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Classification of Animals as Pet, Pest, or Profit: Consistency and Associated Variables Among Spanish University Students

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Classification of Animals as Pet, Pest, or Profit: Consistency and Associated Variables Among Spanish University Students

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ABSTRACT

The present study analyzes the effectiveness (exhaustivity and mutual exclusivity) of a taxonomy for classifying animals into the categories of pet, pest, and profit (PPP), as well as variables that affect the classification assigned to the different species. A total of 463 university students (Mean age = 21.07 years; *SD* = 4.15), mainly female (87%), classified 14 animal species into the PPP categories and answered questionnaire assessments of personality, anthropomorphism, and attitudes toward the wellbeing of animals. On average, the different species were classified into a single PPP category in 71% of the cases (maximum 95% for dogs, and minimum 27% for chimpanzees), with 8% having multiple classifications (15% for horses and pigs, 21% for rabbits), and 21% being unclassified. Women used the profit category less than men ($p < 0.05$; $g = 0.33$). Attitudes toward animals, anthropomorphism, and conscientiousness presented significant correlations ($p < 0.05$) with the use of PPP categories. Finally, logistic regression analyses showed that these variables had a limited yet significative effect in predicting the classification of horses as either pet or profit (explained variance = 8%) and the classification of snakes as pet or pest (explained variance = 9%), but no effect on the classification of bees as pest or profit. The fact that 29% of the cases received multiple or null classifications indicates the need for caution when considering conclusions drawn from studies based on the PPP taxonomy. Personality, anthropomorphism, sex, and attitudes toward animals' wellbeing had only a small effect on the classification of animals, but they revealed possible mechanisms for developing interventions to raise awareness about the treatment of animals.

KEYWORDS

Animal classification; folk taxonomies; human–animal interaction; pest; pet; profit

Spaniards show a growing interest in the wellbeing of animals. The number of dogs, cats, and other species registered as companion animals has grown steadily for more than a decade (Spanish Department of Agriculture, Food, and Environment, 2015). In Europe, Spaniards are among those most concerned with companion animals' wellbeing, with Spain occupying the fourth position out of the 28 countries that participated in a

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special Eurobarometer Report (European Commission, 2016). At the same time, it is possible to find examples of the opposite. For instance, 137,000 dogs and cats are abandoned each year (Fundación Affinity, 2017), Spain is the second highest European country in meat consumption (46.2 kg/person in 2018; Spanish Department of Agriculture, Food and Environment, 2017; 2019), and opinion on traditional bullfighting remains divided and polarized (María et al., 2017).

The scientific literature has often pointed out the ambivalence in attitudes toward animals' wellbeing, highlighting frequent inconsistencies and variation in the recognized rights of different animals within a given community (Bradshaw, 2017; Herzog, 2011). These attitudes are directly related to the roles or status assigned to the animals within each cultural context (Marciniak, 2011). Therefore, understanding how societies classify different animals helps us better understand the treatment that they are given.

Folk Taxonomies as a Cultural Element

It is easy to observe that different classification methods coexist within the same community. Some of these taxonomies use scientific criteria (e.g., phylogenetic proximity) as their basis, although the literature shows that classifications used by the general population do not usually match these taxonomic systems (Harrison & Hall, 2010). It is therefore of interest to examine the category systems that communities create intuitively (usually known as "folk taxonomies" or "folk biology"; Atran, 1998; Berlin, 1992).

Examples of folk taxonomies include classifications based on the utility of each species and/or individual for human beings. In the sphere of anthrozoology, one of the most popular proposals differentiates between pet (companion animal), pest (harmful animal, to be eradicated), and profit (useful, productive animal). This PPP taxonomy was proposed for research on attitudes toward the wellbeing of different groups of animals, as an advancement from the unitary view of earlier proposals (Taylor & Signal, 2009). The PPP categories have proven discriminatory power, with more concern for animals categorized as pets than the pest or profit categories (Signal et al., 2018; Taylor et al., 2009).

However, the animals assigned to each category differ radically from one cultural context to another. In one cross-cultural study that included 60 societies from around the world, Gray and Young (2011) found that the dog functions as a companion animal in 53 of these, but in 23 cases this coexisted with other functions, and in 10 cases it did not match all the aspects present in the definition of companion animal proposed by the researchers. The difficulties involved in proposing a valid classification criterion across cultures are exemplified in the study by Wilkins et al. (2015), who offer a table with examples of animals that fulfill each of the PPP roles in the UK. First, the cell for pet invertebrates was left blank (a choice that might be puzzling in Japan, where numerous insects – called *mushi* – fulfill this function; Herzog, 2011). Second, parrots were selected as pets and pigeons were selected as pests, while in Spain, certain parrots (e.g., *Psittacula Krameri*) are invasive species that threaten local fauna, and colombofilia (pigeon breeding) is a common hobby even in the cities. Additionally, species classification can also change over time, especially when conflicts over resources appear (e.g., Mitchell et al., 2019; Saraswat et al., 2015; Villatoro et al., 2019). For these reasons, it is

complicated to anticipate the level of agreement on which animals can be classified within each PPP group in a given community.

Personal Variables and Interaction with Animals

Previous studies have analyzed the relationship between different personal variables and interaction with nonhuman animals. First, some studies found differences in personality traits between people who live with different animals, such as owners of dogs whose breed is associated with aggressivity (e.g., Rottweiler) or with friendliness (e.g., Labrador retriever; Egan & MacKenzie, 2012; Wells & Hepper, 2012). Second, some studies found differences between dog people and cat people (Alba & Haslam, 2015; Gosling et al., 2010) and between people who live with exotic, cold-blooded animals compared with traditional companion animals (Hergovic et al., 2011). The choice of companion animal seems to depend on personal preferences, as with esthetic choices (e.g., hairstyle, clothing). A variety of studies corroborate this hypothesis, checking participants' ability to correctly match photographs of persons and cohabitating nonhuman animals (Nakajima et al., 2009; Payne & Jaffe, 2005; Roy & Christenfeld, 2005).

Anthropormorphism represents the second variable of interest. Attributing human qualities to other living or nonliving beings is a frequent phenomenon: 80% of dog and horse owners perceive them as being able to feel jealousy, and 65% perceive them as empathic beings (Eddy et al., 1993; Morris et al., 2008). There is a direct correlation between living with animals and anthropomorphizing them (Dotson & Hyatt, 2008; Epley et al., 2007; Morris et al., 2012; Wilkins et al., 2015). The literature shows that attribution of anthropomorphic qualities is most frequent among animals classified as pet, intermediate in the profit category, and least in the animals considered pests (Wilkins et al., 2015).

Finally, we note that the respondent's sex has a direct effect on attitudes and rights attributed to animals, with women showing more acceptance than men (Herzog, 2007; Signal et al., 2018; Taylor et al., 2009).

In sum, personality, anthropomorphism, and respondent's sex relate to attitudes toward animals and preferences for cohabitating with some species and/or breeds. However, literature provides little clues regarding how any of those variables could affect the decision of classifying a given species within a given taxonomy.

Objectives

To the best of our knowledge, the category system proposed by Taylor et al. (2009) has not been tested in Spain or Spanish-speaking countries; its versatility and adequacy for classifying nonhuman animals are therefore unknown. Moreover, there is no information on which personal variables may affect the use of this category system. For these reasons, the present study set three objectives: (a) to evaluate the effectiveness (i.e., exhaustiveness and mutual exclusiveness) of the PPP category system for classifying different animal species in a Spanish population, (b) to analyze a possible relationship between the use of the PPP categories and different personal variables (attitudes toward animal wellbeing, personality, anthropomorphism, and sex), and (c) to analyze the predictive

power of these personal variables in classifying three species selected as pets, pests, or profit animals.

Methods

Participants

A total of 463 students from a public university in southern Spain participated in the study. Participants were adults (age range = 18–49 years; $M = 21.07$; $SD = 4.15$), mainly female (87.3%), and enrolled in degree programs in Psychology (55.3%), Early Childhood Education (31.3%), Nursing (9.1%), and Physical Therapy (4.4%). Around 91% of participants stated that they were living and/or had lived with companion animals at some point in their lives. A total of 72.4% of the participants had experience cohabitating with dogs, 39.7% had lived with cats, and 47.9% had lived with other animal species. All participants gave their consent to participate in the study voluntarily.

Instruments

A battery of questionnaires was administered to assess sociodemographic variables, the classification of different species into PPP categories, personality, anthropomorphism, and attitudes toward the wellbeing of animals.

Sociodemographic Variables: Participants were asked about their age, sex, degree program, marital status, and living experience with companion animals.

Animal Classification: We made a list of 14 animals (dog, cat, louse, fish, cow, pig, rabbit, rat, tarantula, horse, bee, snake, frog, and chimpanzee), similar to that used by Herzog et al. (1991), and participants were asked to classify each one as pet, pest, or profit. The questionnaire allowed the classification of animals into more than one category and included the option "none of the above" to quantify cases where no classification was possible.

Personality: The Ten Item Personality Index (TIPI) was administered (Romero et al., 2012). This short instrument contains two items for each of the five personality dimensions proposed by Costa and McCrae (1992): extraversion, agreeableness, conscientiousness, emotional stability, and openness. The items were answered on an ordinal scale with seven agreement levels (1 = completely disagree, 4 = neither agree nor disagree, 7 = totally agree).

Anthropomorphism: An instrument was compiled with seven items referring to cognitive and emotional attributions toward a companion animal they had lived with (I think my pet … (1) has her own ideas, (2) has her own intentions, (3) has free will, (4) is a conscious, understanding being, (5) has her own desires, (6) has her own convictions and beliefs, and (7) can experience many different emotions). The items were answered on the seven-level scale described above, obtaining a Bayes' Expected A Posteriori (EAP) reliability index of alpha = 0.915.

Attitudes Toward Animals' Wellbeing: This was a Spanish adaptation of the Pet, Pest, Profit questionnaire (PPP; Taylor et al., 2009). For this instrument, different research team members translated the original version (Taylor & Signal, 2009) into Spanish and

back-translated it into English to ensure fidelity of the adaptation. Note that reference to the cane toad (as an example of a pest species) was changed to mouse because these animals are not present in Spain. The draft version was administered to collaborator students, and language and expression issues were discussed to create the final version.

The questionnaire contains three scales with ten items each, designed to analyze attitudes toward the wellbeing of animals classified as pets (e.g., pets should have a regular health check; EAP alpha = 0.935), pests (e.g., Pest species have the right to freedom from pain, injury or disease; EAP alpha = 0.900), and profit (e.g., It is cruel to keep birds in cages simply to mass produce eggs; EAP alpha = 0.859). Items were answered on the seven-level scale described above. The reliability for the total 30 items was EAP alpha = 0.935.

Procedure

We requested collaboration from the schools of Psychology, Physical Therapy, Nursing and Early Childhood Education at a public university in southern Spain. A collaborator from the research team went to every participating class to administer the paper-and-pen questionnaire during regular class hours.

The Ethics Committee of the university approved this study. The participants were of legal age and received information about the objectives of the study. Their informed consent was requested; they were told that their participation was completely anonymous, that the data would be analyzed globally, and that they should respond honestly since there were no correct or incorrect answers. They were not offered any incentives (e.g., monetary compensation or course credits) beyond acknowledging their altruistic help to improve scientific knowledge about our relationships with nonhuman animals. Researchers provided contact data where participants could exercise their data erasure or cancellation rights, according to the pertinent legislation. None of the students declined to participate in the study, and the questionnaire was completed in approximately 20 min. After testing was complete in all the degree programs selected, the data were manually transferred to SPSS (Statistical Package for the Social Sciences), Version 26. The number of questionnaires eliminated because of missing responses represented less than 1%.

Statistical Procedures

The procedures carried out included descriptive analyses (central tendency, dispersion, and frequency), bivariate correlations using Spearman's rho ($p < 0.05$; considered small for rho > 0.1–0.3; medium for rho > 0.3–0.5; and large for rho > 0.5), comparison of means by Student's *t*-test ($p < 0.05$), and binary logistic regression (stepwise inclusion based on likelihood ratios; $p < 0.05$). The reliability coefficients were calculated with Bayes's Expected A Posteriori Alpha (EAP alpha > 0.700; Ferrando & Lorenzo-Seva, 2016), using FACTOR software, Version 10.10. Finally, the effect size was estimated using Hedges' *g* index, an alternative to Cohen's *d* that is more robust when distributions are asymmetrical: small effect for values between ≥ 0.20 and < 0.50, medium for values between ≥ 0.50 and < 0.80, and large for values ≥ 0.80 (Cohen, 1988).

Results

First, participants were asked to classify 14 animals into PPP categories, where multiple classification was allowed. The participants assigned a total of 12.13 categories on average ($SD = 3.40$). Regarding the number of animals classified into each category, participants classified an average of 5.5 animals as pets, and about three each were assigned the labels of profit, pest, or none.

Although certain animals were classified mainly as companion animals (dog, cat, and fish), pests (lice), or profit (cow), nine animals received more than one label in at least 25% of the cases. Pigs, rabbits, and horses were the animals with the highest percentage of multiple, non-exclusive classifications (15–20%), while snakes, frogs, and chimpanzees were not classified into any category in 33–68% of the cases. More detailed results are shown in Table 1.

Next, we analyzed the relationship between the use of different PPP categories and personal variables. Correlational analyses were conducted between the number of animals categorized as PPP, and attitudes toward animal wellbeing, personality characteristics, and anthropomorphism. The number of animals classified as pets was positively correlated ($p < 0.05$) with attitudes toward animal wellbeing and negatively with the degree of conscientiousness. The use of the pests category showed the opposite pattern (negative relationship with attitudes toward wellbeing, and positive with the degree of conscientiousness; $p < 0.05$). Finally, the number of animals classified as profit was negatively correlated ($p < 0.05$) with attitudes toward animal wellbeing and with the level of anthropomorphism ($p < 0.05$). All those correlations fell under 0.300 value. Table 2 shows detailed data.

The effect of the respondent's sex was analyzed through a *t*-test, and showed that men made greater use of the profit category ($p < 0.05$). Although the use of other categories did not present significant differences, the means showed a small effect size ($g > 0.20$) in the use of the categories pet (higher in men) and pests (higher in women). These data are presented in Table 3.

Table 1. Classification percentages for the list of 14 animals.

	% Unique classification	Pets, %	Pests, %	Profits, %	% Multiple classification	None, %
Dog	95.2	99.1	0.4	3.9	3.9	0.9
Cat	94.6	94.6	2.4	1.7	1.9	3.5
Lice	91.9	2.8	89.6	2.6	1.6	6.5
Fish	83.4	82.2	2.2	4.1	2.6	14.0
Cow	80.4	14.3	1.7	81.2	8.7	10.9
Pig	73.2	21.9	3.5	77.8	14.9	11.9
Rabbit	73.1	76.6	2.8	35.9	20.6	6.3
Rat	72.3	22.5	59.6	13.2	10.6	17.1
Tarantula	69.9	10.2	62.9	2.8	3.5	26.6
Horse	67.6	54.3	0.4	42.3	14.9	17.5
Bee	65.4	2.4	36.9	49.5	11.9	22.7
Snake	61.8	20.8	46.2	3.9	4.5	33.7
Frog	37.2	28.6	8.2	6.3	3.0	59.8
Chimpanzee	26.9	21.9	1.7	13.8	5.3	67.8
Average	70.9	39.4	22.8	24.2	7.7	21.4

Note: The categories of PPP are not mutually exclusive.

Table 2. Spearman's rho bivariate correlations for the study variables.

	n Pets	*n* Pests	*n* Profits	*n* None
PPP-Wellbeing				
Pets	0.134**	−0.088	−0.114*	0.038
Pests	0.102*	−0.171**	−0.099*	0.130**
Profits	0.148**	−0.144**	−0.264**	0.144**
Total	0.174**	−0.174**	−0.224**	0.145**
TIPI-Personality				
Emotional Stability	−0.049	0.054	−0.007	−0.037
Conscientiousness	−0.095*	0.127**	−0.047	0.001
Agreeableness	−0.020	−0.079	−0.011	0.095*
Extraversion	−0.053	−0.009	0.010	−0.026
Openness	0.016	−0.065	−0.014	0.007
Anthropomorphism	0.084	−0.041	−0.123**	−0.041

PPP: Pet, Pest, Profit. TIPI: Ten Item Personality Index.

Three species were selected for completing the third objective, where we analyzed possible differences in the independent variables (attitudes toward animal wellbeing, personality, anthropomorphism, and respondent's sex) between participants who assigned these animals to one group vs. another (PPP), considering only those cases where a single classification was assigned. The first species chosen was the horse, for which there were 306 single-category classifications (66% of the total, in the proportion 59:41). The three measures of attitudes toward wellbeing and anthropomorphism were higher in persons who classified the species as a pet ($p < 0.05$; $g > 0.20$; Table 4). The logistic regression analysis only found a significant relationship with two variables ($B_{\text{Wellbeing-pest}} = 1.052$; $B_{\text{anthropomorfism}} = 1.034$), with an explained variance of 8% (Nagelkerke's $R^2 = 0.080$).

Snakes received a total of 269 single-category classifications (58% of the total) between the categories pet and pest (in the proportion 29:71). On average, people who classified them as pets showed better attitudes toward pets and pests and were lower in conscientiousness ($p < 0.05$; $g > 0.20$; Table 5). The logistic regression model showed that better attitudes toward pests, lower conscientiousness, and being male increased the likelihood of classifying snakes as pets ($B_{\text{Wellbeing-pest}} = 1.049$; $B_{\text{Conscientiousness}} = .871$; $B_{\text{Sex-female}} = 0.401$; significant at $p < 0.05$), with an explained variance of less than 10% (Nagelkerke's $R^2 = 0.093$).

Finally, the species that obtained the highest number of single-category classifications ($n = 293$, 63% of the total) in the categories pest and profit was the bee (in proportion 42:58). A *t*-test found no significant differences in any of the variables considered

Table 3. Average use of each category, and *t*-test for sex differences.

	Total		Male		Female		*t*-test		
	M	*SD*	*M*	*SD*	*M*	*SD*	*t*	*p*	*g*
n Pet	5.54	2.41	6.05	2.65	5.46	2.36	1.732	0.084	0.25[a]
n Pest	3.19	1.67	2.88	1.69	3.23	1.66	1.501	0.134	0.21[a]
n Profit	3.39	1.90	3.93	2.12	3.31	1.86	2.136	0.036*	0.33[a]
n Total	12.13	3.40	13.01	3.64	12.00	3.35	1.992	0.050	0.30[a]
n None	2.99	2.31	2.63	2.11	3.04	2.34	1.290	0.198	0.18

*$p < 0.05$, **$p < 0.01$; [a]g = small effect size.

Table 4. Results of *t*-tests: classification of horses as pet or profit.

	Pet ($n = 180$)		Profit ($n = 126$)		*t*-test			
	M	*SD*	*M*	*SD*	*t*	*p*	$\|M_1 - M_2\|$	*g*
PPP-Wellbeing								
Pets	66.56	5.40	64.60	7.70	2.472	0.014*	1.97	0.30[a]
Pests	44.62	9.06	41.51	9.02	2.975	0.003**	3.11	0.34[a]
Profits	42.74	9.60	38.99	9.42	3.410	0.001**	3.74	0.39[a]
TIPI-Personality								
Emotional Stability	6.63	2.76	6.64	2.64	0.019	0.985	0.01	0.00
Conscientious	11.01	2.33	11.02	2.52	0.017	0.987	0.00	0.00
Agreeableness	11.80	2.23	11.66	2.07	0.547	0.585	0.14	0.06
Extraversion	8.34	2.95	8.27	3.08	0.208	0.835	0.07	0.02
Openness	10.70	2.36	10.45	2.38	0.922	0.357	0.25	0.11
Anthropomorphism	39.87	6.70	37.78	8.47	2.251	0.025*	2.09	0.28[a]

PPP: Pet, Pest, Profit. TIPI: Ten Item Personality Index.*$p < 0.05$, **$p < 0.01$; [a]g = Small effect size

(Table 6). Similarly, the logistic regression did not include any of the study variables as precursors to the use of these categories.

Discussion and Conclusions

The first objective of this study was to evaluate the effectiveness of the PPP taxonomy proposed by Taylor et al. (2009) in a Spanish population. The results showed multiple classifications in as many as 21% of cases (rabbit) and animals unclassified in up to 68% (chimpanzee). These phenomena were observed even among animals classified primarily as pet (e.g., dogs and cats), pest (e.g., lice), or profit (e.g., cows and pigs). Taken as a whole, 30% of the cases did not obtain a unique classification, demonstrating the gaps of PPP taxonomy to classify those species with both exhaustiveness and mutual exclusiveness.

These results suggest we should reflect on the use of pet–pest–profit taxonomy in empirical research. For example, in the present study, the scales on attitudes toward animals' wellbeing showed greater interest in animals called pets than in those classified as pest/profit, in agreement with Signal et al. (2018) and Taylor et al. (2009). At the same time, horses and pigs were classified simultaneously in several categories by 15% of the

Table 5. Results of *t*-tests: classification of snakes as pet or pest.

	Pet ($n = 77$)		Pest ($n = 192$)		*t*-test			
	M	*SD*	*M*	*SD*	*t*	*p*	$\|M_1 - M_2\|$	*g*
PPP-Wellbeing								
Pets	67.03	4.83	65.21	6.51	2.511	0.013*	1.82	0.30[a]
Pests	45.51	10.88	42.13	8.77	2.432	0.017*	3.38	0.36[a]
Profits	42.19	10.00	39.93	9.47	1.707	0.090	2.26	0.23[a]
TIPI-Personality								
Emotional Stability	6.61	2.72	7.06	2.61	1.246	0.215	0.45	0.17
Conscientious	10.52	2.38	11.23	2.25	2.269	0.025*	0.71	0.31[a]
Agreeableness	11.20	2.61	11.75	1.82	1.680	0.096	0.55	0.26[a]
Extraversion	8.19	3.12	8.16	2.83	0.079	0.937	0.03	0.01
Openness	10.53	2.59	10.51	2.18	0.067	0.947	0.02	0.01
Anthropomorphism	38.96	6.99	37.98	7.88	0.985	0.326	0.98	0.13

PPP: Pet, Pest, Profit. TIPI: Ten Item Personality Index.*$p < 0.05$, **$p < 0.01$; [a]g = Small effect size

Table 6. Results of *t*-tests: classification of bees as pest or profit.

	Pest ($n = 123$)		Profit ($n = 170$)		*t*-test			
	M	*SD*	*M*	*SD*	*t*	*p*	$\lvert M_1 - M_2 \rvert$	*g*
PPP-Wellbeing								
Pets	65.67	5.68	65.24	6.07	0.615	0.539	0.43	0.07
Pests	41.59	9.87	42.98	9.07	1.243	0.215	1.39	0.15
Profits	39.94	9.33	38.83	9.30	1.025	0.306	1.12	0.12
TIPI-Personality								
Emotional Stability	7.06	2.74	6.64	2.72	1.312	0.191	0.42	0.15
Conscientious	11.37	2.15	10.97	2.39	1.523	0.129	0.40	0.17
Agreeableness	11.80	1.62	11.84	2.13	0.195	0.845	0.04	0.02
Extraversion	8.10	3.06	8.33	2.83	0.647	0.518	0.22	0.08
Openness	10.38	2.21	10.68	2.19	1.139	0.256	0.29	0.14
Anthropomorphism	37.67	8.05	38.41	7.79	0.768	0.443	0.73	0.09

PPP: Pet, Pest, Profit. TIPI: Ten Item Personality Index.

participants and were left unclassified by 12–18% of them, demonstrating that more than one-quarter of the participants did not assign these animals to a unique taxon. These results are congruent with the idea that a given animal species' recognized status is quite variable (Gray et al., 2011; Wilkins et al., 2015). In the light of these findings, research on human–animal interaction should reexamine how the multiplicity of status is reflected in study designs. For example, assigning animal species to a specific group (e.g., horses are pets; Wilkins et al., 2015) facilitates access to aggregate information on that category (pet horses) but does not allow us to learn of other possible combinations (in the present study, less than 30% classified the horse exclusively in this category).

Other studies opt to use the PPP categories in an abstract sense without referring to which species are classified within each group (Signal et al., 2018; Taylor et al., 2009). This strategy does allow participants to assign a single species to as many PPP categories as they like, but it makes data interpretation difficult. Given that more than 15% of the participants considered horses, pigs, and rabbits to come under more than one category simultaneously, what do the questionnaire results tell us about how a specific person will act when encountering one of these animals? Furthermore, what information is gained about attitudes toward an animal when she is not classified in any of the PPP categories? Given that 30% of the participants are represented by one of these situations, the resulting discussion becomes essential.

The second objective of this study explores a hypothesis that has been overlooked in previous literature. Based on the idea that participants may present individual differences in the application of the pet–pest–profit classification, we found an effect of gender, with women showing a lower average number of animals considered as profit. Other differences (greater number of animals considered pets by men, and a greater number considered pests by women) did not reach statistical significance, but a small effect size was found, suggesting further exploration of these relations is warranted in future studies.

The possible relationship between the use of PPP taxonomy and attitudes toward animal wellbeing, personality, and anthropomorphism was explored using bivariate correlations. A positive correlation was found between attitudes toward wellbeing, use of the pet category, and the number of unclassified species; there was a negative correlation with the use of the pest and profit categories. The rest of the significant correlations

had low values, pointing to a positive relationship between conscientiousness and use of the pest category, and a negative correlation between anthropomorphism and use of the profit category.

These results must be taken with caution. First, they do not allow us to establish cause and effect between variables. Second, the literature indicates a relationship between several of the constructs evaluated, such as in the case of sex and attitudes toward animal wellbeing (Taylor et al., 2009), making it necessary to analyze collinearity and the interaction between possible explanatory variables. However, these findings allow us to pose a hypothesis not previously considered in the literature: that personal qualities and beliefs affect the use of folk taxonomies, not the other way around. In other words, we hypothesize that considering a horse a pet does not lead to better attitudes toward her: rather, we classify (or not) horses as pets depending on our attitudes toward them.

The third study objective analyzes this possibility, selecting specific animals and looking for differences between participants who classify them in one category or another. In summary, the regression analyses showed that greater anthropomorphism and recognition of the wellbeing of pests predisposed classification of horses as pets rather than profit animals; that better attitudes toward pest wellbeing, lower conscientiousness, and being a male predisposed classification of snakes as pets, instead of pests; and that none of the variables analyzed served to predict the classification of bees as pests or profit. The explained variance was low, pointing out that the selected variables have a limited power to explain how classifications are made. However, these findings offer new information. Future research should include other variables, both individual (e.g., experience with animals, empathy) and contextual (e.g., cultural values, urban vs. country environments), to test this hypothesis.

The present study had a number of limitations. First, the selection of animals to classify was forced by the methods, excluding other relevant examples. Probably the average quantities of animals with multiple classifications or which were unclassified would present large differences if this set was modified (in Spain, classifying a hamster seems easier than doing so with a platypus). Second, the list used does not represent equivalent levels from a taxonomic viewpoint, since the term snake refers to a suborder (*serpentes*) while dog refers to a subspecies (*Canis lupus familiaris*) – a limitation that is shared with all the literature we found. Third, the regression analyses explained 8% of the variance in the case of horses, 10% in the case of snakes, and none in the case of bees, representing low predictive capacity. Fourth, the design did not include other variables of interest, such as direct experience with each animal, its perceived phylogenetic proximity, or the value given to each animal in the cultural context of reference. Future studies need to consider these. Finally, participants were enrolled university students, and females were overrepresented, thus limiting the representativeness of the findings.

Notwithstanding, the present study also has strengths. It contributes novel information on the status given to different animals, using the PPP category system in a Spanish population for the first time. It also offers examples of the difficulties involved in applying this taxonomy in research, quantifying the existence of multiple classifications and the percentage of cases where participants did not find the system applicable – results with no known precedents. In this way, risks overlooked in the previous literature have been brought to light, indicating the need to pay more attention to the relationship

between the abstract category (e.g., pet) and the animals it represents for each participant. This knowledge will help us learn more about the factors that predispose an individual to classify an animal within a specific category, thereby identifying key elements professionals can use to raise awareness about animal welfare.

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No potential conflict of interest was reported by the authors.

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