

## Abstract

Correlated behaviors, often referred to as personalities, may be inherited and expressed together. Companion animals, such as dogs, are often perceived to have “feeding personalities.” These perceptions may affect how humans interact with their pets. However, little is known about the degree to which dog feeding behaviors are correlated with breed or breed group. This study sought to characterize dog feeding behaviors and determine whether dogs exhibit feeding personalities. We created and distributed an online survey to dog owners via social media and business cards to assess feeding behavior in a wide range of pure and mixed breed dogs. The survey included questions about food preferences, behavior while eating, and the sex of the dog, as well as information about dog family history. We collected owner observations of feeding behavior for 1,138 purebred and 1,272 mixed breed dogs representing 140 breeds and all AKC-recognized breed groups. Three principle components (PCs) were identified that describe nearly 60% of behavior in the purebred dogs in our sample and provide a measure of feeding personality. These measures of feeding personality differ among the total range of breed groups but are shared by several breed groups. These data may ultimately help shelters better characterize dogs, improve adoption success, and inform consumers making decisions about what to feed their pets.

## Introduction

- 78 million pet dogs in the United States (ASPCA 2017)
- 56.7 million all US households have a pet dog (APPA 2013)
- Americans spent nearly \$61 billion dollars, including an average of \$1500/dog, on pets in 2015 (Castillo 2015, Josephson 2015)
- Behavioral issues, including behavior around food, may contribute to animals being rehomed, surrendered to shelters, and/or euthanized (Kirby-Madden et al. 2014)
- Animal personalities describe correlations between suites of traits that are expressed consistently over time and different behavioral contexts (reviewed in Sih et al. 2004)
- **Feeding personality** describes how a dog behaves around food, consumes food items, and interacts with other animals and humans around food
- The goals of this study were to determine if dog feeding personalities are linked to breed or breed group, as well as to determine if specific behaviors are also linked to breed or breed group

## Methods and Materials

- Dog owners were surveyed via Qualtrics Survey Software (Qualtrics, Provo, UT) to assess the personality traits and feeding behaviors of their dogs.
- We accepted responses from all breeds (compare to Ley and Bennett 2008, Kubinyi et al. 2009, Mirkó et al. 2012).
- Dogs that were included in the study were broken up into 9 breed groups according to the AKC guidelines (Fig. 1).
- Owners ranked the likelihood that their dog engages in 20 different behaviors, such as:



Fig 1. AKC Breed Groups (from Sutter and Ostrander 2004)

- Used AKC Breed list plus common breed additions not currently recognized by the AKC (e.g. American Pitbull Terrier and Catahoula Leopard Dog, based on popularity).
- Utilized JMP Pro 12 (SAS 2017) to conduct Principal Components Analyses to identify personalities. Personalities constructed using all 2,410 dogs; 1,138 purebred dogs were then evaluated. Wilcoxon signed rank tests identified differences in personality based on breed group. ANOVA with post-hoc Tukey's tests were used to identify specific differences between breed groups.
- Participant demographics: Participants were obtained via social media and dissemination at March for Science, in Boston, Ma., USA.
- The survey ran from March 1 – May 4, 2017.

## Results

### Data included:

- 2,818 dogs from 32 countries and all US states (self-selection bias likely influenced survey responses) narrowed to 2,410 complete surveys
- Owners were 7.8% male and 71.2% female
- 46.5% female dogs and 49.2% male dogs
- 140 breeds from all AKC recognized breed groups
- Dogs ranged in age from puppy to 18+ years old (mean 5.9 ± 0.1 years)
- 1,138 purebred dogs were included in this analysis

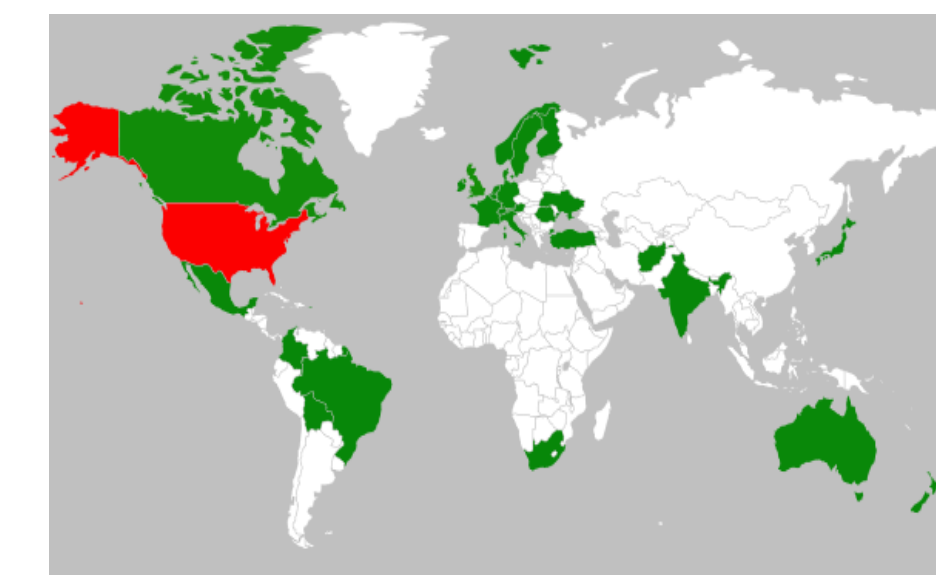


Figure 2 shows the countries from which data were received

**Dog Feeding Personality:** Dog feeding personalities were identified by principal component analysis on correlations. Pairwise correlations are low (Fig. 3) but all feeding behaviors except eating grass load into the first principal component. PC1 explains 29% of observed variation in behavior (Table 1).

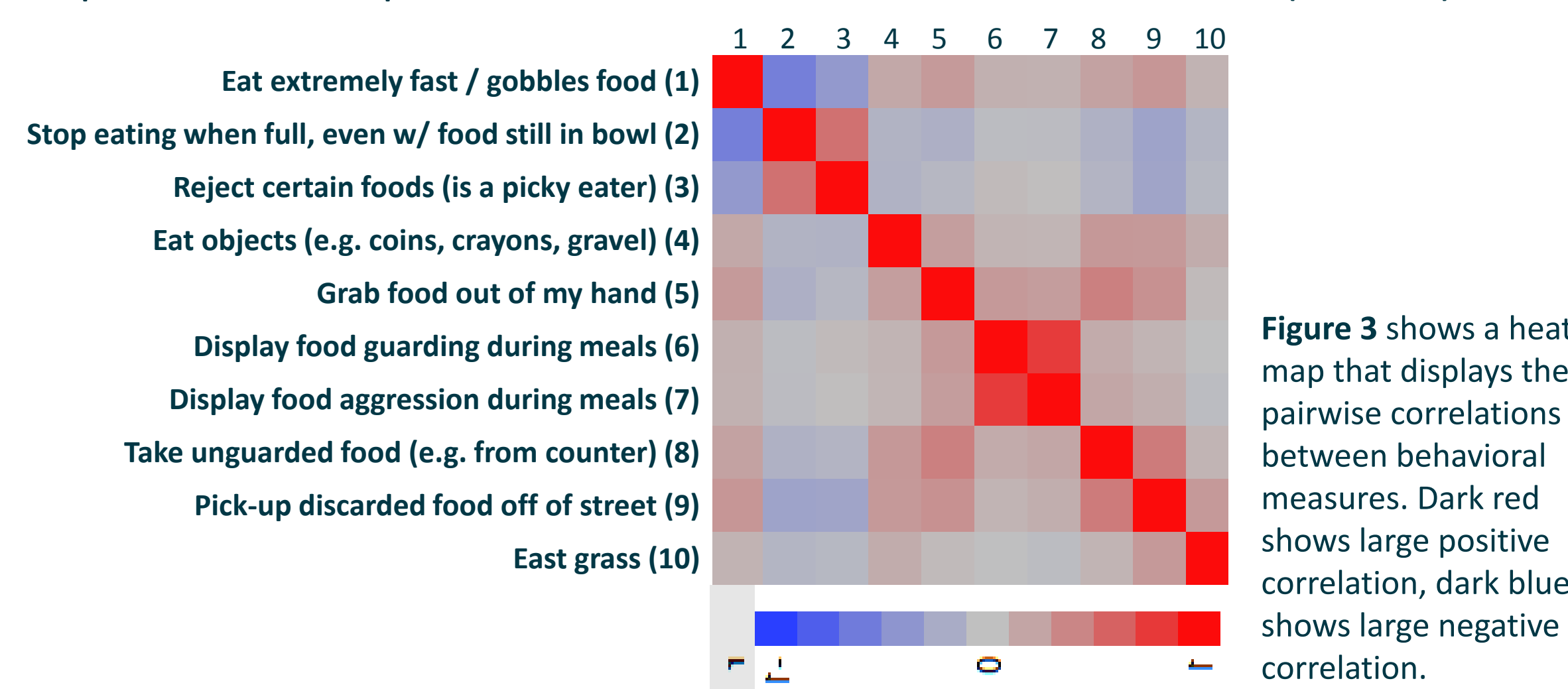


Table 1 Principal Components for food personalities

Behavior	PC 1: Interaction w/ Food	PC 2: Selectivity & Aggression	PC 3: Non-Food Items
Eat Extremely Fast / Gobbles Food	0.6269	-0.3053	-0.3906
Stop Eating When They Are Full, Even if There is Food Left in the Bowl	-0.5856	0.4347	0.4713
Reject Certain Foods (is a picky eater)	-0.4959	0.4889	0.3117
Eat Objects (e.g. coins, crayons, gravel)	0.4771	0.0199	0.3918
Grab Food Out of my Hand	0.5915	0.2271	0.2430
Display Food Guarding During Meals	0.4076	0.7789	-0.2976
Display Food Aggression During Meals	0.4247	0.7654	-0.2856
Take Unguarded Food (e.g. from a counter or coffee table)	0.6182	0.0769	0.4296
Pick-Up Discarded Food off the Street	0.6538	-0.1554	0.3517
Eat Grass	0.2444	-0.1795	0.3760

**Differences among breed groups:** Personalities differed between breed groups, the two sexes, and age groups (Table 2, Figure 4).

Table 2 Association of Food Personality with Breed Group, Sex and Age

Y	Source	Nparm	DF	DF	SS	F Ratio	Prob > F
Food Personality	Breed Group	10	10	10	126.4863	4.4639	< 0.0001
Food Personality	Sex	1	1	1	0.0294	0.0103	0.9188
Food Personality	Age	18	18	18	116.2931	2.2801	0.0017
Selectivity & Aggression	Breed Group	10	10	10	204.0933	12.7853	< 0.0001
Selectivity & Aggression	Sex	1	1	1	0.2922	0.1830	0.6688
Selectivity & Aggression	Age	18	18	18	27.6649	0.9628	0.5012
Non-food items	Breed Group	10	10	10	17.7831	1.4590	0.1496
Non-food items	Sex	1	1	1	0.5080	0.4168	0.5186
Non-food items	Age	18	18	18	64.3261	2.9320	< 0.0001
Owner Centric	Breed Group	10	10	10	21.3184	1.6480	0.0884
Owner Centric	Sex	1	1	1	1.2951	1.0012	0.3172
Owner Centric	Age	18	18	18	96.3681	4.1388	< 0.0001
Food Motivated	Breed Group	10	10	10	65.9550	6.5540	< 0.0001
Food Motivated	Sex	1	1	1	0.4080	0.4054	0.5244
Food Motivated	Age	18	18	18	24.3067	1.3418	0.1531

## Results, continued

Breed groups differed in their food personalities, food selectivity and aggression, and food motivation but not owner centrality (Table 2, Figure 4).

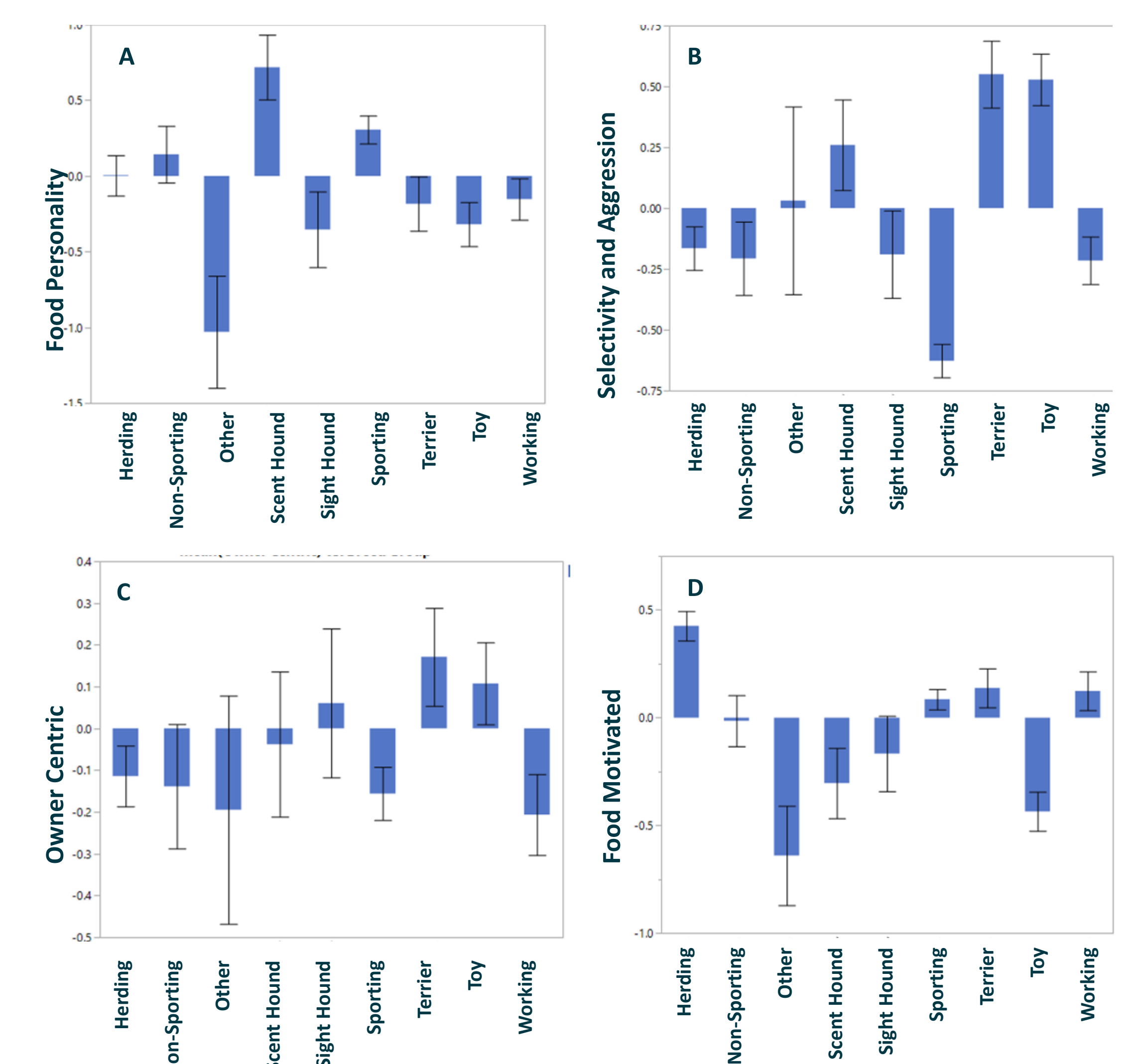


Figure 4 – Figure 4A depicts the mean of the Principal Component Feeding Personality against Breed Group. Figure 4B depicts the mean of the Principal Component Selectivity and Aggression against Breed Group. Figure 4C depicts the mean of the Principal Component Owner Centric against Breed Group. Figure 4D depicts the mean of the Principal Component Food Motivated against Breed Group. Different letters indicate differences between groups as indicated by Tukey's post-hoc comparisons ( $\alpha = 0.05$ ).

## Discussion

These results suggest that there are distinctive feeding personalities among dogs and that these personalities may vary somewhat with breed group. We described three axes of dog feeding personality: *Interaction with Food*, *Selectivity and Aggression*, and *Non-Food Items*. There are some differences in feeding personalities among breed groups and dogs of different age. Each feeding personality score is composed of a set of 10 food based behaviors. Owner centric behavior varies with age but not with breed group.

## Conclusions

These results suggest that there is an influence of genetic heritage (breed) on feeding personality in dogs. However, environmental factors and developmental factors such as age may also play a strong role in shaping feeding personality. In the future, it will be interesting to compare the traits of dogs who work in a manner consistent with their breed group (e.g. dogs that are actively used to herd or hunt) with others who are solely household pets. In the coming months, we plan to compare purebred to mixed breed dogs and further compare breed groups, examine the characteristics of individual breeds, and examine the purchasing preferences of dog owners with dog foods.

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