; Middle = High school; High = College or technical school/university (as the levels of the educational system in The Netherlands and Belgium are different, this is an approximate translation of the levels used).

(PBS score decreases by an average of 0.1 per year). Furthermore, the PBS scores of people who ascribed human characteristics to their pet were 5.8 points higher compared with those who did not. The PBS scores of people who were members of, or donated to, an animal welfare charity were 2.4 points higher than the PBS scores of people who did not.

An investigation of the relationship between how owners cared for their dog and their level of attachment to that dog revealed that owners who walked their dog for more than two hours

per day had an attachment score 2.8 points higher than owners who walked their dog less than one hour per day. Owners who allowed their dogs to sleep in their bedroom had an attachment score 2.9 points higher than dogs that slept elsewhere. Attachment scores were also positively correlated with length of ownership: PBS scores were 2.6 points higher for owners who had lived with their dog for 5 years or longer, compared with owners who had lived with their dog for less than one year. Additionally, owners who found it pleasant to pet their dog had a higher average PBS score than people who did not enjoy it (difference of 11.5 points). Finally, when dogs communicated with their owners by touching them with their head or paw or by scratching (e.g., against a door), higher PBS scores for owners were found (2.5 and 1.5 points, respectively) than owners whose dogs did not perform these communicative behaviors. No demographic variables of the dog were found to significantly correlate with owners' attachment levels.

For cats (see Table 4), the strongest influencing variable on the degree of owner attachment was the sex of the owner: the PBS scores of women were on average 10.6 points higher than the PBS scores of men. In addition to the gender of the owner, the degree of attachment also varied by education level: like with dogs, the PBS scores of people with higher education (college, university) was an average of 4.0 points lower than the PBS of people with lower education (primary school.) Furthermore, the PBS scores were an average of 5.3 points higher for owners who sometimes attributed human characteristics to their cat, compared with people who did not.

The attachment to cats that never go outside was on average 3.9 points higher than the attachment to cats that had the opportunity to go outside ad lib. For cats that slept in the bedroom or kitchen, the PBS scores were on average 4.3-4.5 points higher than for cats that were not allowed to sleep there. Owners of cats who frequently touched them had a PBS score 2.2 points higher than owners of cats who did not seek out physical contact. The degree of owner attachment to female cats was on average 2.5 points lower than attachment to male cats.

Is There a Relationship Between PBS Score and the Attribution of Emotions to Companion Animals?

There was a significant positive correlation between the degree of attachment to the companion animal, as measured by the PBS, and the attribution of the emotions joy, sadness, surprise, shame, jealousy, disappointment, and compassion to it. There was no significant correlation between the degree of attachment and the attribution of anger, disgust, and fear to companion dogs and cats. The same pattern was observed for both cat and dog owners, although for cat owners the positive correlations between PBS scores and joy, sadness, surprise, and compassion were slightly stronger. For dog owners, the positive correlation between PBS scores and shame and jealousy was stronger (Table 5). The correlation between the degree of attachment and the recognition of emotions did not differ greatly between men and women, but the recognition of surprise and jealousy occurred more with women than with men (Table 5).

Are the Emotional Experiences Attributed to Companion Animals Believed to Be Influenced by the Owner?

The relationship between owner attribution of mirroring emotions (attunement of the emotions of the owner and the pet) and the degree of attachment was significant for all emotions attributed to dogs (with the correlation in female dogs generally being stronger than in male dogs), whilst this relationship was significant only for the attribution of joy, sadness, surprise,

Table 5. Correlations of the Pet Bonding Scale (PBS) scores and the attribution of emotions to companion animals by their owners (by sex of owner and species owned).

Sex of Owner				
	Male		**Female**	
	Correlation PBS	***p* (2-tailed)**	**Correlation PBS**	***p* (2-tailed)**
Anger	–0.022	0.845	0.008	0.823
Joy	0.297	0.005	0.251	< 0.001
Sadness	0.384	0.001	0.279	< 0.001
Disgust	–0.037	0.740	0.011	0.765
Fear	–0.171	0.111	–0.047	0.154
Surprise	0.132	0.249	0.251	< 0.001
Shame	0.375	0.002	0.205	< 0.001
Jealousy	0.058	0.604	0.151	< 0.001
Disappointment	0.357	0.002	0.137	< 0.001
Compassion	0.465	< 0.001	0.420	< 0.001
Species Owned				
	Dog Owner		**Cat Owner**	
	Correlation PBS	***p* (2-tailed)**	**Correlation PBS**	***p* (2-tailed)**
Anger	0.002	0.955	0.039	0.430
Joy	0.123	0.003	0.303	< 0.001
Sadness	0.249	< 0.001	0.263	< 0.001
Disgust	0.056	0.206	–0.028	0.587
Fear	–0.031	0.455	–0.058	0.231
Surprise	0.180	< 0.001	0.254	< 0.001
Shame	0.197	< 0.001	0.174	0.002
Jealousy	0.150	< 0.001	0.107	0.032
Disappointment	0.130	0.003	0.131	0.014
Compassion	0.388	< 0.001	0.411	< 0.001

Table 6. Correlations between owners' attachment scores and their beliefs that their animals' emotional experiences mirror their own.

	Dog		**Cat**	
	Correlation PBS	***p* (2-tailed)**	**Correlation PBS**	***p* (2-tailed)**
Anger	0.126	0.005	0.071	0.192
Joy	0.161	< 0.001	0.268	< 0.001
Sadness	0.352	< 0.001	0.348	< 0.001
Disgust	0.197	< 0.001	0.039	0.497
Fear	0.105	0.015	0.039	0.452
Surprise	0.229	< 0.001	0.258	< 0.001
Shame	0.185	< 0.001	0.185	0.002
Jealousy	0.111	0.012	0.093	0.087
Disappointment	0.156	0.001	0.169	0.003
Compassion	0.328	< 0.001	0.333	< 0.001

shame, disappointment, and compassion to cats (the relationship being similar for both cat sexes) (Table 6). The overall relationship between the attribution of mirroring the emotions and the degree of attachment was significant for more individual emotions by female companion-animal owners (n = 7) than male owners (n = 5). This difference can be partly explained by the far fewer male respondents (91 males compared with 915 females).

Discussion and Conclusions

The aims of our research were to investigate which of 10 posited emotions owners assign to their companion cat or dog, the influence of demographic variables on the assignment of emotions, and if the assignment of emotions correlated with attachment levels. The results suggest that owners were willing to attribute all posited basic and complex emotions to their animals, with attachment levels positively correlated with willingness to attribute four out of six basic emotions and all four complex emotions. All participants were highly attached to their companion animal. Dog owners were more attached to their dogs than cat owners were to their cat, independent of animal characteristics such as gender and age. Cat owners were more attached to a male cat than to a female cat. Female owners showed stronger attachment to their companion animal than male owners, and the older the person, the lower the attachment score, while the lower the education level and income, the higher the attachment score.

Emotions Attributed and Species Differences

In this study, we asked respondents to comment on whether they believed their companion animals could experience six basic emotions (anger, joy [happiness], fear, surprise, disgust, and sadness) and four secondary emotions (shame, jealousy, disappointment, compassion). Although our findings suggest that respondents attributed all posited basic and complex emotions to their companion animals, we saw a general trend toward basic emotions (with the exception of sadness) being more commonly attributed to companion animals than complex emotions. One complex emotion—jealousy—was an exception to this finding, and the frequency of its attribution to companion animals in this study parallels earlier findings of complex emotions in animals (Morris, Doe and Godsell 2008).

A general trend in predominately complex emotions attributed to dogs was also observed, in comparison to a greater attribution of predominately basic emotions to cats. This result parallels recently published work by Paul et al. (2014), who demonstrated that cat owners tended to report a greater capacity for basic emotions in their animals. The increased attribution of complex emotions to dogs may be explained by the high level of mutual understanding and shared emotions which are suggested to exist between humans and dogs (Bekoff 2006). Additionally, these differences may be explained by the fact that dogs are pack animals, in contrast to cats who tend to be semi-solitary animals (consequently, they might be considered to have less need for expression of their emotions for the maintenance of social relationships within a group). The degree of owner attachment to their dog correlated significantly with the perceived attunement to the emotions of the owner. This was only partly the case with cats; again, this might be explained by their different social needs.

The Influence of Owner Demographics

In contrast to earlier studies (Walker et al. 2014b), both male and female respondents attributed primary and secondary emotions to their companion animals, with some emotions (shame and surprise) attributed more frequently by men than women. Previous literature suggests that females in general show greater empathy toward animals (Taylor and Signal

2005; Phillips et al. 2011), show more positive attitudes toward animals (Ascione and Weber 1996; Kruse 1999; Mariti et al. 2011), and are more willing to attribute secondary (complex) emotions to animals (Walker et al. 2014b) than males. Conversely, the results of this research suggest that when respondents are attributing emotions to their own companion animals, men and women do not differ in the frequency or complexity of emotions attributed.

Some recent research has demonstrated that belief in animal mind, belief in animal cognition, and belief in animal sentience is dependent on the species in question (Knight et al. 2004; Knight et al. 2009), and familiarity with animals improves attitudes and empathy toward them (Wells and Hepper 1995; Fidler, Light and Costall 1996; Cutt et al. 2006; Daly and Morton 2009; Morris, Knight and Lesley 2012). Familiarity with animals has previously been demonstrated to influence the attribution of one complex emotion, grief. Another study (Walker et al. 2014b) found that companion-animal owners are significantly more likely to believe that animals experience grief than non-owners. Other research has indicated that the number of emotions attributed to individual animal species increases if the person attributing the emotion also owns a member of that animal species (Morris, Knight and Lesley 2012). The strong familiarity with, and attachment to, the companion animals in this study may explain why male and female respondents did not differ significantly as has been described in previous studies. However, given the relatively limited number of male respondents in this study (9%), this finding needs to be viewed with caution.

Our results also suggest that respondent age and education level influenced attribution of emotions to companion animals. Empathizing with animals has also been demonstrated to differ according to belief systems, contexts, and own experiences (Knight et al. 2010; Walker et al. 2014a). This might explain why the attribution of emotions differed between owners of different age groups and educational levels (e.g., research has shown that younger respondents are more likely to oppose animal testing (Kruse 1999)).

Owner Attachment and Attribution of Emotions

Our results demonstrate that attachment influences an owner's willingness to attribute emotions to their companion animal. Attachment levels positively correlated with willingness to attribute all four complex emotions and four out of six basic emotions. These results parallel previous work by Fidler, Light and Costall (1996) and Kiesler, Lee and Kramer (2007), who demonstrated that companion-animal owners, compared with non-owners, describe animals utilizing more emotive terms.

Attunement/Mirroring of Emotions

We found a significant positive correlation between the attribution of all posited emotions and respondents' beliefs that the emotional experiences of their animals is influenced by their own emotions and behaviors, suggesting that a mutual attunement of behavior and/or mirroring of emotions takes place in the relationship between companion animal and owner. Our finding that the relationship between owners' attributions of mirrored emotions (attunement of the emotions/behavior of the owner and the pet) and the degree of attachment is positively correlated, suggests a similar mechanism to the attunement in human–human attachment relationships and is in line with the findings of Hare and Woods (2013).

Limitations of the Study

It must be acknowledged that sources of error may exist in this study, such as respondents providing socially desirable answers (all were dog lovers and/or cat lovers; however,

as the questionnaire was fully anonymous, we feel that the chances of socially desirable responses are minimal), respondent recruitment methodology (internet fora), skewed distribution of respondents (the proportion of women that filled in the questionnaire was several magnitudes higher than that of men), and possible anthropomorphic attributions. Furthermore, the question still remains if owners' claims regarding the emotions of their companion animals can be taken as a source of evidence or dismissed as anthropomorphic projections. Recently, research attempting to explore underlying components and variation in anthropomorphic attributions to nonhuman animals has gained interest (Epley, Waytz and Cacioppo 2007; Paul et al. 2014). Indeed, research has demonstrated that owners are more reliable in their assessment of the expression of positive emotions in dogs than non-owners (Costa et al. 2014). In parallel, the area of research investigating the ability of various animal species, including companion animals, to experience a range of positive and negative emotions (both basic and complex) is experiencing exponential growth. This includes, but is not limited to, pain, fear, joy, anger, disgust, regret, compassion, empathy, depression, and surprise (Yue, Moccia and Duncan 2004; Custance and Mayer 2012; Meridda, Gazzano and Mariti 2014).

Understanding when, why, and how the general public attributes emotional states to animals is very important, since the recognition of emotions in animals will be of great help in improving animal welfare (Walker et al. 2014a). More research is now required to reveal the mechanisms underlying the process of recognition of emotions in pets and attunement of emotions between owners and their pets. Furthering our understanding of the capacity for emotion and the range of emotions that animals experience is invaluable if environments are to be created in which animals and their emotions are acknowledged and respected, and so optimal animal welfare can be attained.

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