

ManyDogs 2 Study Manual

Study Overview.....	2
1. MD2 Study Background & Research Aims.....	2
Main MD2 Goals: Research Questions and Hypotheses.....	3
Ethical Statement.....	4
2. Collaborator Registration, Onboarding, & MD2 Authorship.....	4
Joining ManyDogs & Registering for MD2.....	4
Author Agreement.....	4
Collaborator Checklist.....	8
Ethics Approval and Floor Plan.....	11
Preparing to run MD2.....	12
3. Collecting and Submitting Data.....	12
Dog Subjects.....	12
Dog inclusion criteria:.....	13
Entering Data.....	13
Coding Sheet.....	13
Warm-up trials.....	14
Experimental trials.....	14
Data entry sheet.....	15
Verifying and Submitting Data.....	15
Video Recording.....	15
Video Storage.....	16
Data Reliability.....	16
Data Dictionary.....	17
Data Availability.....	19
4. Data Analysis.....	19
Response variables.....	19
Predictors.....	19
Random effects.....	19
Models.....	19
5. Using MD2 Data for Secondary & Student Projects.....	21
6. FAQ.....	21
Appendix 1: Contact information and Resources.....	23
ManyDogs 2 Study Coordinators.....	23
Study Resources.....	23
Appendix 2: Research Site Google Folder.....	24
MD2_SiteID_upload Folder.....	24
MD2_datasheet_siteID.....	24
MD2_study_manual.....	24
MD2_tenzing.....	24
MD2_collaborator_timeline.....	24
Appendix 3: Background References and Helpful Articles.....	25
Background References:.....	25

Study Overview

This brief overview summarizes key information about the ManyDogs 2 study (MD2). For full details, please read the entire manual and protocol to learn about the pre-registration, data collection, and authorship policy. If you have questions, please contact the MD2 Study Coordinators at manydogsproject2@gmail.com, we would be delighted to provide additional information and clarification on the study and how to participate.

What is the study about? A growing body of literature is investigating how dogs copy human actions that are irrelevant or unnecessary - in what is called “overimitation”. Following studies from the *Clever Dog Lab* in Vienna, MD2 will investigate overimitation in dogs to determine whether dogs are more likely to copy their guardians or a stranger when performing irrelevant actions. In this study, dogs participate in a behavioural task where they observe either their guardian or a stranger perform a *functionally irrelevant* action (touching two colored dots on a wall) and a *functionally relevant* action (removing a lid to access a treat). Each dog experiences four trials following a warm-up game, and the entire study can be completed in under 30 minutes.

How does participation work? ManyDogs 2 is currently open for research collaborators to register for data collection. The deadline to register is April 1st, 2026 and the deadline to submit the data contribution is June 30th, 2026. This data contribution will include behavioural data and online surveys from at least 16 dogs and their guardians. Research teams collecting data are capped at four co-authors for the minimum sample (more spots available with larger contributions). Proof of ethical approval from the appropriate oversight body is required to implement the behavioural protocol with a local dog sample, collect human participant data via surveys, and record and share video data of behavioural sessions with other MD2 collaborators.

Who can participate? All researchers interested in collecting data are welcome to join the ManyDogs Project and register for MD2. By participating in this study, you’ll contribute to the greater canine science community through supporting big team science and the use of open science tools in research. Specifically, we’ll collectively investigate the question of whether overimitation is influenced by the relationship of the dog to the demonstrator (guardian vs. stranger) and explore cross-lab effects on the copying of irrelevant actions (overimitation) in dogs. Let’s shape the future of canine science—together!

1. MD2 Study Background & Research Aims

The [ManyDogs Project](#) is an international consortium that produces high-powered and reproducible research within the canine science subfield of animal behavior ([ManyDogs Project, 2023a](#)). The first study from the consortium – [ManyDogs 1](#) – investigated whether dogs are more likely to follow pointing that is performed ostensively (i.e., highly communicative, with high pitch speech and eye contact) or non-ostensively (i.e., non-communicative without high pitched speech or eye contact; [ManyDogs Project, 2023b](#)). The present ManyDogs 2 study (MD2) will similarly investigate dog-human social interaction, this time turning to *overimitation*.

Overimitation is a behavioural phenomenon found mostly occurring in human children when they observe a model performing actions. This phenomenon is commonly defined as the “... imitation of perceivably causally unnecessary actions in relation to the goal of an action sequence performed by a model.” (Hoehl et al., 2019)

It should be noted that the term overimitation does not imply that the actions performed by an observer go beyond (or “over”) the actions performed by a model, nor that the behaviour is necessarily maladaptive or dysfunctional in the subject’s everyday lives. Rather, the individual is imitating more than is necessary in the context at hand - assuming a certain goal such as extracting a reward from a puzzle box.

Despite their close genetic relatedness, chimpanzees and bonobos have not been found to overimitate a human demonstrator’s irrelevant actions (Clay & Tennie, 2018; Horner & Whiten, 2005), suggesting that humans may be unique in our tendency to overimitate. However, given the pro-social nature of their relationship with humans, dogs may provide a better model for testing this theory. Several studies have been conducted to date exploring overimitation in dogs. Since some studies indicate overimitation in dogs (Huber et al., 2018, 2020, 2022; Mackie & Huber, 2023) and others do not (due to finding a decreasing tendency of overimitation in dogs and dingos over time, Johnston et al., 2017), context may be a key factor to consider in seeking to better understand this phenomenon in dogs and other non-human species.

In many studies of non-human animals, the observer-demonstrator relationship has been shown to have an influence on social learning (Camacho-Alpizar & Guillette, 2023), and previously published work conducted with a limited sample has shown that dogs overimitate more frequently when their guardian, compared to an unknown individual, demonstrates the irrelevant actions (Huber et al., 2020). This suggests that social context – in this case, affiliation, or the relationship between the dog and the demonstrator – may indeed impact dogs’ tendency to overimitate (Huber et al., 2020; 2022; Mackie & Huber, 2023). In MD2, we aim to conduct a large-scale investigation of whether dogs will be more likely to overimitate their guardian or a human stranger, with a goal of gaining further evidence to support the influence of such social factors on dogs’ learning.

MD2 uses a method adapted from the dot-touching task from the Clever Dog Lab in Vienna, Austria (Huber et al., 2018). In this adapted task, dogs will be shown a demonstration of how to receive a food reward with a functionally irrelevant (touching colored-paper dots on the wall) and a functionally relevant action (opening a bucket to access a food reward). This study will examine if social connections affect how dogs choose to copy a demonstrated irrelevant or relevant action when the demonstrator is either a guardian or a stranger (unfamiliar experimenter).

Main MD2 Goals: Research Questions and Hypotheses

Our main research question is whether familiarity with the model (**guardian vs. stranger**) has a cross-lab effect on overimitation in dogs in the dot-touching task. Given that prior literature has exhibited an effect of model familiarity on social learning in animals (i.e., Camacho-Alpizar & Guillette, 2023), and one previous study has revealed this effect for overimitation in dogs (Huber et al., 2020), we hypothesize that dogs will be more likely to

copy the **causally irrelevant actions** of their familiar guardian rather than a stranger (RQ1a). On this note, we would further expect dogs to also copy the **causally relevant action** better when a guardian rather than a stranger is demonstrating the task (RQ1b).

We are also interested in **what kinds of dogs** are engaging in overimitation during the dot-touching task. We will examine effects of dog sex and age on imitation, and, as there has been some evidence for cooperative-type dog breeds learning better from human social demonstrations than more independent-type breeds (Dobos & Pongracz, 2023), we also aim to include **breed-type** in our analyses. We hypothesize that some breeds, for example retrievers, sheepdogs and cattle dogs (grouping by FCI standards), may be more prone to overimitate (RQ2a). In addition to characteristics of the dogs themselves, we will investigate whether **dog-human interactions** are related to overimitation. Specifically, we hypothesize that dog training levels and attachment level to the guardian predict overimitation (RQ2b). In summary, the dog's individual features of interest for overimitation in dogs are as follows:

- Breed-type (FCI group standards)
- Guardian relationship (LAPS attachment questionnaire)
- Training (CBARQ training section)

Ethical Statement

Prior to recruiting dogs and their guardians, each research site will be responsible for following their institution's requirements for obtaining explicit ethical approval to run the study and collect video data of test sessions. This documentation will be shared with the MD2 administrative team before the site is authorized to implement the protocol.

2. Collaborator Registration, Onboarding, & MD2 Authorship

Study Phases

The MD2 study topic was selected through a democratic process and was developed into an experimental protocol through a consensus-driven approach. There are three main phases of the study: 1) conceptualization and study development (complete), 2) collaborator registration and data collection (current stage), and 3) manuscript writing and data analysis (yet to begin). These phases are non-overlapping and sequential. To join the project as a collaborator and become a co-author, individuals are welcome to register and participate during phase 2 and continue their involvement through phase 3.

Joining ManyDogs & Registering for MD2

All MD Research Members are eligible to join MD2 and contribute to the study. Membership in MD is a prerequisite for participating in MD2 research activities. If you are not yet an MD research member, you can sign up [here](#). After registering for MD, you are welcome to register as an MD2 collaborator [here](#).

Author Agreement

This author agreement describes the avenues to authorship on the MD2 empirical paper, the associated responsibilities of co-authors on the study, the process for resolving conflicts, and conditions under which the author order may be amended. This agreement and the criteria below pertain to achieving authorship on the main MD2 empirical paper and do not apply or extend to other publications that make use of the MD2 dataset. MD2 co-authors are

encouraged to join and contribute to follow-up studies using the data from MD2 and can design new author agreements specific to these studies. This agreement is included in the MD2 registration survey.

Authorship contribution areas are based on the CRediT Taxonomy (<https://credit.niso.org/>) and have been adapted to fit the specific research activities taking place within the scope of MD2. Research collaborators (i.e., co-authors) are encouraged to make substantial contributions to multiple areas. Co-authors are *required* to meet criteria for contribution in at least **two** separate areas. The notable exception to this rule is for co-authors contributing to “Investigation” and/or “Supervision” which are significant, stand-alone areas that meet the threshold for authorship without further contributions.

Author order on the MD2 empirical manuscript

- First position: The consortium, ManyDogs Project, will be listed in first position in recognition of the collective effort of the group in achieving the overarching research goal and the supporting project infrastructure facilitating the study.
- Second position: The MD2 Study Lead, will be listed in second position in recognition of the enormous leadership efforts and administrative load required to organize a multisite research project.
- Third - XX positions: The MD2 Admin Team Leads will be listed after the second position, ordered alphabetically by surname, in recognition of substantial contributions to the study administration. MD2 Team Lead positions include Data Team Lead, Onboarding/Recruitment Team Lead, Methods Team Lead, and Advertising/Communications Team Lead.
- Middle positions: All individual co-authors not serving as a Team Lead will be listed next, ordered alphabetically by surname.
- Last position: The senior scientific co-author of the MD2 Study, in recognition of significant contributions to the study origination through conceptualization, methodology, and/or project administration.

Contribution areas for MD2

Co-authors are required to make contributions to at least two of the following, with the exception of co-authors that meet the criteria for authorship through “Investigation” and/or “Supervision” (see next section for additional details on these two contribution areas).

- a. **Conceptualization**: Actively contributing ideas and participating in the formulation of the overarching theoretical framework of the study, including hypotheses and aims.
- b. **Data Curation**: Sustained activities over the project to annotate (produce metadata), design and maintain data submission and data analysis infrastructure, clean submitted behavioural and/or survey data, and/or maintain research data infrastructure (including software code, where it is necessary for interpreting the data itself). Requires an individual’s sustained involvement at the larger project level, i.e., working with data submissions and processing across multiple sites.
- c. **Formal Analysis**: Defining the analytic approach included in MD2 study pre-registration, and application of these statistical, mathematical, computational, or other formal techniques in the analysis of resulting MD2 behavioural or survey data.

- d. **Investigation:** Conducting a research and investigation process, specifically performing the experiments and data collection with dogs and guardians at local research sites, with the minimum sample of 16 eligible participants submitted.
- e. **Methodology:** Active participation in the development and design of methodology and experimental procedures detailed in the pre-registered MD2 study protocol.
- f. **Project Administration:** Sustained participation in management and coordination activities over the course of the project, specifically responsibilities at the larger project level for research activity planning and execution, designing and creating project infrastructure, and facilitating co-author participation.
- g. **Resources:** Provision of study materials, laboratory space, and the means to facilitate participant recruitment and participation at a local research site.
- h. **Software:** Programming, software development required to support research activities of MD2; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components outside of data curation or analysis contexts.
- i. **Supervision:** Oversight and leadership responsibility for research activity execution at a local research site, with the minimum sample of 16 eligible participants submitted.
- j. **Validation:** Verification of results through reliability coding of data gathered at local research sites.
- k. **Writing - Original Draft:** Contributing original writing to the empirical manuscript of MD2 by those with prior involvement in conceptualization, methodology, or project administration, specifically by writing substantial sections of the first draft of the manuscript.
- l. **Writing - Review & Editing:** Contributing substantial, holistic critical review, commentary or revisions to the pre-published empirical manuscript of MD2 by those with qualifying authorship contributions in another area.

Detailed information about Investigation and Supervision credits

The minimum data contribution to earn authorship on MD2 through “Investigation” and/or “Supervision” is $n = 16/\text{site}$. At the time of submission, these data points must be collected through the same research site and not meet any criteria for exclusion from main (pre-registered) analyses. If data points end up being flagged for exclusion later on in cleaning and/or analysis, eligibility for authorship credit will not be impacted.

With this data contribution there are four authorship spots available to researchers at each local site: Depending on the contributions of each person, up to two researchers can claim “Supervision” and/or “Resources” credit, and up to three researchers can claim “Investigation” credit (i.e., for some research sites it may be accurate for an individual to have credit both for investigation and supervision). For each additional increment of eight dogs beyond the minimum sample, an additional authorship spot for “Investigation” is available to the team (e.g., if a research site submits data for 24 dogs that do not meet exclusion criteria, they can include a total of five co-authors for their team, and upward from there).

MD2 co-author rights and responsibilities

- MD2 co-authors are required to read and abide by the MD Code of Conduct (signed when becoming an MD member) as well as the MD2 author agreement (this document) as prerequisites for participation in the study and to maintain their authorship status.
- MD2 co-authors are required to keep their contact information current and communicate any changes in affiliation or email address directly with the MD2 Study Coordinators.
- Where applicable, MD2 co-authors are required to seek and document the appropriate ethical approval at their local institution to implement the study protocol.
- While the study is ongoing and unpublished, MD2 co-authors are not permitted to share their individual site results on social media or via peer-reviewed or published venues (e.g., through publication with a journal or in published conference proceedings).
- All MD2 co-authors with “Supervision” contributions are responsible for verifying the reliability of the data collected at their site through the specified reliability coding procedure (see manual for instructions).
- All MD2 co-authors with “Supervision” contributions retain ownership over data collected at their site.
- All MD2 co-authors have the right to join an editing team during the editing & review process and provide substantial contributions to the manuscript, thereby earning Writing - Review & Editing credit on the paper.
- All MD2 co-authors have the right to read through and comment on the final manuscript prior to submission and the responsibility to do so during the posted time period (which will not be less than two weeks). This final check does not qualify for Writing - Review & Editing credit.
- All MD2 co-authors acknowledge that the final manuscript will be submitted on their behalf at the end of the final read-through period unless major concerns are raised.
- All MD2 co-authors are asked to acknowledge the ManyDogs Project in the Acknowledgements sections of secondary projects they conduct or participate in that use the MD2 study data.
- MD2 co-authors that are also students (undergraduate or graduate) are allowed to use their site’s results for internal projects at their institution before the main empirical manuscript is published. This includes (but is not limited to) using their own site’s data for student theses, student honors projects, or student presentations.
- All MD2 co-authors have the right to initiate and lead-author secondary projects using MD2 data, provided that the main empirical MD2 manuscript has been accepted for publication.
- All MD2 collaborators that (for any reason) do not meet the threshold for inclusion in the author list (see criteria above) will be listed in the Acknowledgments section of the main MD2 empirical manuscript. This section may also include individuals in supporting roles from research sites.

Resolving issues with author order or inclusion

In the event of disagreements about author order or inclusion, individuals are encouraged to contact the MD2 Study Coordinators via [email](#) to explain the situation in detail. The content of such communications will be kept confidential within the MD2 Study Coordinators. The MD2 Study Coordinators may conduct additional information gathering to understand the

issue and as required to equitably and impartially determine author order and inclusion. In the event that MD2 Study Coordinators are conflicted in an authorship issue, concerns should be directed to [Camila Cavalli](#), ManyDogs Co-Director. If necessary, to resolve the conflict Dr. Cavalli may seek the advice of other elected members of the ManyDogs Administrative Team that are not connected to research activities in MD2.

Amending the author order

The aim in creating this system and agreement is to set clear expectations for authorship that reflects as much as possible individual effort invested in the study. In the course of completing the study, individual roles may shift, and the author order may need to be updated to reflect this redistribution of responsibilities (e.g., someone volunteers for or is asked to step into a (Co)Team Lead role or (Co)Study Lead role and provides substantial contributions in that role to move the study towards completion). In such cases, amendments can be made.

To suggest amendments to the MD2 author order and recognize someone (self or another individual) in a named co-author position (i.e., Study Lead, Admin Team Lead, or Senior Scientist), send an email to the MD2 Study Coordinators (manydogsproject2@gmail.com) detailing the justification for the amendment. If the request is substantiated based on available information, the MD2 Study Coordinators will announce the proposed amendment to the MD2 collaboratorship (without identifying the nominator) and make a request for confidential (but not anonymous) feedback. Unanimously accepted amendments will be announced following feedback collection and in situations where there is disagreement raised, an impartial committee of MD members will be formed to investigate and determine the author order and whether to accept or reject the amendment.

Dissenting opinions in the final paper

Dissent is healthy in science and all co-authors should feel empowered to share their opinions on the interpretation of the study findings. Feedback on the empirical manuscript will be sought in the writing process, all co-authors will be notified via email and Slack of this opportunity. In situations where disagreements on the interpretation of the data cannot be resolved via discussion, then the main text will summarize the majority view of the findings and additional interpretations will be organized in the supplement and published as part of the paper.

Collaborator Checklist

The following list presents, in chronological order, the steps for registration and data collection for research site team leads.

Registration & Onboarding

- ☐ **Prepare** to register for the study by reading study documentation and identifying your team.
 - MD2 Study Coordinators are happy to answer questions as you prepare: manydogsproject2@gmail.com.
- ☐ **Compile** necessary information and documentation.
 - The registration form will ask you for information about the population of dogs from which you intend to collect data, whether you have ethics approval to run

the study at your institution / organization, to sign the author agreement, and to identify the team members that will be working on the study at your site.

- ☐ **Submit** the collaborator registration [here](#).
 - When you're ready and have a good idea of where, when, and with whom you will conduct the research, submit your registration through Qualtrics and begin the onboarding process.
 - Team Leads should complete the form before other research site team members. Following Team Lead registration, the survey platform will send automatic invitations to any identified team members.
 - If you added team member contact information in your response, check with them that they received and have completed the registration survey as well.
 - The deadline to submit a registration is April 1st, 2026.
- ☐ **Upload** supplementary documents to your site folder on Google Drive.
 - After the survey is submitted, a member of the Registration & Onboarding team will reach out via email with information and a link to a private google drive folder that will be used for collecting documents and data from your research site. Prior to beginning data collection, you will need to upload i) proof of ethics for running the study, ii) a copy of the research consent form, iii) a signed data storage agreement, and iv) a floor plan/description of the space where you will be running the MD2 protocol (if known).
- ☐ **Accept** e-invites to join the MD Slack Workspace and google groups (mailing lists).
 - The primary way that MD2 collaborators communicate about day-to-day activities is through the ManyDogs Slack workspace. This facilitates communication between all collaborators at all levels. We will cross-post important updates using the study email list so that collaborators have email records as well.
 - Confirm that all team members at your site have also accepted communication network invitations and are able to access resources they need to learn and implement the protocol.
- ☐ **Attend** an MD2 virtual onboarding orientation with study coordinators (optional).
 - If you would like to discuss onboarding and registration in real time with a study coordinator, you are welcome to attend an optional virtual orientation and review the site registration and onboarding steps
 - These orientations are announced over our communication network and take place every 2-4 weeks, depending on how many new collaborators sign up in a given period.
- ☐ **Track** the hours that you and your team invest in preparing for and carrying out MD2. Using the last tab of your private datasheet called "hour_log", note down the approximate time spent collectively on onboarding preparations and data collection. Please track hours throughout your participation.
- ☐ **Practice** the experimental protocol with all team members who will participate in data collection at your site.
 - Each team member who will perform the protocol at your site should practice the procedure.
- ☐ **Record** the first set of practice videos of each experimenter that will perform the demonstration at your site.

- The set of videos includes one clip showing the warm up task, and a separate clip showing the experimenter performing the dot touching demonstration. Include one set per experimenter.
- ☐ **Upload** videos for the first review to the #md2_methods channel on Slack and tag the Methods Team Lead @Karoline Gerwisch to notify her.
 - One of the Methods co-leads will review the videos and provide feedback on any adjustments to the experimenter actions or setup. This may include additional videos of the adjusted protocol.
- ☐ **Receive** approval from Methods Lead to proceed with recruiting the 1st participant.
 - When the Methods Team Lead have reviewed the videos and found that the experimenters are performing the demonstration correctly, they will send an email to the research site team to notify them that they can recruit and test the first dog.
- ☐ **Upload** the videos of the first dog and guardian doing the demonstration to your google drive folder for the final review. Send the Methods Lead, Karoline Gerwisch, a slack DM to let her know the videos are available.
- ☐ **Receive** final feedback and proceed with data collection for all remaining participants according to your research site's normal recruitment and participation procedures.

Data Collection & Submission

- ☐ **Recruit** all remaining participants for the study.
 - Dog-guardian pairs that have cohabited for at least three months and where the dog is at least six months of age are eligible to participate. For more information on eligibility please see [Section 3](#).
- ☐ **Collect** survey data from dog guardians prior to the behavioural study.
 - Distribute the guardian survey via email to potential participants and receive automated emails from Qualtrics with summaries of participant responses.
- ☐ **Collect** behavioural data from dogs and their guardians in person.
 - The minimum sample size is 16 dogs that meet eligibility criteria for inclusion in the study.
- ☐ **Enter** data from test sessions into the datasheet.
 - Using the prepared Google spreadsheet in your Google drive folder, transcribe the data from the coding sheet into the appropriate columns. Update the participant tab with information about the dog.
- ☐ **Validate** tabulated data through reliability coding.
 - Reliability code 25% of the test sessions from video to confirm that the data entered into the spreadsheet matches the video record. See details of this process in [Section 3](#).

Ethics Approval and Floor Plan

Testing area floor plan. To control for features of the environment where dogs will be tested, we require each research team to upload a floor plan or diagram of the space where data will be collected. Please upload a PDF or word document with a top-down view of the space or a detailed written description, including the room dimensions (in meters and centimeters), the location of doors and windows, where you will position the bucket and the

two paper dots, the approach area around these stimuli, the location of video cameras, and finally, where the handler will sit with the dog in relation to these room landmarks.

If you are collecting data in guardian homes or in multiple locations, you do not need to upload this document, instead you will gather the data about the space and include it with the relevant participant behavioral data entered into the data spreadsheet.

Ethics approval for MD2. Ethics approval is required to collect data for MD2. A copy of the approval, consent form, and signed [data storage agreement](#) will need to be uploaded to your private Google drive folder. If you're applying for a new approval for this study, we have gathered some example materials here from previous studies [here](#). Here is a list of the research activities that will need to be approved at your site:

- Testing dogs in person at your research site / location where you collect data.
- Collecting information from guardians via online surveys. You can see the text of the Guardian Survey [here](#).
- Recording videos of the dog and guardian as they participate in the experimental protocol. Videos will be used for the reliability coding data validation process that can take place within your research group. Please see the section below on Data Reliability.
- Storing videos in the data repository at UNL. All sites **must have a consent form** that informs participants that videos of their sessions will be stored at the repository. Here is suggested language to include in the consent form. It can be modified and translated, but the gist must be included. Please see the section below on Video Storage.
 - *Video recordings of research sessions (potentially showing your face) will be stored at our institution and at the project data repository at the University of Nebraska-Lincoln (UNL) in Lincoln, Nebraska, USA on a secure Microsoft SharePoint site. Your name and personal information will NOT be uploaded to UNL, but audio that includes your dog's name may be included. The principal investigator at UNL (Jeffrey R. Stevens) and UNL information technology staff will have access to the videos. In addition, we may grant access to other researchers in the project to review videos for data integrity or to answer additional research questions. The videos will NOT be made public and will only be available to select project personnel.*
- Sharing tabular data with the ManyDogs Project. This data comes from the guardian survey and the behavioural task and will be combined in your site's data spreadsheet that is stored in your site's google folder.

Preparing to run MD2

The ManyDogs 2 protocol is designed to be run in an indoor space that is at least 3m x 3m with a useable wall for hanging the dots. Here is an example of how the stimuli are arranged:

 MD2_study_protocol.docx

Before running MD2, each site's experimenter(s) will prepare their materials (found here [MD2_study_protocol.docx](#)) and set-up their experiment for practice. Experimenters should read and follow the [protocol](#), which includes a [check-list](#) for the testing sessions. There is also an [experimenter script](#) to follow (English), Any translation of materials,

particularly our [Guardian Survey](#), should be coordinated with the Methods team during the onboarding and video review process, depending on each site's language requirements.

Experimenters will each record **two rounds** of videos showing their procedure with a real dog for the **warm up** and **one trial** of the overimitation task (the first round with the experimenter demonstrating the task and the second round with the guardian demonstrating the task), to then be uploaded and reviewed by the Methods Team Leads in the #md2_methods slack channel. Once a Methods Team Lead has provided feedback on the first round of videos, experimenters will have the opportunity to meet online and discuss the feedback.

The second round of videos will require the first dog subject (i.e., first actual participant that counts towards data contribution) and should show the guardian's demonstration over the full set of trials. To share the video with the Methods Team Leads, the videos of the participant should be uploaded to the site's private google folder for review. With approval of the second round of experimenter videos, the site may officially collect their full sample of dogs for MD2.

3. Collecting and Submitting Data

Once your Lab/Research Site has been approved by ManyDogs 2 Admins, you are able to recruit dog participants and collect data for ManyDogs 2. All data collection must be complete by **June 30, 2026**.

Dog Subjects

Each site is asked to collect a minimum of 16 dog subjects for their sample, however there is no upper limit to the number of dogs tested at each site with the [MD2 protocol](#). In addition to behavioural data, each guardian is required to complete the online [MD2 Guardian Survey](#) for their dog, ideally before they visit your lab. This survey collects background information such as training experience, prior participation in research, and their perceived relationship with their dog. The link to the survey should be sent via email along with the subject ID number.

To ensure that survey data can be linked with behavioral data by our data team, the subject ID must be assigned at the time the survey link is distributed, ideally before participating in the behavioural task. The order of your subject ID numbers and their sequence is not important, all that matters is that each dog with behavioural data has a corresponding survey entry with the same subject ID number so that their data can be linked.

We require each lab to collect at least 16 dog subjects, not including an estimated exclusion rate of 20% (i.e., if a site aims to collect 16 or 24 dogs they should expect to test, respectively, around 20 or 30 dogs total). Dogs should be balanced as closely as possible for sex, breed, and age between the two main groups (guardian-demo / stranger-demo). Each lab will have at least eight dogs who have a guardian demonstrator and eight dogs who have a stranger demonstrator.

- See participant_sheet tab of the MD2 datasheet for an example balancing of 24 participants: MD2_siteID_datasheet.xlsx

Dog inclusion criteria:

Recruited dogs must;

1. have no experience with the dot-touching overimitation task or do-as-i-do training
2. have spent at least three months living in the same household as their guardian (attachment information of participating guardian to be retrieved from survey)
3. be at least six months old.
4. be food-motivated

You will be asked to choose your site ID at registration. This ID will be used to tag files / folders within the study and generally used to track contributions and collaborators from your research site. This ID must contain characters from the Latin alphabet and should be 3 - 8 characters in length. E.g., "utoronto". *In the event that the site ID you have selected is not available, you will have an opportunity to create a new one.*

Each dog that participates in MD2 should be assigned a subject ID at the time of confirming their visit with the guardian. This ID should be sent via email with the link to the guardian survey. Use the following form: **siteID_##**. For example, dogs collected at Memorial University of Newfoundland (site ID is *mun*) would use the following for their first dog's subject ID: **mun_01**. Each subsequent dog would be given the next ascending numeral (e.g., *mun_02*, etc.). Single digits must include a leading zero. If dogs end up dropping out of the study, **do not** reuse their ID numbers for subsequent participants.

You can use the prepared email blurb (provided in your site folder) when contacting dogs' guardians to give them information about the study and provide them with the Qualtrics survey link.

Entering Data

Each site's Google Drive folder will include a PDF/DOCX of a coding sheet and a data entry Google sheet. Researchers can choose to either enter data directly into the Google sheet during the session or complete the coding sheets offline and transcribe the data into the data entry sheet afterwards. We recommend printing off or saving coding sheets for each subject. Coding from videos afterwards is allowed only if live coding is not possible. Live coding is preferred to avoid the possibility of losing data due to video errors.

Though the coding sheets are useful for collecting data, the data entry sheets are the definitive data sheets that will be automatically imported into the data analysis pipeline. Therefore, do not change any of the columns, column names, or drop-down menu items in the data entry sheet. Please check the Data Dictionary section to understand the meaning and the responses for each column.

Coding Sheet

Before the trials, complete the following parts of the coding sheet to avoid possible mistakes that could happen if filled after or during the trial:

- **Subject ID:** Enter subject ID, which is site ID and the subject's corresponding number (one number to represent each dog).

- **Dog name:** Enter the dog's name.
- **Date:** Enter the testing date using format YYYY-MM-DD.
- **Dog date of birth:** Enter the dog's date of birth using YYYY-MM-DD. If the guardian does not know the exact date of birth, include an estimate. For instance, if they said April 2021, use 2021-04-01.
- **Dog sex:** Enter "male" or "female".
- **Dog breed:** If the dog is of a single breed or known crossbreed (e.g., goldendoodle), enter the breed here. Otherwise, enter "mixed".
- **Condition:** Enter "guardian" or "experimenter" based on who will demonstrate the task. This information for a particular subject is available in the *participant_sheet* in the data entry sheet.
- **Dot order:** Enter "blue-then-yellow" or "yellow-then-blue" based on the order that will be followed. This information for a particular subject is available in the *participant_sheet* in the data entry sheet.
- **Dot location:** Enter "yellowleft" or "blueleft" to indicate which dot is on the left side. This information for a particular subject is available in the *participant_sheet* in the data entry sheet.
- **Experimenter(s):** Enter the unique initials of the experimenter or experimenters conducting session.
- **Completed all required tasks?:** After the session has ended, circle whether the subject completed all trials.

Warm-up trials

Subjects should experience six food-finding warm-up trials. For each trial, the sheet indicates which screen experimenters should hide the treat behind. Experimenters should record whether the subject retrieved the treat in the given time (Y/N) and include any notes for each trial. After all warm-up trials have ended, sum up the trials in which the subject retrieved the treat and enter that in the TOTAL row.

Experimental trials

Subjects should experience four experimental trials based on the overall condition, dot demonstration order, and dot location. Each trial should include the following information:

- **Overimitated:** Yes/No response. Occurs when the dog touches at least one dot
- **Dot color:** Yellow/Blue/Both/Control/None. Indicates which dot on display is touched.
- **Timing:** Before/After. The dog approaches the dot before or after opening the bucket.
- **Irrelevant actions:** 0-3 response. As zero being "no touch" and 3 "touched both dots in the demonstrated order"
- **Relevant actions:** 0-3 response. Zero means "no touch" and 1, 2, and 3 different manners in which it can open the bucket (check Data Dictionary for more details).
- **Approach dots:** Yes/No response. The dog enters the area near the dots.
- **Approach bucket:** Yes/No response. The dog enters the area near the bucket.
- **Notes:** Indicate if anything unusual happened during the trials (e.g., the dog accidentally opened the bucket by touching the lid with the tail and got the treat), indicating which trial.

Data entry sheet

Unless you are entering the data directly into the Google sheet during the session, data from the coding sheet should be transcribed to the data entry Google sheet as soon as possible after a session has ended. The data entry sheet has three sub-sheets: *participant_sheet*, *datasheet*, and *datasheet_key*.

For the *participant_sheet*, each row represents a subject. The top section of the coding sheet should be transcribed for one row, ensuring that subject ID is entered correctly. The subject-specific columns are drop-down menus that should already be correct.

For the *datasheet*, each row represents an experimental trial. First, enter the `test_date`, `subject_id`, `dog_name`, and `warmup` (total number of warm-up trials correctly completed) and copy for all four trial rows. Use drop-down menus to enter `overimitated` through `approach_bucket` for each experimental trial. Include any unusual events in the `notes` column.

Verifying and Submitting Data

Once all data has been collected, site team leaders are responsible for having a team member verify the data input into the data entry sheet. This team member should check each coding sheet with the data entry sheet to ensure that the data were accurately transcribed. Make sure to double check that subject IDs and testing dates match. This should occur for every subject tested and should include verifying both the *datasheet* and the *participant_sheet*. Any discrepancies should be addressed in the data entry sheet.

Please note that any and all collected data (coded and video) must be submitted even if a dog does not complete all phases of the protocol and will end up being excluded from the analyses later on. Once all data collection has been completed and verified, notify the ManyDogs 2 team that you are ready to move onto the next step. The ManyDogs 2 data team will complete another data verification step to ensure all data are consistent and match expected values.

Video Recording

All test sessions must be video recorded with at least one camera set up to view the dots and bucket. If possible, please start each video with a board or sheet that lists the date, time, subject ID, and condition.

Following your site's normal video data collection procedure, you should ensure you have a single video of each session from start to finish. If your session is split over separate video files or separate video streams, please merge these into a single video.

The video should be labeled in the format: **subjectID_testDate**, where the test date is noted YYYYMMDD. Recall that the subject ID combines the previously chosen site ID and a number assigned to the given subject (one number to represent each dog, in the order of testing), with no spaces in the file name. For example the Memorial University of Newfoundland would name a video of the session of the first participant collected on July 5th, 2025, with the following: **mun_01_20250705**. Do not include personally identifiable information in the file name.

Video Storage

Video storage and use procedures must be included in each site's human subjects research protocol and consent form. Namely, videos will be stored locally at the research site as well as archived remotely on a University of Nebraska-Lincoln (UNL) secure Microsoft SharePoint account. The UNL archive can be accessed by UNL administrative staff, Jeff Stevens, ManyDogs staff (if site personnel cannot complete their own reliability coding), and potentially ManyDogs researchers conducting secondary data analysis. Participant confidentiality will be maintained as much as possible.

Research sites must record and store videos of each experimental trial according to their institute's data storage policies. Because videos will include personally identifiable information (images of participants), sites must follow their institute's policies for storing personally identifiable information.

In addition to local storage, videos should be transferred to the secure UNL data archive for secure long-term storage and secondary data analysis.

- Each site will need to nominate a single "video manager" who will be responsible for uploading videos to the UNL archive. The video manager should contact Jeff Stevens (jstevens5@unl.edu) with their name and email address. UNL will then create a folder for the site's videos and grant access to the video manager.
- To ensure all videos can be stored, each session must be a single video file and file sizes of individual videos must be **less than 500 MB**. To get file sizes down to this size, the site must either record videos at lower resolutions or compress the videos after recording. Numerous video compression apps are available for Windows, Mac, and Linux (e.g., [iMovie](#), [Windows Movie Maker](#), [VLC](#), [FFmpeg](#), [HandBrake](#)). If you have questions about video compression, reach out to Jeff Stevens.
- The video manager should then upload the appropriately named and sized videos to their site's folder.
- The video manager should verify that each of their site's sessions has a video uploaded. If there are sessions without a video, include a document file in the folder explaining which sessions do not have videos and why.
- After all videos are uploaded, the video manager should contact Jeff Stevens.

Data Reliability

To determine reliability, a hypothesis-blind coder from each site will review 25% of videos and score these dogs in a reliability-coding version of the standard datasheet. For samples where 25% is a decimal number, round up to the nearest integer (e.g., 25% of 18 would be 5 videos). Once the site has confirmed that they have completed data collection, the data team will generate and place in the site's folder a file with a randomly chosen set of experimental sessions that must be recoded. Each site's coder must use their videos to code the chosen sessions in the absence of the data entry sheet and coding sheets.

We have set the required Cohen's kappa score to $\kappa \geq 0.9$. Any site that does not meet this threshold will have to recode their data from all sessions with another coder. If the results of the second reliability coding are at or above $\kappa \geq 0.9$, the data will be included, while falling below the threshold on the second round of reliability coding will cause the data to be excluded.

Data Dictionary

Data Coding Sheet Columns	Description	Response Options
test_date	Date of testing	
subject_id	Subject identification	
dog_name	Dog name	
warmup	Results from warm-up trials	Number of warm-up trials that the dog successfully retrieved food (ranges from 0-6)
condition	Experimental condition	guardian - the guardian did the four task demonstrations; experimenter - the experimenter (stranger) did the four task demonstrations
dot_order	Dot presentation order (counterbalancing demonstration of dots)	blue-then-yellow - the demonstrator touches the blue dot first then the yellow dot; yellow-then-blue - the demonstrator touches the yellow dot first then the blue dot
dot_location	Dot color location (counterbalancing dot colour location)	yellowleft - the yellow dot is presented on the left side, near the bucket; blueleft - the blue dot is presented on the left side, near the bucket
trial	Trial number	one - trial 1; two - trial 2; three - trial 3; four - trial 4
overimitated	Binary response for whether the subject	yes - the dog touched at least one dot with its nose; no - the dog did not touch at least one dot with its nose

	touched an irrelevant dot	
dot_colour	Colour of dot(s) touched	blue - the dog touched the blue dot; yellow - the dog touched the yellow dot; both - the dog touched both dots; control - the dog touches the grey control dot; none - the dog touched no dots
timing_oi	Timing of when dot was touched	after = dog touched a dot after opening the bucket; before = dog touched a dot before opening the bucket
irr	Degree of irrelevant actions observed	0 = no touching of a dot; 1 = dog touched at least one dot with its nose; 2 = dog touched both dots with its nose; 3 = dog touched both dots with its nose in the demonstrated order.
rel	Degree of relevant actions observed	0 = no touching of the bucket; 1 = dog touched the bucket with its nose or paw; 2 = dog opened the bucket from the front (facing starting position); 3 = dog opened the bucket from the back (away from starting position, same position as demonstrated)
approach_dots	Binary response for whether the subject approached the dots	yes - dog entered the approach area with the front of the body and orientated towards the dots; no- dog did not enter the approach area
approach_bucket	Binary response for whether the subject approached the bucket	yes - dog entered the approach area with the front of the body and orientated towards the bucket; no- dog did not enter the approach area

notes	Indicate if anything unusual happened during the trials
-------	---

Data Availability

Complying with open science policies, the completed full data set (without personally identifiable information) and R scripts will be uploaded to the [ManyDogs 2 OSF page](#) and [GitHub repository](#). This repository is currently private and will remain so until the paper is submitted. Contact the MD2 Data Team for access.

4. Data Analysis

Given that the behaviours coded will resemble [Mackie and Huber \(2023\)](#)'s IRR, REL, timing and approach variables, models will resemble these analysis methods, which will be conducted in R.

Response variables

- irr_bin - Binary variable representing the presence or absence of any irrelevant actions in a particular trial (binarized version of irr: 0 for irr = 0, 1 for irr > 0).
- irr_bin2 - Binary variable representing the presence or absence of any irrelevant actions in any trial from one subject (binarized version of sum(irr): 0 for sum(irr) = 0, 1 for sum(irr) > 0).

Predictors

- condition - Categorical variable representing the between-subjects condition of having the guardian or strangers as a model.
- trial - Numeric (integer) variable representing the trial number for within-subject repetition of the experimental trials.
- dot-order - Order of dot colors touched by the demonstrator.
- dot-location - Location of dot colors.
- breed-group - Categorical variable representing the FCI breed group, plus a category for mixed or unknown breed.
- sex - Categorical variable representing dog sex.
- age - Numeric variable representing the dog's age in months.
- training - Numeric variable representing the combined score on the CBARQ trainability scale (Hsu & Serpell, 2003).
- relationship - Numeric variable representing the combined score on the Lexington Attachment to Pets Scale (LAPS; Johnson et al. 1992).

Random effects

- subject - Categorical variable representing subject ID.
- site - Categorical variable representing research site.

Models

- RQ1a: $\text{irr_bin} \sim \text{condition} * \text{z.trial} + \text{dot-order} + \text{dot-location} + (1|\text{subject}) + (1|\text{site})$

- We will analyze whether dogs overimitated in their trials with a binarized variable for irrelevant actions using a logistic regression model and binomial error distribution and logit link function.
 - There will be four observations per dog (one for each trial).
 - The following predictors will be included in the model: condition, z.trial, dot-order, and dot-location. We will conduct model RQ2 first. If sex and/or age show up as significant predictors, we will include them here.
 - z.trial represents z-transformed trial number.
 - One interaction effect – condition*z.trial –will be analyzed in the full model as in Mackie and Huber (2023).
 - To account for repeated measures and potential differences between research sites, we will include subject ID and site ID as random effects.
- RQ1b: $\text{rel} \sim \text{condition} * \text{z.trial} + (1|\text{subject}) + (1|\text{site})$
 - We will analyze whether dogs showed increasing levels of relevant-action copying using an ordinal regression model with a cumulative logit link function and proportional odds structure.
 - There will be four observations per dog (one for each trial)
 - The following predictors will be included in the model: condition and z.trial
 - z.trial represents z-transformed trial number.
 - One interaction effect will be analysed in the full model as in Mackie and Huber (2023)
 - To account for repeated measures and potential differences between research sites, we will include subject ID and site ID as random effects.
- RQ2a: $\text{irr_bin2} \sim \text{condition} + \text{breed-type} + \text{dot-order} + \text{dot-location} + \text{sex} + \text{age} + \text{age}^2 + (1|\text{site})$
 - We will analyze whether breed type influences any potential overimitation effects observed in dogs using a logistic regression model and binomial error distribution and logit link function.
 - Data will be aggregated so there will be one observation per dog. The response variable will be a binarized measure of whether the subject made an irrelevant action in any of its four trials.
 - The following predictors will be included in the model: condition, breed-type, dot-order, and dot-location, sex, and age.
 - To account for potential differences between research sites, we will include site ID as a random effect.
- RQ2b: $\text{irr_bin2} \sim \text{condition} + \text{training} + \text{relationship} + \text{dot-order} + \text{dot-location} + \text{sex} + \text{age} + \text{age}^2 + (1|\text{site})$
 - We will analyze whether dog-human interaction influences any potential overimitation effects observed in dogs using a logistic regression model and binomial error distribution and logit link function.
 - Data will be aggregated so there will be one observation per dog. The response variable will be a binarized measure of whether the subject made an irrelevant action in any of its four trials.
 - The following predictors will be included in the model: condition, training, relationship, dot-order, and dot-location, sex, and age.

- To account for potential differences between research sites, we will include site ID as a random effect.

5. Using MD2 Data for Secondary & Student Projects

While the project is ongoing, we ask that collaborators do not perform analyses on their data, make their data publicly available, or publish their own subset of the results. This publication embargo does not include student papers, thesis projects, or internal institution conference presentations. We enthusiastically support students' use of their site's data to complete degree requirements or participate in conferences at their institution.

Any use of data subsets for student projects should be acknowledged in writing in the appropriate section. We request that where appropriate, the most recent version of the pre-print or the final manuscript is included as a reference for the study design and/or rationale. You can find all MD preprints and publications linked on our [website](#). For direct links to the pre-registration, please visit the [ManyDogs 2 OSF page](#). Here is a prepared blurb that can be added to acknowledgements:

"This project's results are based on a subset of data collected as part of a larger study by the ManyDogs consortium. Analyses and interpretations of this presentation do not represent the findings of the parent study."

For spin-off projects and secondary analysis projects that use the study design and/or entire data for publication in a peer-reviewed journal, please use a version of the following statement in the acknowledgements section:

"This project uses data collected in ManyDogs 2, a multisite study by the ManyDogs Project. The original study design and pre-registration are available at <https://doi.org/10.17605/OSF.IO/YTQJH>."

ManyDogs logos for use in acknowledgements or posters can be found [here](#).

6. FAQ

Q: When is the deadline to register as a data contributor for the study, and when are data submissions due?

A: Research sites must register by April 1, 2026 and should plan to submit all data by June 30, 2026. This does not include reliability coding for your data, only the primary data (i.e., behavioral task coding, videos, and survey responses).

If you experience unanticipated delays for whatever reason, please contact the MD2 Coordinators as soon as you're aware of the situation; they will be able to help you navigate it and find a solution, manydogsproject2@gmail.com.

Q: Can labs run other behavioral tasks with the subject in the same test session as the dot-touching task?

A: Yes. This task is short enough to be combined with other behavioral studies in the same test session. However, you should plan to run the dot-touching task as the first task of the session, before the dog does anything else. The aim of the task is to understand how dogs respond to the demonstration with very specific information available about the space and the people and other tasks could influence how they respond.

Q: Is an ethics approval required to collect data for this study?

A: Yes*. This project will collect survey responses and videos of the behavioral task that will contain personal identifiable information about the guardians.

The online survey includes basic demographics about the guardians (age, gender, income and education) and asks them to rate their attachment to their dog. The behavioral data will be recorded with video cameras which will capture the guardian's face in the condition where they perform the demonstration for their dog.

***NOTE:** In some countries, behavioral experiments with dogs are exempt from ethics committee review. Even though this task is centered on dog behavior, it will also capture sensitive information about the guardian and therefore you will need to seek appropriate ethical approval prior to collecting this data. In particular, you will need to have permission to store the videos from the test sessions in the secure online repository that has been set up at the University of Nebraska Lincoln and obtain informed consent from the guardians to use the data in this way. Please see other sections of this manual for information about the data storage agreement, and suggested text to include in your informed consent forms and ethics application.

Q: How many people can be co-authors from one research site/team?

A: There are 4 co-author positions for the minimum sample of 16 dogs. Of these, up to two can claim "Supervision" and/or "Resources" in addition to "Investigation". To appreciate the work that goes into each of these areas and decide who on the team can claim the credit,, please see the definitions of these contribution areas in the authorship agreement section above.

For each additional 8 dogs collected beyond the minimum sample, another authorship position can be added for "Investigation" credit (e.g., 5 co-authors for 24 dogs, 6 co-authors for 32 dogs, and upward).

Q: How many rounds of videos are being reviewed, is there a difference between the experimenter videos and the first participant videos?

A: There are two rounds of video review prior to data collection. The first round, the experimenter videos, are completed first and shared on slack (#md2_methods channel), tagging the Methods Team Lead, Karoline Gerwisch. These videos should show an experimenter performing the demonstration (i.e., the unfamiliar condition) for the purpose of receiving feedback on how to adjust their actions, or the way that the stimuli have been arranged in the space. We suggest using a practice dog and guardian for the experimenter videos (i.e., a colleague and their dog) to make it as realistic as possible. Plan to record a set of experimenter videos for each individual who will be performing the demonstration at your site.

The second round of videos, the first participant videos, are completed after the experimenter videos and uploaded to the secure UNL video repository. These videos should show a guardian and dog that are unaffiliated with the lab participating in the task. This is intended to be a valid datapoint for your site and will allow you to receive feedback on the

“familiar person” condition (i.e., when the guardian is the demonstrator) which can help you to anticipate how subsequent community dogs and guardians may behave in the space and adjust your recruitment or information delivery accordingly. By doing one practice data point and waiting for feedback, your team can move through all recruitment, data collection, and data entry steps to identify any issues or confusing parts with the support of the MD2 Methods Leads. Do not use a researcher’s dog for this step; you will want to see how the task unfolds with a naive guardian and dog and is a good opportunity to fine-tune your instructions on how to perform the task. This is not to say they have to be a first time participant in your lab, just that they are completely unfamiliar with this task.

Q: Can data be collected outside of a research lab, e.g., guardian homes, working dog facilities, or animal shelters?

A: Possibly, provided core conditions for the study and the participant relationships are met. It’s possible to run the study outside of a lab as long as the parameters of the experimental stimuli set-up can be maintained in the guardian’s home or the facility, you can find the measurements between stimuli in the protocol. The second necessary condition is an individual, able to perform the “familiar person” demonstration who meets the 3-month minimum primary caregiver requirement, i.e., a 3-month relationship with the dog and person. If the population of dogs you would like to collect data from meet these conditions then it should be possible to move forward. Please reach out to the coordinators with more questions or to explain unique aspects of your study population.

Q: Can I use the ManyDogs logo on presentations about the MD2 study?

A: Yes. Various versions of the logo are available for you to add to your posters and presentations:  MD Logos

Q: Can the MD2 study be used for student projects before the whole dataset is published?

A: Yes. We support the use of individual site data for student projects such as papers, theses, and presentations at internal conferences.

Simultaneously, there is an embargo on analysing, publishing, or publicly sharing the results of your research site before the MD2 empirical paper based on the full dataset has been accepted for publication. This includes submitting abstracts for conferences outside of your institution, posting findings on social media, or submitting a write up based on your site’s results to a journal.

Appendix 1: Contact information and Resources

ManyDogs 2 Study Coordinators

For general inquiries about ManyDogs 2, please reach out to the study email address (manydogsproject2@gmail.com) or post in the #questions channel on Slack. If you have specific or confidential questions, you are welcome to direct message the study coordinators:

- Study Lead: TBD
- Admin Team Leads:
 - Anna Korzeniowska, Administration
 - Karoline Gerwisch, Methods

- Julia Espinosa, Registration & Onboarding
- Courtney Sexton, Communications
- Jeffrey Stevens, Data

Study Resources

- Alphabetized resources/links for all MD2 materials coming soon.

Appendix 2: Research Site Google Folder

Read through this brief appendix to understand the resources in your site's google folder. The Registration & Onboarding team creates a private google folder for each research team that registers, populating it with the information and resources necessary for learning and implementing the protocol. For all instances where "siteID" is present in the file title, this will be replaced with your site's chosen ID (see above for the parameters of selecting a site ID during registration). At the time of creation, the folder will only be shared with the site team lead's email address.

NOTE: Not all email accounts are able to be added with editing access to a google folder.

MD2_SiteID_upload Folder

This folder is the location where you will upload a copy of the ethics approval letter, a copy of the participant consent form for guardians, the signed data storage agreement, and your testing space floor plan / description. All of these files are required prior to collecting data. If you are working with a guardian survey translation file, please upload it to this folder as well.

MD2_datasheet_siteID

This spreadsheet has multiple tabs and is the location where you will enter behavioral data (datasheet tab) and maintain a list of participants you have tested on the protocol at your site (participant_sheet tab). The file also contains a datasheet key that explains the information being entered in each column. If your team typically works in a language besides English, this can be translated. Each research site is using a copy of the same datasheet which means that the formatting and organization of the file cannot be edited.

Note that the last tab on the spreadsheet is your team's hour log. Please use this to track the hours spent by your team on MD2, starting with onboarding and continuing through the data collection and manuscript writing process. This data serves two purposes: 1) for internal usage to help us understand how time-intensive a ManyDogs study is to run, and 2) for reporting in our semi-annual report to partner initiatives.

MD2_study_manual

This document. Please use it to refresh your understanding of study logistics, including the checklist and author agreement.

MD2_tenzing

This is the author list in tabular form. The information added through the collaborator registration survey will be added here and we ask that you check it for accuracy prior to

beginning data collection. If you need to update information for any reason, please contact the Registration & Onboarding Team Lead with the updated information.

MD2_collaborator_timeline

Use this spreadsheet to keep track of study milestones at your research site. Your site folder will be linked here and you are responsible for adding the dates on which milestones are completed.

Appendix 3: Background References and Helpful Articles

Background References:

- Camacho-Alpízar, A., & Guillette, L. M. (2023). From whom do animals learn? A meta-analysis on model-based social learning. *Psychonomic Bulletin & Review*, 30(3), 863–881. <https://doi.org/10.3758/s13423-022-02236-4>
- Clay, Z., & Tennie, C. (2018). Is Overimitation a Uniquely Human Phenomenon? Insights From Human Children as Compared to Bonobos. *Child Development*, 89(5), 1535–1544. <https://doi.org/10.1111/cdev.12857>
- Dobos, P., & Pongrácz, P. (2023). Would You Detour with Me? Association between Functional Breed Selection and Social Learning in Dogs Sheds Light on Elements of Dog–Human Cooperation. *Animals*, 13(12), Article 12. <https://doi.org/10.3390/ani13122001>
- Horner, V., & Whiten, A. (2005). Causal knowledge and imitation/emulation switching in chimpanzees (*Pan troglodytes*) and children (*Homo sapiens*). *Animal Cognition*, 8(3), 164–181. <https://doi.org/10.1007/s10071-004-0239-6>
- Hsu, Y., & Serpell, J. A. (2003). Development and validation of a questionnaire for measuring behavior and temperament traits in pet dogs. <https://doi.org/10.2460/javma.2003.223.1293>
- Huber, L., Kubala, D., & Cimorelli, G. (2022). Overimitation in Dogs: Is There a Link to the Quality of the Relationship with the Caregiver? *Animals*, 12(3). <https://doi.org/10.3390/ani12030326>
- Huber, L., Popovová, N., Riener, S., Salobir, K., & Cimorelli, G. (2018). Would dogs copy irrelevant actions from their human caregiver? *Learning and Behavior*, 46(4), 387–397. <https://doi.org/10.3758/s13420-018-0336-z>
- Huber, L., Salobir, K., Mundry, R., & Cimorelli, G. (2020). Selective overimitation in dogs. *Learning and Behavior*, 48(1), 113–123. <https://doi.org/10.3758/s13420-019-00400-w>
- Johnson, T. P., Garrity, T. F., & Stallones, L. (1992). Psychometric evaluation of the Lexington attachment to pets scale (LAPS). *Anthrozoös*, 5(3), 160-175.
- Johnston, A. M., Holden, P. C., & Santos, L. R. (2017). Exploring the evolutionary origins of overimitation: A comparison across domesticated and non-domesticated canids. *Developmental Science*, 20(4). <https://doi.org/10.1111/desc.12460>
- Lyons, D. E., Young, A. G., & Keil, F. C. (2007). The hidden structure of overimitation. *Proceedings of the National Academy of Sciences*, 104(50), 19751–19756. <https://doi.org/10.1073/pnas.0704452104>

Mackie, L., & Huber, L. (2023). Socially priming dogs in an overimitation task. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1063132>

ManyDogs, Espinosa, J., Stevens, J. R., Alberghina, D., Barela, J., Bogese, M., Bray, E., Buchsbaum, D., Byosiore, S.-E., Cavalli, C., Dror, S., Fitzpatrick, H., Freeman, M. S., Frinton, S., Gnanadesikan, G., Guran, C.-N. A., Glover, M., Hare, B., Hare, E., ... Walsh, C. (2023). ManyDogs 1: A multi-lab replication study of dogs' pointing comprehension. <https://doi.org/10.31234/osf.io/4knqr>

Roy, A., Lahiri, A., Nandi, S., Manchalwar, A., Siddharth, S., Abishek, J. V. R., Bulhan, I., Sengupta, S., Kumar, S., Chakravarty, T., & Bhadra, A. (2025). Ready, set, yellow! Color preference of Indian free-ranging dogs. *Animal Cognition*, 28(1), 7. <https://doi.org/10.1007/s10071-024-01928-9>

Whiten, A., & Ham, R. (1992). Kingdom: reappraisal of a century of research. *Advances in the Study of Behavior*, 21, 239.

Helpful articles (from 28.06.2024 meeting):

- C-BARQ (questionnaire): Hare E, Essler JL, Otto CM, Ebbecke D and Serpell JA (2024) Development of a modified C-BARQ for evaluating behavior in working dogs. *Front. Vet. Sci.* 11:1371630. <https://doi.org/10.3389/fvets.2024.1371630>
- Breed: Parker, H. G., Dreger, D. L., Rimbault, M., Davis, B. W., Mullen, A. B., Carpintero-Ramirez, G., & Ostrander, E. A. (2017). Genomic analyses reveal the influence of geographic origin, migration, and hybridization on modern dog breed development. *Cell reports*, 19(4), 697-708. <https://doi.org/10.1016/j.celrep.2017.03.079>