

Personality Profiles of Users Sharing Animal-related Content on Social Media

Courtney Hagan*, Jordan Carpenter*, Lyle Ungar†, and Daniel Preotiuc-Pietro*†

*Department of Psychology, University of Pennsylvania, Philadelphia, PA, USA

†Department of Computer and Information Science, University of Pennsylvania, Philadelphia, PA, USA

Address for correspondence: Courtney Hagan, Department of Psychology, University of Pennsylvania, Positive Psychology Center, 3701 Market Street, Philadelphia, PA 19104, USA. E-mail: haganco@sas.upenn.edu

Abstract

Animal preferences are thought to be linked with more salient psychological traits of people, and most research examining owner personality as a differentiating factor has obtained mixed results. The rise in usage of social networks offers users a new medium in which they can broadcast their preferences and activities, including about animals. In two studies, the first on Facebook status updates and the second on images shared on Twitter, we revisited the link between Big Five personality traits and animal preference, specifically focusing on cats and dogs. We used automatic content analysis of text and images to unobtrusively measure preference for animals online using large datasets. In study 1, a dataset of Facebook status updates ($n = 72,559$) were analyzed and it was found that those who mentioned ownership of a cat (by using the phrase “my cat” ($n = 5,053$)) in their status updates were more open to experience, introverted, neurotic, and less conscientious when compared with the

general population. Users mentioning ownership of a dog (by using “my dog” ($n = 8,045$)) were only less conscientious compared with the rest of the population. In study 2, a dataset of Twitter images was analyzed and revealed that users who featured either cat ($n = 1,036$) or dog ($n = 1,499$) images in their tweets were more neurotic, less conscientious, and less agreeable than those who did not. In addition, posting images containing cats was specific to users higher in openness, while posting images featuring dogs was associated with users higher in extraversion. These findings taken together align with some previous findings on the relationship between owner personality and animal preference, additionally highlighting some social media-specific behaviors.

Keywords: Big Five, cat people, dog people, Facebook, social media, Twitter

The most recent survey from the American Pet Products Association (2016) shows that 65% of American households (79.9 million) include at least one pet and most of these households include a cat or a dog (34.9% and 44% of households, respectively). This raises the question as to why an individual may prefer one pet over the other. Psychologists have long been fascinated about whether individual differences drive pet ownership and preference, and it is now widely believed that owner personality may be one important factor (Gosling, Sandy, & Potter, 2010). Due to the differences between the behaviors of different species and the significant relationship that builds between pet and owner (Bagley & Gonsman, 2005; Cavanaugh, Leonard, & Scammon, 2008), there is an argument that owners may choose pets that are complementary to their personality (Alba & Haslam, 2015). This relationship between preference and pet personality is often played out within popular culture, where cat

people are usually stereotyped as quiet, sensitive, and unorthodox, and dog people are viewed as gregarious and energetic (Perrine & Osbourne, 1998).

When examining the specific differences between pet owners and non-pet owners, studies have produced mixed results. These studies have found that pet owners are more satisfied with life (Bao & Schreer, 2016) and have higher self-esteem (McConnell, Brown, Shoda, Stayton, & Martin, 2011). Results have also shown that individuals who owned a pet as a child were more empathic in adulthood (Daly & Morton, 2009). Furthermore, previous research has also found that pet owners are more likely to complete cardiovascular rehabilitation treatment than non-pet owners (Herrald, Tomaka, & Medina, 2002). In contrast, some studies have found no significant differences between pet owners and non-pet owners in dominance, independence, extraversion, and neuroticism (Johnson & Rule, 1991; Perrine & Osbourne, 1998). These conflicting results demonstrate an inconsistent and uncertain picture of the relationship between personality traits and pet ownership, which needs to be further clarified.

Potential differences between owners and non-owners may be more salient if comparisons are made by type of pet ownership. Researchers found differences between “dog people” and “cat people” when it came to measures on the Big Five personality traits (Bao & Schreer, 2016; Gosling et al., 2010). One of the largest studies concerning ownership and personality analyzed 4,565 participants who took the Big Five Personality Inventory (John, Naumann, & Soto, 2008) and self-identified as dog people, cat people, both, or neither (Gosling et al., 2010). They found that dog people are higher in extraversion (pronounced engagement with the external world),

agreeableness (concern for social harmony and getting along with others), and conscientiousness (the preference for planned rather than spontaneous behavior), and lower in neuroticism (the tendency to experience unpleasant emotions easily, such as anger, anxiety, depression, and vulnerability) and openness (a general appreciation for art, adventure, unusual ideas, curiosity and variety of experience), compared with cat people, even when controlling for gender differences. Bao and Schreer (2016) came to similar results with the exception of openness, where they found no significant differences between cat and dog people. Reevy and Delgado (2015) also argue that neuroticism correlates with more anxious attachment to pets, and high scores on conscientiousness, openness, and extraversion correlate with less avoidant attachment to pets. Providing contradictory results, Johnson and Rule (1991) found no significant differences between cat and dog owners on traits of neuroticism, extraversion, and self-esteem when utilizing the measures from the Eysenck Personality inventory. Beyond personality, researchers found that “dog people” are higher in wellbeing (Bao & Schreer, 2016), social dominance orientation, and competitiveness (Alba & Haslam, 2015), compared with cat people. Kidd and Kidd (1980) compared male and female dog- and cat-people and found that male dog-people are higher in dominance and aggression than all other groups, and female “pet lovers” are higher in nurturance than all other groups.

Previous studies that have examined pets and owner personality have asked participants to fill in extensive questionnaires to gain insights into their personality structure and preference for specific pets (Alba & Haslam, 2015; Gosling et al., 2010). With the availability of big data from social media and computational methods for analyzing these data, researchers have been able to measure personality traits

automatically using social media behaviors, as opposed to measuring these traits via survey data (Celli, Bruni, & Lepri, 2014; Kosinski, Stillwell, & Graepel, 2013; Liu, Preotiuc-Pietro, Samani, Moghaddam, & Ungar, 2016; Schwartz et al., 2013). Social media also adds a layer of self-expression for the user, where the individual can share and post about themselves, their interests, and their activities. Therefore, the user can share and display information about themselves, fulfilling the need for self-presentation (Seidman, 2013). When a user posts a status update or picture that contains an image or language about a dog or a cat, it may also be reflective of who they are or how they are presenting themselves. Information posted to social media sites has been shown to reliably reflect the actual self instead of the idealized self, assuring that in some capacity when the user posts about “my dog” or “dog” they are doing so to reflect their actual self-interests (Golbeck, Robles, & Turner, 2011). This platform allows the user to express animal preference by way of posting about an animal in a status update, making an animal their profile picture, or posting an image of an animal on their social networking page.

Current Studies

The current studies sought to shed new light on the relationship between pet preference and user personality traits by utilizing big data from social media. We completed two studies that aimed to analyze online behavior. The first study examined the relationship between the Big Five Personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism; Costa & McCrae, 1992) and mentions of animals (“cat,” “dog,” “my cat,” “my dog”) in status updates on Facebook. In the second study, we used texts posted on Twitter to estimate user Big Five personality scores and study their relationship with profile and posted

images that contain dogs or cats as a proxy for pet preference. We believe that in both studies mentions and images of animals can best reflect pet preference because users generally utilize social media for self-presentation and to demonstrate their genuine interests (Seidman, 2013). By employing big data and the developed automatic method (Schwartz et al., 2013), we can measure the relationship between user personality and user preference without having to utilize the expensive and intrusive measures that previous studies have had to apply.

Methods

Data

In the first study, we used the MyPersonality dataset consisting of 72,559 Facebook users who took the International Personality Item Pool proxy for the NEO Personality Inventory Revised (NEO-PI-R; Costa & McCrae, 2008). These users had opted in to share their Facebook updates and basic demographic information (including age and gender) for research purposes. We restricted our analysis to users with English as their primary language and to those who posted at least 1,000 words, in order to remove any bias potentially caused by users not having enough status updates in which to mention animal names. Our dataset consisted of 14,094,365 status updates, with a mean of 194.2 ($SD = 165$, $Mdn = 146$) status updates per user.

For the second study, we used a dataset that contains a total of 3,810 users, recruited through the Qualtrics platform, who filled in a standard demographic survey and shared their Twitter screen name for research purposes. Initially, we eliminated all handles that had a follower count higher than 2,000 or were verified by Twitter (as these were very likely celebrities and not the users taking the survey). We limited

participation to users based in the US in order to minimize any potential cultural influences. We downloaded the following two sets of images using the Twitter Search API Version 2.5. First, we collected all profile pictures, as these are images that users deem appropriate to represent their online self. Secondly, for each user, we collected up to 3,200 of their most recent tweets (as per Twitter limitations) and downloaded all images that were embedded in these posts. In total, we downloaded 5,547,510 tweets, out of which 682,717 contained a photo and 663,469 could be processed. Similar to the previous study, we limited our analysis to users who posted at least 20 images, in order to remove any bias potentially caused by users not having enough images in which to feature animals. There were 2,486 users who posted at least 20 photos ($M = 255.9$, $SD = 317.4$, $Mdn = 129$). Data collection took place from 16 to 30 June, 2016.

Procedure

All research procedures were approved by the University of Pennsylvania Institutional Review Board (IRB reference number: 816091). Volunteers had agreed to participate in these studies via informed consent.

For linguistic analysis, we first split all status updates into tokens, that is, single linguistic units, using a Social Media aware tokenizer. Then, we identified the users who mentioned words or phrases such as “cat,” “dog,” “my cat,” and “my dog” at least once in their status updates. Although other synonyms may exist (e.g., kitty, puppy), we chose these words as they are unambiguous and preliminary experiments found that including other synonyms did not dramatically improve coverage. As social media may contain a skew in demographic make-up, we used user age and gender information as controls, in order to limit their effect.

For image analysis, recent advances in computer vision, combined with availability of large annotated datasets, allow general object recognition systems to work with good reliability. Such systems can automatically tag images shared online, with accuracy in tasks such as detecting cats vs. dogs of over 97%. For this study, we used a commercial API (<http://www.imagga.com>) to tag all images and keep images where a “cat” or “dog” appeared above a threshold of 20, as recommended by the developers. Similar to the language analysis, we identified the users who featured cats or dogs either in their profile image or in at least one posted image.

The users in the second dataset did not have personality extracted using questionnaires, as these are very costly and time-consuming to administer. Hence, we used the automatic method developed by Schwartz et al. (2013) to assign each user score to the Big Five personality traits. Their model is trained on a sample of over 70,000 Facebook users (used in the first study of this paper), using tokens and topics extracted from status updates as features in regularized linear regression models (Park et al., 2014; Schwartz et al., 2013). This model uses an open-vocabulary approach, where it pulls automatically clustered words, phrases, and topics and correlates the language with the Big Five personality traits. In their original validation, the model achieved a Pearson correlation coefficient of ~ 0.35 on average for all five traits (Park et al., 2014; Schwartz et al., 2013), which is considered a strong effect in psychology, especially when measuring internal states (Meyer et al., 2001). This approach has been used with good results in previous studies (Liu et al., 2016).

Results

Study 1

The intercorrelations between personality traits for the users in study 1 are presented in Table 1. These results show small to moderate intercorrelations between the five personality traits. Table 2 shows the associations between user demographics and personality traits and mentioning any of the terms (i.e., “cat,” “dog,” “my cat,” “my dog”) in status updates.

Demographic Associations with Users Mentioning Cats or Dogs: Our analysis found that females were more likely than males to mention all words or phrases in their Facebook status updates: “cat” ($r_{pb(31,397)} = 0.072, p < 0.001$), “dog” ($r_{pb(21,697)} = 0.056, p < 0.001$), “my cat” ($r_{pb(5,051)} = 0.069, p < 0.001$), “my dog” ($r_{pb(8,043)} = 0.061, p < 0.001$), “cat” & “dog” ($r_{pb(9,739)} = 0.067, p < 0.001$), and “my cat” & “my dog” ($r_{pb(734)} = 0.038, p < 0.001$). Older users were more likely to mention “dog” ($r_{(21,697)} = 0.039, p < 0.001$), “my dog” ($r_{(8,043)} = 0.013, p = 0.0004$), and “cat & dog” ($r_{(9739)} = 0.017, p < 0.001$) than younger people. In contrast, younger people were more likely to mention “my cat” ($r_{(5,051)} = -0.020, p < 0.001$) and “my cat” & “my dog” ($r_{(734)} = -0.011, p = 0.003$). There was no association between age and the mention of “cat.”

Personality Associations with Users Mentioning Cats or Dogs: Users mentioning the words “dog” and “cat” had similar personality profiles compared with users who did not: higher in openness (cat $r_{(31,397)} = 0.071, p < 0.001$, dog $r_{(21,697)} = 0.020, p < 0.001$) and neuroticism (cat $r_{(31,397)} = 0.044, p < 0.001$, dog $r_{(21,697)} = 0.027, p < 0.001$) and lower in agreeableness (cat $r_{(31,397)} = -0.020, p < 0.001$, dog $r_{(21,697)} = -0.019, p < 0.001$), extraversion (cat $r_{(31,397)} = -0.034, p < 0.001$), and conscientiousness (cat

$r_{(31,397)} = -0.048, p < 0.001$, dog $r_{(21,697)} = -0.027, p < 0.001$). There was no association between mentioning “dog” and extraversion. Users mentioning both animal names (i.e., “cat” & “dog”) in their posts were more open to experience ($r_{(9,739)} = 0.046, p < 0.001$) and neurotic ($r_{(9,739)} = 0.034, p < 0.001$), and less conscientious ($r_{(9,739)} = -0.039, p < 0.001$), extraverted ($r_{(9,739)} = -0.012, p < 0.001$), and agreeable ($r_{(9,739)} = -0.016, p < 0.001$) than those who mentioned at most one animal name.

Only mentioning these animal names is a very loose proxy for animal preference. An analysis of users mentioning phrases indicating ownership (i.e., “my dog” or “my cat”) uncovered a slightly different pattern: both users groups were slightly lower in conscientiousness than the general population (my cat $r_{(5,051)} = -0.032, p < 0.001$, my dog $r_{(8,043)} = -0.020, p < 0.001$). Further, users mentioning “my cat” were more neurotic ($r_{(5,051)} = 0.039, p < 0.001$), open to experience ($r_{(5,051)} = 0.030, p < 0.001$), and less extraverted ($r_{(5,051)} = -0.038, p < 0.001$) than users who did not. In contrast, there were no associations between any other personality trait and mentioning “my dog.” Users mentioning both phrases indicating ownership (i.e., “my cat” & “my dog”) were more open to experience ($r_{(734)} = 0.008, p < .05$) and neurotic ($r_{(734)} = 0.019, p < 0.001$), and less conscientious ($r_{(734)} = -0.016, p < 0.001$) and extraverted ($r_{(734)} = -0.009, p < 0.05$) than those who mentioned at most one of the phrases. There was no significant correlation between mentioning “my cat” and “my dog” and agreeableness. This personality profile is similar to the group of users mentioning “my cat” only, albeit with smaller effect sizes.

Study 2

The intercorrelations for personality traits in study 2 are presented in Table 3. These results show small to moderate intercorrelations between personality traits. Table 4 presents correlations between basic user demographics and personality traits with images featuring animals in either profile images or posted images.

Demographic Associations with Images Featuring Cats or Dogs: Profile pictures are images that a user deems appropriate to represent his or her online persona (Liu et al., 2016). Hence, featuring a dog or cat in one's profile pictures represents a strong indication of preference for this type of animal. We analyzed only the 1,648 profile images that had no human faces detected, as previous research identified that personality is associated with selecting images not containing human faces (Liu et al., 2016). We identified 27 Twitter profile images containing cats and 46 images containing dogs in our dataset.

We computed correlations between presence of cats or dogs in the profile picture and demographics: females were more likely to feature both cats ($r_{bp(25)} = 0.077, p < 0.05$) and dogs ($r_{bp(44)} = 0.065, p < 0.05$) in their profile picture than males. Age was only associated with preference for dogs in profile images ($r_{(44)} = 0.071, p < 0.05$) and not with cats.

We also correlated user demographics with the presence of cat and dog images in tweets, which is a weaker indicator of preference than featuring these animals in profile pictures. Similar to profile images, females were more likely to post images of both cats ($r_{pb(1,034)} = 0.098, p < 0.001$) and dogs ($r_{pb(1,497)} = 0.153, p < 0.001$) than

males. We found no association between age and posting of images containing either cats or dogs.

Personality Associations with Images Featuring Cats or Dogs: We next computed the association between user personality and posting images of cats and dogs, while also controlling for age and gender. The only association found between personality and featuring cats or dogs in the profile picture was between the use of profile images featuring cats and neuroticism ($r_{(25)} = 0.066, p < 0.05$).

Both groups of users that posted images containing cats or dogs were lower in conscientiousness (cat: $r_{(1,034)} = -0.111, p < 0.001$; dog: $r_{(1,497)} = -0.066, p < 0.001$) and agreeableness (cat: $r_{(1,034)} = -0.079, p < 0.001$; dog: $r_{(1,497)} = -0.071, p < 0.001$) and higher in neuroticism (cat: $r_{(1,034)} = 0.222, p < 0.001$; dog: $r_{(1,497)} = 0.174, p < 0.001$), when compared with the rest of the users. In addition, users posting images of cats were higher in openness ($r_{(1,034)} = 0.124, p < 0.001$), while users posting images of dogs were similar to the general population in openness. Conversely, users posting images of dogs were higher in extraversion ($r_{(1,497)} = 0.089, p < 0.001$) than the general population, with users posting images of cats showing no difference in this trait.

Discussion and Limitations

The purpose of the present two studies was to explore the relationship between pet preference and user personality using social media behavior. Findings across both studies related to people posting about cats indicate that these users are more neurotic (the tendency to experience unpleasant emotions easily, such as anger, anxiety,

depression, and vulnerability) and generally more likely to be introverted (a reserved, reflective personality, which can be perceived as aloof or self-absorbed), open to experience (a general appreciation for art, adventure, unusual ideas, curiosity and variety of experience) and less conscientious (the preference for planned rather than spontaneous behavior) than the general population. There were fewer associations between personality and posting about dogs; compared with those posting about cats, the effect sizes for these relationships were smaller (e.g., lower conscientiousness) and sometimes contradictory (e.g., extraversion).

Our two studies mirror findings from previous research (Bao & Schreer, 2016; Gosling et al., 2010) that examined pet preference and owner personality type, yet reach beyond the typical findings of surveys to a level of depth that encompasses behaviors, such as posting status updates or images of animals. With the added component of the social media context, we have demonstrated a more nuanced portrait of individuals who express their pet preference in a more novel way than taking a survey. These individuals publicly and implicitly state their pet preference by way of posting pictures or updating their status about the respective animal. These individuals choose to actively post about dogs or cats, suggesting that they go beyond just passively preferring dogs or cats to sharing their preference with their social media network. The layer of social media characterizes an individual who posts about either animal to be more neurotic and less conscientious than the general population. This suggest that these neurotic and low conscientious individuals may be more inclined to break online social norms and use social media in an unconventional way, by posting pictures or status updates about cats or dogs, whereas other users might

post about social events or friends and family within a social context (Cheung, Chiu, & Lee, 2010; McAndrew & Jeong, 2012).

In study 1, where we explored the relationship between user personality and Facebook status updates about pets, we found that users who posted about “cat,” “dog,” “my cat,” and “my dog” displayed the same correlational direction for openness (positive), conscientiousness (negative), extraversion (negative), and neuroticism (positive), but users who posted using “cat” and “my cat” had stronger correlations when compared with the general population than users posting about “dog” and “my dog.”

In study 2, where we examined user personality and images from Twitter, we found users who had a cat as their profile picture were more neurotic than the general population. Also, users who posted images of dogs on Twitter were more extraverted than those who did not, contrasting the findings from study 1, which showed no significant difference for extraversion for those individuals who mentioned “dog” or “my dog” when compared with the general population. This finding on extraversion and users who mentioned “dog” demonstrates further inconsistencies, as it does not match with previous studies (Bao & Schreer, 2016; Gosling et al., 2010) that found “dog people” were higher in extraversion.

Our results should of course be put into the context of the limitation of our method: not all animal lovers or owners actually post about the animals they prefer or feature them in a picture or profile picture. Therefore, our pool of participants in these studies may not be a representative sample of the population that prefers pets. However, using large-scale social media footprints, we painted a picture that is complementary

to previous psychology literature on the topic, but also adds a look through the unique lens of social media, to determine how users who prefer different animals may utilize their social networking profile. Another limitation regarding our study, given the real-world environment it took place in, was the small correlations and effect sizes that our findings produced. While this is a limitation when interpreting the results of the current study, it is also encouraging that we found significant results with real-world constraints. Future research on the topic of big data, pet preference, and owner personality can look more closely at other influencing factors such as attachment (Reeve & Delgado, 2015) or exotic pet species (Hergovich, Maurer, & Riemer, 2011). Broadening future experiments to include examining attachment to animals as well as the language social media users use concerning those animals can provide greater insight into the intersection of the human–animal relationship.

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Conflict of Interests

The authors declare that they have no conflicts of interest.

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Table 1. Intercorrelations between the Big Five personality traits in the Facebook-user dataset ($n = 72,559$).

	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Openness	1				
Conscientiousness	0.030	1			
Extraversion	0.127	0.188	1		
Agreeableness	0.046	0.178	0.169	1	
Neuroticism	-0.048	-0.313	-0.357	-0.353	1

Table 2. Pearson correlations between basic user demographics or personality traits and mentions of animal-related words/phrases (i.e., “cat,” “dog,” “my cat,” “my dog”) in status updates in the Facebook dataset ($n = 72,559$).

	<i>n</i>	Gender ($F = 1$)	Age	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
“cat”	31399	0.072**	0.003	0.071**	-0.048**	-0.034**	-0.020**	0.044**
“dog”	21699	0.056**	0.039**	0.020**	-0.027**	0.006	-0.019**	0.027**
“cat” & “dog”	9741	0.067**	0.017**	0.046**	-0.039**	-0.012**	-0.016**	0.034**
“my cat”	5053	0.069**	0.020**	0.030**	-0.032**	-0.038**	-0.014**	0.039**
“my dog”	8045	0.061**	0.013**	0.004	-0.020**	0.003	-0.001	0.011*
“my cat” & “my dog”	736	0.038**	-0.011*	0.008*	-0.016**	-0.009*	-0.002	0.019**

Note. The first column indicates the number of users that mention each word/phrase. Personality correlations are controlled for age and gender using partial correlation. * $p < 0.05$, ** $p < 0.001$, two-tailed test.

Table 3. Intercorrelations between the Big Five personality traits in the Twitter-user dataset ($n = 3,180$).

	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Openness	1				
Conscientiousness	-0.204	1			
Extraversion	0.176	0.325	1		
Agreeableness	-0.144	0.422	0.245	1	
Neuroticism	0.157	-0.523	-0.417	-0.444	1

Table 4. Correlations between basic demographics and personality and posting images of cats and dogs in tweets in the Twitter dataset.

	<i>n</i>	Gender ($F = 1$)	Age	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Profile cat	27	0.077*	-0.009	0.021	-0.031	-0.039	-0.044	0.066*
Profile dog	46	0.065*	0.071*	-0.045	0.024	0.031	0.006	0.010
Cat image posts	1,036	0.098**	0.023	0.124**	-0.111**	-0.004	-0.079**	0.222**
Dog image posts	1,499	0.153**	-0.048	0.031	-0.066**	0.089**	-0.071**	0.174**

* $p < 0.05$, ** $p < 0.001$, two-tailed test.