Data from ManyDogs 1

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The ManyDogs 1 project investigated whether dogs act on human pointing signals as though they are communicative social cues (ManyDogs Project, et al., 2023b). Researchers from 20 research sites across nine countries collected behavioral data from 704 dogs. Here, we present not only the behavior data on the dogs' responses to experimental conditions but also guardian responses to survey questions, including the Canine Behavior and Research Questionnaire (C-BARQ, Serpell and Hsu, 2001). This dataset allows for assessing associations among C-BARQ measures as well as connections to the experimental task data and other dog and guardian characteristic data.

Keywords: Canine; Dog; Pointing; Social communication

(1) Background

ManyDogs is a research consortium of teams worldwide interested in shared research questions about canine science (ManyDogs Project et al., 2023a). This consortium actively fosters a dynamic and diverse community and formalizes a transparent and equitable process for proposing and engaging in multi-lab collaborative projects related to canine cognition and behavior. In the first ManyDogs study—named ManyDogs 1 (ManyDogs Project et al., 2023b), we investigated a question of theoretical importance in canine science: Do dogs act on human pointing signals as though they are communicative social cues? Domestic dogs (*Canis familiaris*) have become a popular animal model for investigations of cognitive evolution and behavior, particularly after they appeared to respond to human communicative cues such as pointing in a way that was more accurate and flexible than other species (e.g., Bräuer et al., 2006). Though point following behavior in dogs has been widely observed and the subject of scientific study by many over recent decades (Miklösi et al., 1998; Soproni et al., 2001; Hare et al., 2002; Kaminski & Nitzschner, 2013), there is still disagreement as to why dogs follow pointing cues. Is it because they interpret human pointing as socially communicative (**CITE**)? Or is it because dogs have learned to associate human pointing with food rewards (e.g., Wynne et al., 2008)?

To investigate this question, we used a big team science, single-study approach, modeled after other groups such as ManyBabies (Frank et al., 2017) and ManyPrimates (ManyPrimates et al., 2019). With this method, multiple research teams followed the same experimental protocol, sharing the high cost of behavioral data collection and striving to implement the method in an identical manner.

Under our main hypothesis, we predicted that when dogs saw a pointing gesture paired with ostensive signals such as eye gaze and dog-directed speech (i.e., calling the dog's name), they would be more likely to follow the gesture than when no such ostensive cues accompanied the point. If we observed this response across dogs, the result would lend support to the idea that explicitly communicative cues help dogs understand the intention behind the gesture, or that they find ostensive cues necessary for understanding pointing, similar to human children (Behne et al., 2005). On the other hand, if no difference was observed in point following across the two conditions (Ostensive vs Non-Ostensive), this result would

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suggest that dogs indiscriminately follow pointing, perhaps because they have learned to associate it with rewards and not due to understanding the communicative intention underlying the gesture.

In addition to testing our main hypothesis, we took the opportunity offered by multiple labs collaborating on the same study to collect data on sources of inter-lab variability that could influence results. Often, studies by different groups produce inconsistent results (Rodriguez et al., 2021). The impact of cultural differences in scientific practice, dog training norms across regions, and of course variation in heritable traits across dog breeds have complicated replication studies carried out by isolated groups, making it difficult to pinpoint the reasons that results differ. By collecting as much information about the testing environments and subject population as we were practically able, we ended up with a rich and robust data set that would support investigation about multiple influences on dogs' behavior previously out of reach.

(2) Methods

2.1 Study design

The ManyDogs 1 project used a cross-sectional design in which guardians completed an online survey before bringing their dog into a research team's site for behavioral testing. The online survey recorded demographic information of guardians and dogs, along with a standardized evaluation of canine temperament and behavior using the Canine Behavioral Assessment and Research Questionnaire (C-BARQ©, Serpell & Hsu, 2001; Hsu & Serpell, 2003). Once guardians completed the survey, they were invited to the team research site for behavioral testing. Behavioral sessions involved a series of object choice tasks, including the two experimental conditions testing the effects of ostensive and non-ostensive signals on point following. The key focus of the study was to compare responses to the ostensive and non-ostensive signals within subjects and investigate between-subjects factors (drawn from the survey data) that may account for any variability in the behavioral responses.

2.2 Time of data collection

Overall, data were collected between Jan 2022 and Jan 2023, though research sites differed in when they collected data during that time frame (collection dates available in dataset).

2.3 Location of data collection

Data were collected in 20 research sites across nine countries (Argentina, Canada, Croatia, Czech Republic, Hungary, Italy, Poland, UK, USA) on three continents (Figure 1). A full list and description of research sites is available in Table S1 of ManyDogs Project et al. (2023b).

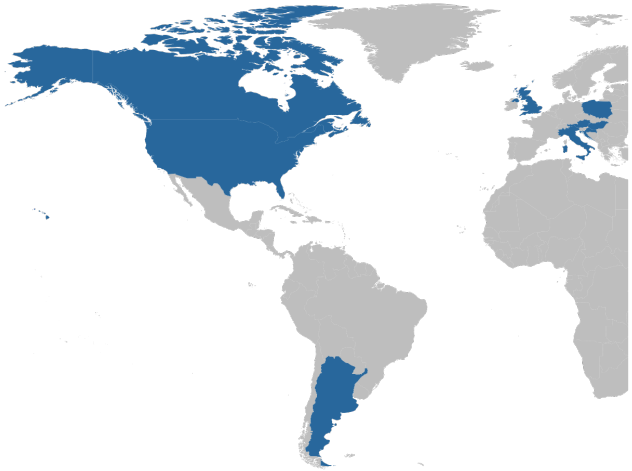

Figure 1. ManyDogs1 was conducted in 20 research sites in nine countries: Argentina, Canada, Croatia, Czech Republic, Hungary, Italy, Poland, UK, USA.

2.4 Sampling, sample and data collection

Across all 20 research sites, teams behaviorally tested 704 dogs (M:F = 334:373, mean ± SD age = 4.40 ± 3.1 years [range = 0.3-20.8]). Approximately 76.9% of the dogs were spayed or neutered, 53.8% were purebred (comprising 85 breeds), 90.2% lived in private homes, 9.6% lived in group/kennel housing, and 0.3% lived in other housing. Complete behavioral data were collected from 455 dogs, and complete survey data were collected from 495 dogs. Guardians identified as female (81.0%), male (17.7%), and nonbinary/other (1.3%) with a modal guardian age range of 30-39 years.

2.5 Materials/Survey instruments

The guardian survey was hosted on Qualtrics (complete survey available at https://osf.io/7rwpc/). The survey included dog demographics (name, living situation, sex, neuter status, birth date, breed, acquisition,), training information (communication style and frequency, training experience, research experience), guardian demographics (gender, age, community type), and the Canine Behavioral Assessment and Research Questionnaire (C-BARQ). The first eight questions of the C-BARQ concern trainability, and their answers were used as part of the preregistered analysis of pointing (ManyDogs Project et al., 2023b). After answering the C-BARQ trainability questions, guardians could opt out of completing the rest of the C-BARQ questions. If they continued, they answered questions about aggression (28 questions), fear (18 questions),

separation-related behavior (9 questions), excitability (7 questions), attachment (7 questions), attachment/attention-seeking (6 questions), and miscellaneous behavior problems (28 questions), including chasing, chewing, begging, pulling, urinating, defecating, barking, and licking. Most questions used a 5-point Likert scale with a Not Observed option. Some categories included open-ended questions for additional explanations.

Behavioral data were collected at individual research sites, where handlers brought the dogs in for test sessions. After acclimating subjects to the testing room, subjects completed a series of object choice tasks in which food was hidden under cups and subjects had to approach a cup to receive any available food rewards hidden underneath (complete methods available in ManyDogs Project et al., 2023b). These tests were conducted by two individuals, an experimenter to arrange the food and cups and a handler to release the subject to make a choice (handlers could be either trained researchers or the dog's guardian). Sessions started with warm-up trials to familiarize subjects to the testing procedures. These involved subjects seeing whether a food reward was placed under a single cup (one-cup warm-ups with four out of seven trials correct) or one of two cups (two-cup warm-ups with four out of size trials correct). Once meeting the completion criteria, subjects moved one to two experimental condition sessions with eight trials per condition (order counterbalanced between subjects). In the non-ostensive condition, the experimenter cleared their throat to get the dog's attention, showed them the food, and placed food underneath one of two cups behind a visual barrier. They then removed the barrier, gazed at the ground in front of them, cleared their throat again, and pointed to the cup with the food using a contralateral momentary point. In the ostensive condition, instead of clearing their throat, the experimenter said "[dog name], look!" in an engaging voice and instead of looking at the floor, they made eye contact with the subject. The two conditions were separated by a one minute play break and re-familiarization with the testing situation . Finally, subjects completed an odor control condition with a similar set-up as the ostensive condition, except no cue was given. Therefore, if subjects were using olfactory instead of visual cues, they should be able to choose the correct cup.

2.6 Quality control

Collecting high-quality data was a key objective of ManyDogs 1. To validate the study design and analysis plan, we conducted a pilot experiment at a single site with 91 dogs. We pre-registered the pilot study at the Open Science Framework (https://osf.io/gz5pj/). The pilot data are not included in this dataset.

For the primary study presented here, we pre-registered the hypotheses, methods, and analysis plan as a registered report at *Animal Behavior and Cognition* (https://doi.org/10.31234/osf.io/f86jq). Because this study involved multiple sites running the same protocol, we sought to ensure consistent procedures across sites. Participating sites were required to submit videos of practice sessions as well as the first participant session to the project administrators. Reviewers then viewed the videos to determine whether the protocols were being followed and offered feedback to sites to ensure consistent procedures across sites. Researchers from each lab also practiced entering data into a Qualtrics survey that maintained all behavioral data. Administrators offered feedback to ensure correct data entry.

Experimenters entered data into spreadsheets or paper worksheets live during the experimental sessions. All experimenters had the opportunity to correct data entry errors with another Qualtrics survey. To measure inter-rater reliability of the live coding of experimental sessions, each site had a research assistant blind to the project's focus recode a subset of sessions. This recoding resulted in an overall Cohen's kappa of 0.98 with individual sites ranging from kappa = 0.92-1.00.

2.7 Data anonymization and ethical issues

Each research site participating in this study provided approval from their respective institutional ethics committee (see Table S1 of ManyDogs Project et al., 2023b). All participants gave informed consent to participate and were free to discontinue from the study when wanted.

All identifiable information has been removed from the dataset, including replacing dog names with dog ID numbers.

2.8 Existing use of data

A portion of the guardian data collected for the ManyDogs 1 study were used and published in:

ManyDogs Project, Espinosa, J., Stevens, J. R., Alberghina, D., Always, H. E. E., Barela, J. D., Bogese, M., Bray, E. E., Buchsbaum, D., Byosiere, S-E., Byrne, M., Cavalli, C. M., Chaudoir, L. M., Collins-Pisano, C., DeBoer, H. J., Douglas, L. E. L. C., Dror, S., Dzik, M. V., Ferguson, B., … Zylberfuden, S. G. (2023). ManyDogs 1: A multi-lab replication study of dogs' pointing comprehension. *Animal Behavior and Cognition*, 10(3), 232-286. https://doi.org/10.26451/abc.10.03.03.2023

(3) Dataset description and access

The data set contains 704 observations of 158 variables described in Table 1. The dataset contains variables supplied by a survey as well as experimental variables. Data provided by

each dog's guardian include demographic information about the dog and guardian, responses to questions about the types and frequencies of the dog's training activities, and answers to the Canine Behavior and Research Questionnaire (C-BARQ, Serpell & Hsu, 2001; Hsu & Serpell, 2003).

In addition to the data provided by guardians, experimental variables are included in this data set. These include information about experimental conditions, proportions of correct choices under ostensive and non-ostensive conditions and non-ostensive conditions, whether the correct and chosen option were on the right side of the dog, and whether the subject completed the experiment and was used in the analysis.

3.1 Repository location

The dataset for this study is available on the Open Science Framework at https://osf.io/7rwpc/ (DOI: https://doi.org/????) and on GitHub at https://github.com/ManyDogsProject/md1_datapaper.

3.2 Object/file name

The file name for the dataset is `manydogs_etal_2024_data.csv` and the codebook is `manydogs_etal_2024_codebook.csv`.

3.3 Data type

This dataset includes processed data from the ManyDogs1 project. We have removed identifiable information, recoded data values for consistency, renamed and reordered columns for clarity, and combined survey data submitted by guardians via Qualtrics and behavioral data submitted by research teams via Qualtrics.

3.4 Format names and versions

The dataset and codebook are provided in a comma-separated (`.csv`) plain text format. There is one version of the dataset with no anticipated additional versions as data collection has ended.

3.5 Language

The variable names and text values are in English. Though data were collected in other languages (Croatian, Czech, Hungarian, Italian, Polish, and Spanish), the Qualtrics surveys were coded to save responses in English.

3.6 License

The ManyDogs 1 dataset is available under a CC BY 4.0 license, which allows users to share (copy and redistribute the material in any medium or format for any purpose, even commercially) and adapt (remix, transform, and build upon the material for any purpose, even commercially) this material as long as they give appropriate credit, provide a link to the license, indicate if changes were made, and do not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

3.7 Limits to sharing

The dataset is freely available for download on the Open Science Framework. There are no limits to sharing beyond those described in the license.

3.8 Publication date

The dataset was uploaded to the Open Science Frame work on

3.9 FAIR data/Codebook

This dataset is *findable* through the persistent identifier on the Open Science Framework (), *accessible* through free availability on Open Science Framework and GitHub, *interoperable* by using plain-text CSV data files, and *reusable* with the CC-BY 4.0 license. Metadata are included as codebook here (Table 1) and with the data on Open Science Framework and GitHub.

(4) Reuse potential

The original data from ManyDogs 1 (ManyDogs Project et al., 2023b) focuses on dog responses in the two-alternative object choice task across warm-up, ostenstive, non-ostenstive, and odor control trials. In addition, that dataset includes basic demographics on the dog and guardian, as well as the mean training score from the C-BARQ. The current dataset adds information on dog origin and household, dog training experience, guardian communication practices, and the complete C-BARQ profile. The C-BARQ data in particular are quite rich, with sections on training, aggression, fear, separate-related behavior, excitability, attachment and attention seeking, and miscellaneous problem behaviors. Thus, this dataset allows for assessing associations among all of the C-BARQ measures as well as connections to the experimental task data and the other dog and guardian characteristic data.

A key strength of this data set is its diversity. The data were collected by 20 different research sites in nine countries, allowing the assessment of site effects as well as cultural differences. In addition, while most dogs are kept in private homes, the dataset also includes a subset of dogs kept in group housing at working dog facilities. Finally, when appropriate, breed is included, allowing the exploration of breed differences.

Though the current dataset has expanded survey information about dog and guardian characteristics, the behavioral task data has been summarized at the level of mean choices per subject and experimental condition rather than including individual trial data. Thus, the trial data are not available for analysis in the current dataset. However, the trial data are available in the original dataset, so it is possible to merge the current and original datasets using subject ID as the primary key to gain access to the trial data. An additional limitation is that, though the C-BARQ training survey questions were compulsory for all participants, the remaining questions were optional to ease the survey burden. As a result, 512 of the 704 guardians elected to continue on to the optional questions (though not all completed the survey).

Contribution Statement

The authors made the following contributions. Julia Espinosa: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Supervision, Writing - original draft, Writing - review & editing; Elizabeth Hare: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Software, Validation, Writing - original draft, Writing - review & editing; Daniela Alberghina: Investigation, Validation, Writing - original draft, Writing - review & editing; Brian Perez: Investigation, Validation, Writing - original draft, Writing - review & editing; Jeffrey R. Stevens: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Software, Supervision, Visualization, Writing - original draft, Writing - review & editing.

For the original ManyDogs 1 project, data were collected by: D. Alberghina., H.E.E. Alway, J.D. Barela, E.E. Bray, S.-E. Byosiere, C.M. Cavalli, L.M. Chaudoir, C. Collins-Pisano, H.J. DeBoer, L.E.L.C. Douglas, S. Dror, M.V. Dzik, B. Ferguson, L. Fisher, H.C. Fitzpatrick, M.S. Freeman, S.N. Frinton, M.K. Glover, J.E.P. Goacher, M. Golańska, M. Hickey, H.-L. Jim, D.M. Kelly, V.A. Kuhlmeier, L. Lassiter, L. Lazarowski, J. Leighton-Birch, K. Maliszewska, V. Marra, L.I. Montgomery, M.S. Murray, E.K. Nelson, L. Ostojić, S.G. Palermo, A.E. Parks Russell, M.H. Pelgrim, S.D. Pellowe, A. Reinholz, L.A. Rial, E.M. Richards, M.A. Ross, L.G. Rothkoff, H.Salomons, J.K. Sanger, A.R. Schirle, S.J. Shearer, J.M. Silverman, A. Sommese, T. Srdoc, H. St. John-Mosse, K. Vékony, Y.A. Worth, L.M.I. Zipperling, B. Żołędziewska, and S.G. Zylberfuden.

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Conflict of Interest

The author(s) declare no conflict of interest associated with the publication of this manuscript.

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Table 1
Data description for complete ManyDogs1 project data

Category of Variable	Variable Name	Question Text	Possible Response Values
Dog Demographics	date	Timestamp for completion of questionnaire	YYYY-MM-DD HH:MM:SS
	site	What location are you going to visit?	accc, auburn, bccc, bdl, cchil, cci, crumun, dcc, duke, eltebuda, icoc, ldbtdc, manitoba, other, queensu, tdc, ucs, umessina, urijeka, uwarsaw, yale
	subject_id	What is your dog's assigned subject ID?	Text entry
	owned_status	What is the dog's living situation? - Selected Choice	Group housing (e.g., working dog kennel), Private home, Other
	birthdate	Date of birth	YYYY-MM-DD
	sex	What is your dog's sex?	Female, Male
	desexed	Has your dog been spayed or neutered?	Yes, No
	purebred	Is your dog purebred?	Yes, No
	breed	What breed is your dog?	Multiple choice; 95 breeds represented
	breed_registry	Is your dog registered with a kennel club in your country?	Yes, No
	mixed_breed	Is your dog a mix of known breeds?	Yes, No
Training and Communication	communication_method	How do you typically communicate with your dog? Select all that apply	Acoustic (clicker or whistle), Gesture (hand gestures, pointing), Verbal (spoken words), Other
	gesture_frequency	How frequently do you use hand gestures (such as pointing or waving) to communicate with your dog?	Never, Seldom, Sometimes, Usually, Always, Not observed
	gaze_follow	My dog follows pointing gestures with it's gaze immediately	Never, Seldom, Sometimes, Usually, Always, Not observed
	training_type	Indicate the frequency with which your dog has participated in each of the following types of training/activity in the past 12 months. Select all that apply.	Agility, Ballsport (flyball), Conform (Conformation), Discdog, Herd (Herding/sheepdog trials), Hunt (Game hunting/tracking), Music (Musical freestyle), Neighbor (Good neighbor class), Obedience1 (Basic obedience), Obedience2 (Advanced obedience), Pullsport (Skijoring/Canicross/Bikejoring), Puppy (Puppy class), Rallyo (Rally obedience), Scent, Search_rescue, Service, Therapy, Other
	training_freq_puppy	Puppy class frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_neighbor	Good neighbor class frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_obedience1	Basic obedience frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_obedience2	Advanced obedience frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_rallyo	Rally obedience frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_music	Musical freestyle frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_agility	Agility frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_flyball	Flyball frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_disc	DiscDog frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_conform	Conformation frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month

Table 1
Data description for complete ManyDogs1 project data (continued)

Category of Variable	Variable Name	Question Text	Possible Response Values
	training_freq_scent	Scent detection frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_search	Search and rescue frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_sled	Sled pulling/cart pullin frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_pullsport	Skijoring/Canicross/Bikejoring frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_therapy	Therapy/ambulance dog frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_service	Specialized service training frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_hunt	Game hunting/tracking frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_herd	Herding/sheepdog trials frequency of participation in the last 12 months	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_other1	Other frequency of participation in the last 12 months (1)	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_other2	Other frequency of participation in the last 12 months (2)	Never, Weekly, >1 week, <1 month, 1-2 month
	training_freq_other3	Other frequency of participation in the last 12 months (3)	Never, Weekly, >1 week, <1 month, 1-2 month
	lab_exposure	Has your dog participated in research studies before at this or another location/institution?	Yes, same site; Yes, different site; No; Unsure
	research_experience	What type of research tasks has your dog participated in during previous visits to research centers?	Choice tasks, Cup tasks, Human point, Other
	other_household_dogs	Does your dog currently live with other dogs?	Yes, No
	num_household_dogs	If yes, how many?	Number
Guardian Demographics	years_owned	Approximately, how many years have you owned your dog?	Number
	origin	How did you acquire your dog?	Breeder, Relation, Rescue, Shelter, Other
	guardian_gender	With which gender do you most identify?	Male, Female, Other, Prefer not to say
	guardian_age	How old are you?	Under 20, 20-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80+, Prefer not to say
	environment	What type of environment do you and your dog live in?	Rural, Suburban, Urban, Prefer not to say
C-BARQ Trainability	cbarq_train_1	When off the leash, returns immediately when called	Never, Seldom, Sometimes, Usually, Always, NA
	cbarq_train_2	Obeys the “sit” command immediately	Never, Seldom, Sometimes, Usually, Always, NA
	cbarq_train_3	Obeys the “stay” command immediately	Never, Seldom, Sometimes, Usually, Always, NA
	cbarq_train_4	Seems to attend/listen closely to everything you say or do	Never, Seldom, Sometimes, Usually, Always, NA
	cbarq_train_5	Slow to respond to correction or punishment	Never, Seldom, Sometimes, Usually, Always, NA
	cbarq_train_6	Slow to learn new tricks or tasks	Never, Seldom, Sometimes, Usually, Always, NA
	cbarq_train_7	Easily distracted by interesting sights, sounds, or smells	Never, Seldom, Sometimes, Usually, Always, NA
	cbarq_train_8	Will “fetch,” or attempt to fetch, sticks, balls, or objects	Never, Seldom, Sometimes, Usually, Always, NA

Table 1
Data description for complete ManyDogs1 project data (continued)

Category of Variable	Variable Name	Question Text	Possible Response Values
Opt-Out Point	continue_cbarq	Thank you so much for your answers! At this point in the survey, you have completed the minimum amount required to participate in ManyDogs Study 1, and can choose to submit your information now by selecting "Submit my info now". If you would like to tell us more about your dog, we would love to hear all about them! We have prepared several more questions about their behaviour that you can answer by selecting "More questions please", this will take approximately 12-15 minutes.	Yes (Continue to take full C-BARQ), No (Decline to complete full C-BARQ), NA
C-BARQ Aggression	cbarq_aggression_1	When verbally corrected or punished (scolded, shouted at, etc) by you or a household member.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_2	When approached directly by an unfamiliar adult while being walked/exercised on a leash	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_3	When approached directly by an unfamiliar child while being walked/exercised on a leash	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_4	Toward unfamiliar persons approaching the dog while s/he is in your car (at the gas station for example).	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_5	When toys, bones or other objects are taken away by a household member	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_6	When bathed or groomed by a household member	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_7	When an unfamiliar person approaches you or anothermember of your family at home.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_8	When unfamiliar persons approach you or another member of your family away from home.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_9	When approached directly by a household member while s/he (the dog) is eating	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_10	When mailmen or other delivery workers approach your home.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_11	When his/her food is taken away by a household member.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_12	When strangers walk past your home while your dog is outside or in the yard.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_13	When an unfamiliar person tries to touch or pet the dog.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_14	When joggers, cyclists, rollerbladers or skateboarders pass your home while your dog is outside or in the yard.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_15	When approached directly by an unfamiliar male dog while being walked/exercised on a leash	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_16	When approached directly by an unfamiliar female dog while being walked/exercised on a leash	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_17	When stared at directly by a member of the household.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_18	Toward unfamiliar dogs visiting your home.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA

Table 1
Data description for complete ManyDogs1 project data (continued)

Category of Variable	Variable Name	Question Text	Possible Response Values
	cbarq_aggression_19	Toward cats, squirrels or other small animals entering your yard.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_20	Toward unfamiliar persons visiting your home.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_21	When barked, growled, or lunged at by another (unfamiliar) dog.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_22	When stepped over by a member of the household.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_23	When you or a household member retrieves food or objects stolen by the dog.	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_24	Towards another (familiar) dog in your household (leave blank if no other dogs).	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_25	When approached at a favorite resting/sleeping place by another (familiar) household dog (leave blank if no other dogs).	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_26	When approached while eating by another (familiar) household dog (leave blank ifno other dogs).	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
	cbarq_aggression_27	When approached while playing with/chewing a favorite toy, bone, object, etc., by another (familiar) household dog (leave blank ifno other dogs).	No aggression, Mild aggression, Moderate aggression, High aggression, Serious aggression, NA
C-BARQ Fear	cbarq_fear_1	When approached directly by an unfamiliar adult while away from your home	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_2	When approached directly by an unfamiliar child while away from your home	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_3	In response to sudden or loud noises (e.g. vacuum cleaner, car backfire, road drills, objects being dropped, etc.)	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_4	When unfamiliar persons visit your home	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_5	When an unfamiliar person tries to touch or pet the dog.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_6	In heavy traffic	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_7	In response to strange or unfamiliar objects on or near the sidewalk (e.g. plastic trash bags, leaves, litter, flags flapping, etc.)	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_8	When examined/treated by a veterinarian.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_9	During thunderstorms, firework displays, or similar events.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_10	When approached directly by an unfamiliar dog of the same or larger size.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_11	When approached directly by an unfamiliar dog of a smaller size.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_12	When first exposed to unfamiliar situations (e.g. first car trip, first time in elevator, first visit to veterinarian, etc.)	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA

Table 1
Data description for complete ManyDogs1 project data (continued)

Category of Variable	Variable Name	Question Text	Possible Response Values
	cbarq_fear_13	In response to wind or wind-blown objects.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_14	When having nails clipped by a household member.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_15	When groomed or bathed by a household member.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_16	When having his/her feet toweled by a member of the household.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_17	When unfamiliar dogs visit your home	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
	cbarq_fear_18	When barked, growled, or lunged at by an unfamiliar dog.	No fear, Mild fear, Moderate fear, High fear, Extreme fear, NA
C-BARQ Separation	cbarq_separation_1	Shaking, shivering, or trembling	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_separation_2	Excessive Salivation	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_separation_3	Restlessness/agitation/pacing	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_separation_4	Whining	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_separation_5	Barking	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_separation_6	Howling	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_separation_7	Chewing/scratching at doors, floor, windows, curtains, etc	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_separation_8	Loss of appetite	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
C-BARQ Excitability	cbarq_excitability_1	When you or other members of the household come home after a brief absence.	No excitability, Mild excitability, Moderate excitability, High excitability, Extreme excitability, NA
	cbarq_excitability_2	When playing with you or other members of your household.	No excitability, Mild excitability, Moderate excitability, High excitability, Extreme excitability, NA
	cbarq_excitability_3	When the doorbell rings.	No excitability, Mild excitability, Moderate excitability, High excitability, Extreme excitability, NA
	cbarq_excitability_4	Just before being taken for a walk	No excitability, Mild excitability, Moderate excitability, High excitability, Extreme excitability, NA
	cbarq_excitability_5	Just before being taken on a car trip	No excitability, Mild excitability, Moderate excitability, High excitability, Extreme excitability, NA
	cbarq_excitability_6	When visitors arrive at your home.	No excitability, Mild excitability, Moderate excitability, High excitability, Extreme excitability, NA
C-BARQ Attachment/Attention-Seeking	cbarq_attachment_1	Displays a strong attachment for one particular member of the household	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_attachment_2	Tends to follow you (or other members of household) about the house, from room to room	Never, Seldom, Sometimes, Usually, Always, Not observed, NA

Table 1
Data description for complete ManyDogs1 project data (continued)

Category of Variable	Variable Name	Question Text	Possible Response Values
	cbarq_attachment_3	Tends to sit close to, or in contact with, you (or others) when you are sitting down	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_attachment_4	Tends to nudge, nuzzle or paw you (or others) for attention when you are sitting down	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_attachment_5	Becomes agitated (whines, jumps up, tries to intervene) when you (or others) show affection for another person	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_attachment_6	Becomes agitated (whines, jumps up, tries to intervene) when you show affection for another dog or animal	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
C-BARQ Miscellaneous Behavior Problems	cbarq_miscellaneous_1	Chases or would chase cats given the opportunity	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_2	Chases or would chase birds given the opportunity	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_3	Chases or would chase squirrels, rabbits and other small animals given the opportunity	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_4	Escapes or would escape from home or yard given the chance	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_5	Rolls in animal droppings or other 'smelly' substances	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_6	Eats own or other animals' droppings or feces	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_7	Chews inappropriate objects	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_8	Mounts' objects, furniture, or people	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_9	Begs persistently for food when people are eating	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_10	Steals food	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_11	Nervous or frightened on stairs	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_12	Pulls excessively hard when on the leash	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_13	Urinates against objects/ furnishings in your home	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_14	Urinates when approached, petted, handled or picked up	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_15	Urinates when left alone at night, or during the daytime	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_16	Defecates when left alone at night, or during the daytime	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_17	Hyperactive, restless, has trouble settling down	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_18	Playful, puppyish, boisterous	Never, Seldom, Sometimes, Usually, Always, Not observed, NA

Table 1
Data description for complete ManyDogs1 project data (continued)

Category of Variable	Variable Name	Question Text	Possible Response Values
	cbarq_miscellaneous_19	Active, energetic, always on the go	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_20	Stares intently at nothing visible	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_21	Snaps at (invisible) flies	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_22	Chases own tail/hind end	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_23	Chases/follows shadows, light spots, etc.	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_24	Barks persistently when alarmed or excited	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_25	Licks him/herself excessively	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_26	Licks people or objects excessively	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
	cbarq_miscellaneous_27	Displays other bizarre, strange, or repetitive behavior(s)	Never, Seldom, Sometimes, Usually, Always, Not observed, NA
Behavior Testing	status	Status of subject in experiment	Error (Experimental error invalidated session), Incomplete (Subject did not complete session, invalidating it), Included (Valid session used in analysis)
	first_condition	Which experimental condition was experienced first	Nonostensive, Ostensive
	onecup	Warm-up trials with one cup	Proportion correct trials
	twocup	Warm-up trials with two cups	Proportion correct trials
	nonostensive	Nonostensive experimental trials	Proportion correct trials
	ostensive	Ostensive experimental trials	Proportion correct trials
	odor	Odor control trials	Proportion correct trials
	right_side_ost	Right side correct in ostensive condition	Proportion of trials with right side correct
	right_side_nonost	Right side correct in nonostensive condition	Proportion of trials with right side correct
	right_choice_ost	Right side chosen in ostenstive condition	Proportion of trials choosing right side
	right_choice_nonost	Right side chosen in nonostensive condition	Proportion of trials choosing right side