

The ManyPrimates Project: A Multinational, Multi-institutional, Multi-species Collaborative Effort to Study Primate Cognition and Behavior

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The ManyPrimates Project

If researchers are interested in studying primate behavior or cognition, collaborating in multi-institutional efforts ensures that more subjects can be tested and more species can be represented within a single study [1, 2].

Platforms such as ManyLabs [3] or ManyBabies [4] have been established to facilitate large-scale collaborative research efforts by fostering cross-lab communication and consensus on research efforts.

The ManyPrimates project was created to enable those within primatology to systematically answer questions from a phylogenetic or ontogenetic perspective by facilitating the collective development of methods and the free sharing of data.

Collaboration Aims

To establish a platform for researchers to interact and collaboratively decide on research projects to be run at each contributing facility.

- Large and diverse samples
- Pooling of resources across research settings
- Infrastructure to support studies and share data

Pilot Study: Short-term Memory

Goal 1: run a pilot study to evaluate the feasibility of this collaborative effort.

Goal 2: evaluate the efficacy of applying new analytic techniques that could reveal phylogenetic factors that predict memory performance (Fig. 4).

To evaluate this effort, we selected a previously-validated test of short-term memory [5-7] because it could be easily adapted for a range of species and facilities (Fig. 1).

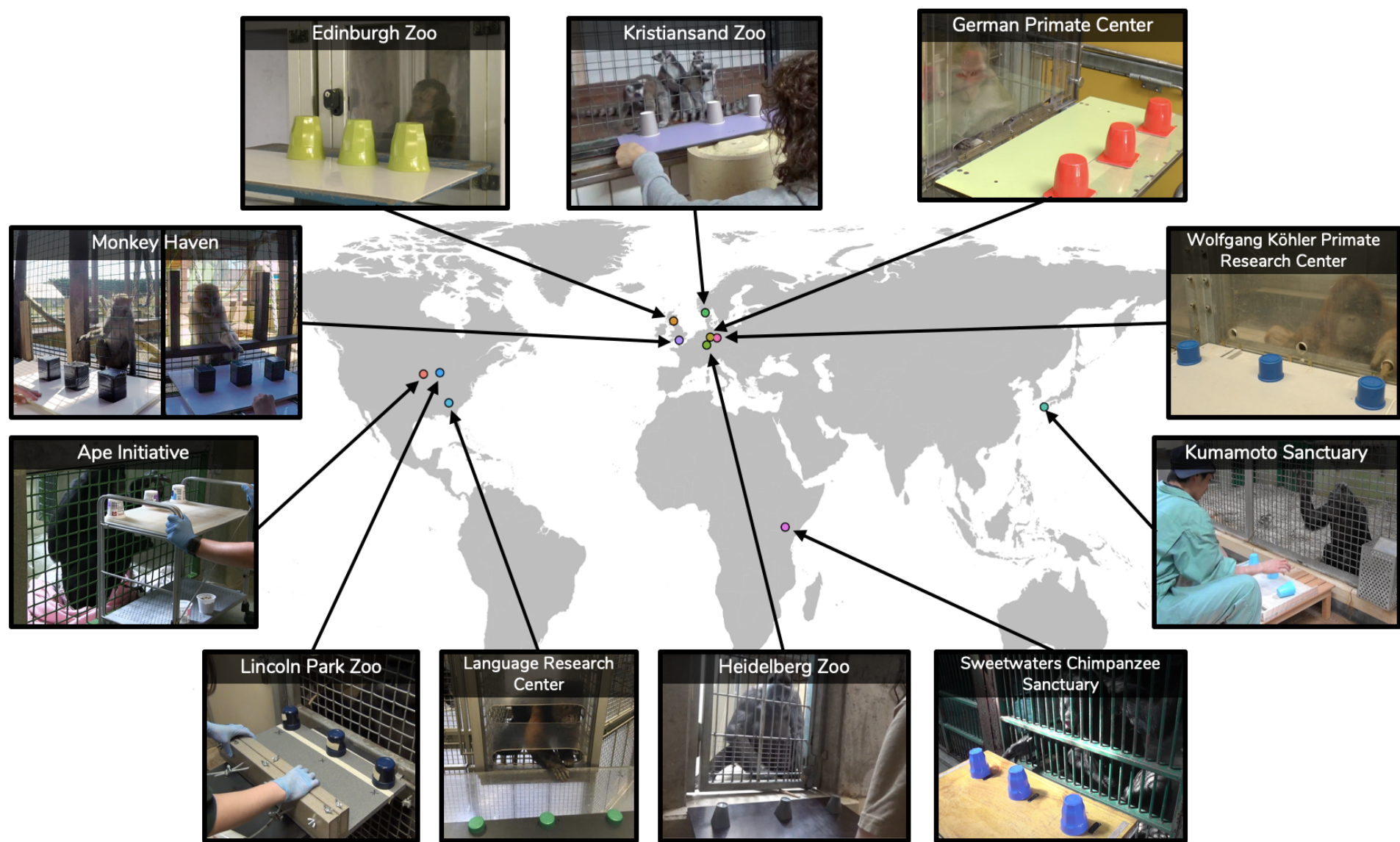


Figure 1. Examples of the experimental protocol run at the different sites with apes, monkeys, and prosimians.

In each trial a subject was shown three opaque cups (Fig. 1) and a food reward was placed under one cup. The subject was then asked to choose the cup that covered the reward after a 0-second, 15-second or 30-second delay. If the subject selected the cup hiding the food reward, the experimenter gave it to them. If not, no reward was given. Complete methods are provided in our preprint (see QR code).

Analysis and Results

The ManyPrimates group tested 176 primates, representing 12 species (prosimians, monkeys, and apes), housed in zoos, sanctuaries, and research centers across four continents (Fig. 1, Fig. 2).

All analyses were run in R (version 3.5.1) and details of the analyses can be found in our preprint (see QR code).

Across species, performance was better in trials with shorter delays (Fig.2, Fig. 3). Contrary to our hypothesis, we found no interaction between age and delay (LRT: $\chi^2(2) = 1.57, p = .456$).

The model also showed positive effects of cup distance ($\beta = 0.40, 95\% \text{ CI } [0.19, 0.62], p < .001, \text{ OR} = 1.49$) and board size ($\beta = 0.38, 95\% \text{ CI } [0.20, 0.59], p < .001, \text{ OR} = 1.46$) on performance.

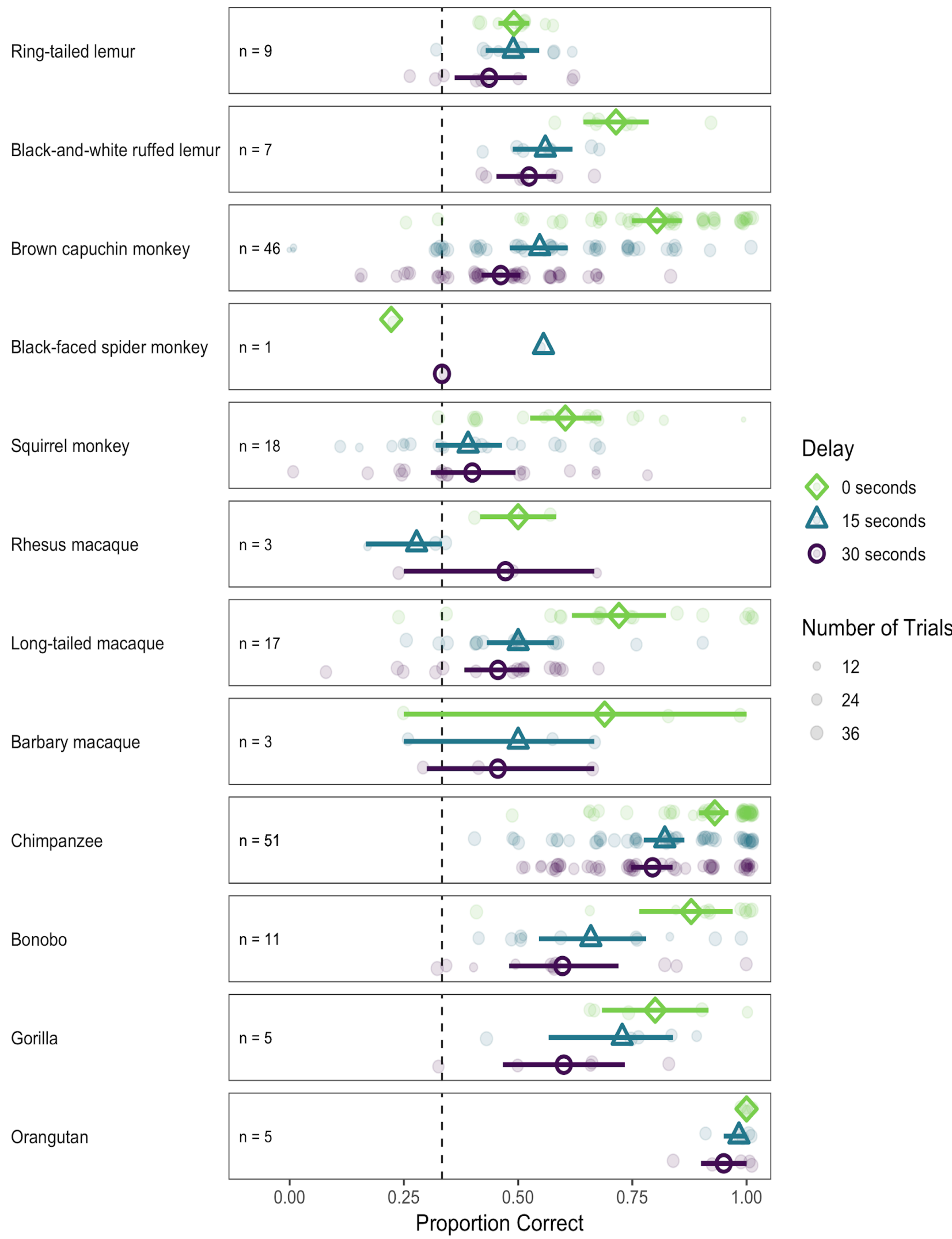


Figure 2. Proportion correct choice by species and condition against chance (0.33). Open shapes denote the group mean per condition. Error bars are 95% confidence intervals based on a nonparametric bootstrap. Small, transparent dots represent aggregated data for each individual. Size of these dots is proportional to the number of trials that individuals completed. Dashed line indicates performance expected by chance.

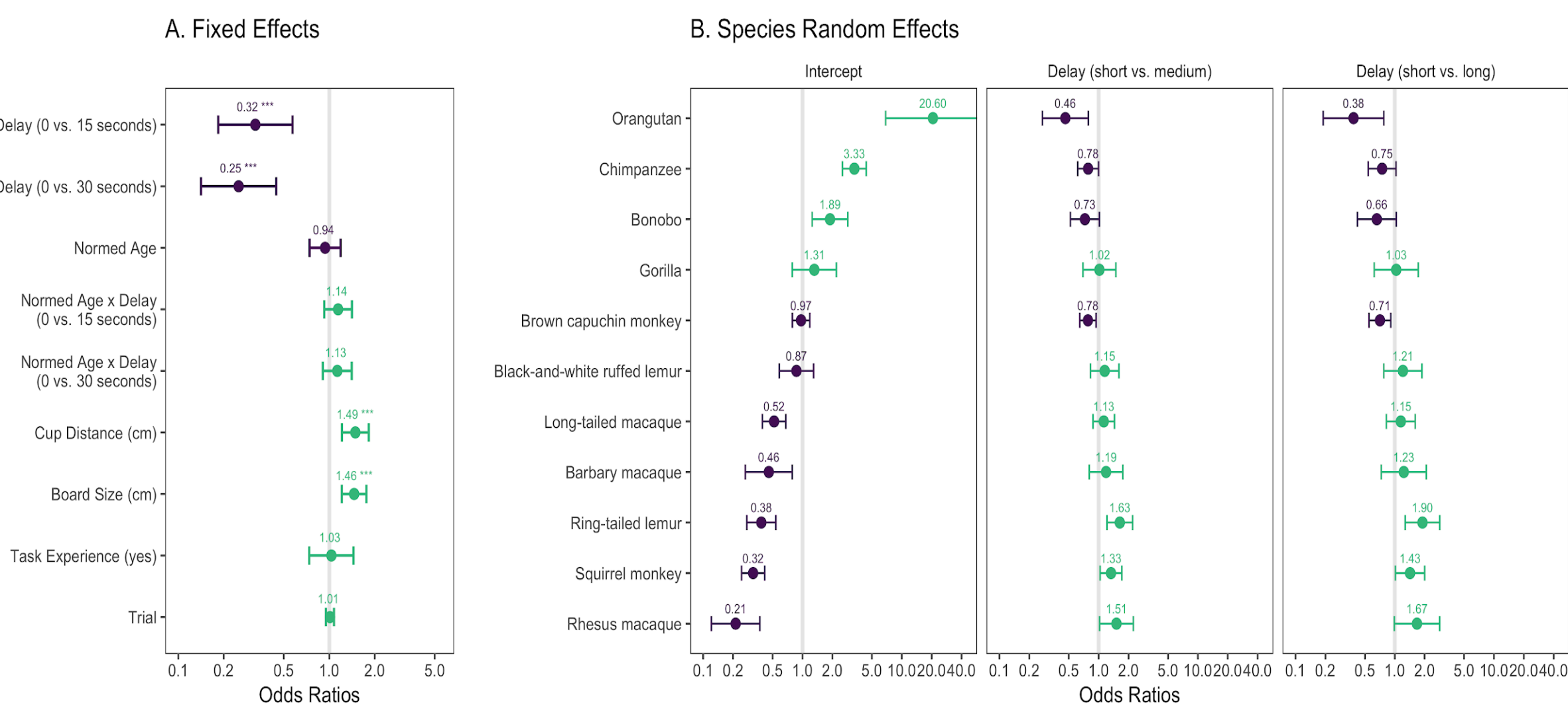


Figure 3. Forest plots for GLMMs predicting mean proportion of correct choices. A. Odds ratios for fixed effects in the final model. B. Odds ratios for species random effects in the model with a reduced random-effects structure. Odds ratios are plotted on a log scale.

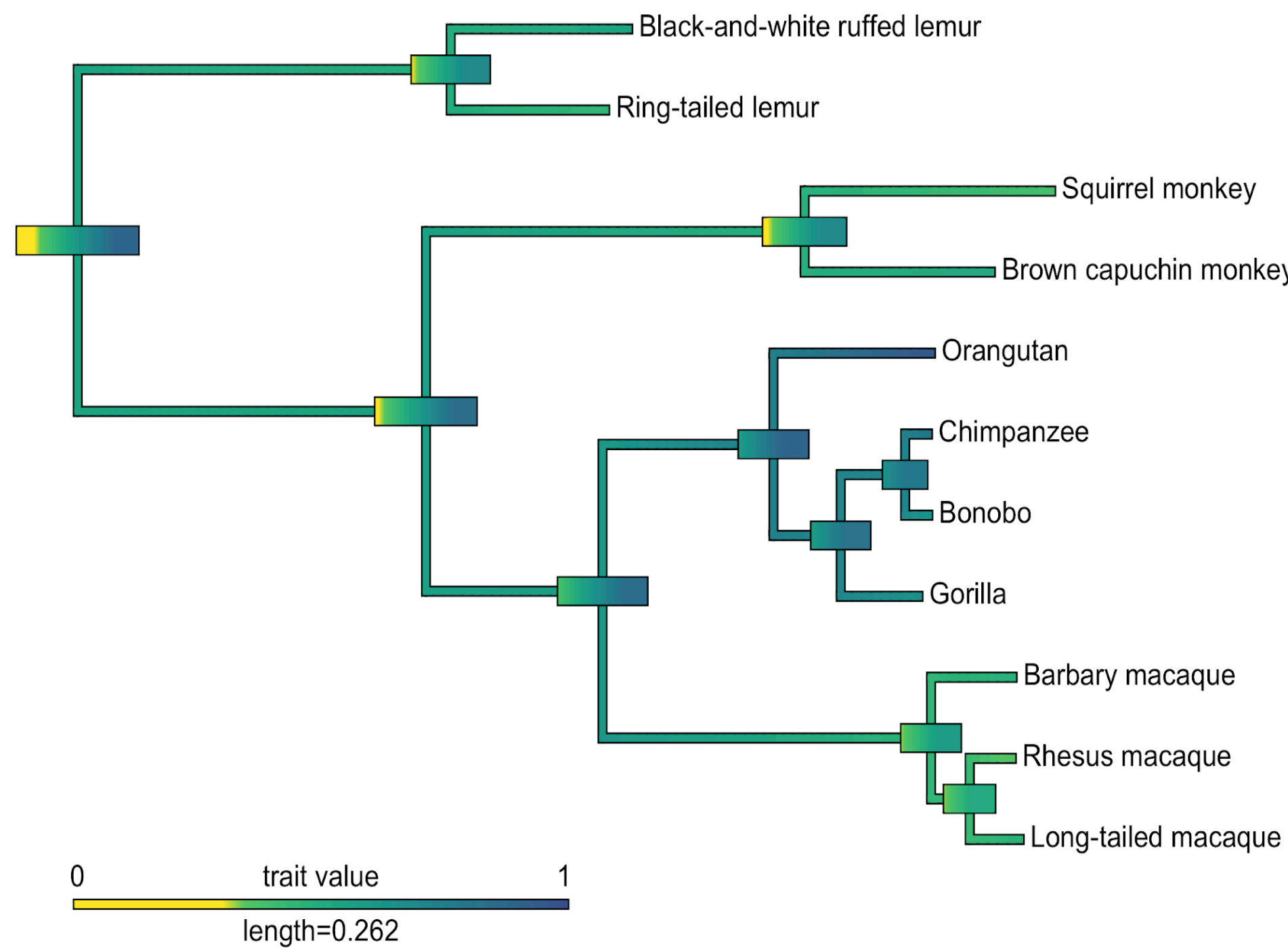


Figure 4. Ancestral state reconstruction of primates' short-term memory abilities for the 15- and 30-second delay conditions. Colors are representative of the confidence intervals of abilities, for this trait, accuracy ranging from 0 to 1. Large bars represent the confidence intervals of proposed common ancestors. Any yellow in the confidence interval indicates below chance performance. Length of legend indicates scale for the branch lengths (proportional to the number of nucleotide substitutions per site).

Future Directions

In addition to providing novel insights into primate short-term memory, our pilot study highlights that large-scale collaboration in the field of primate cognition is feasible and valid.

We were able to administer the same experimental protocol across multiple research facilities, adapting it for use with apes, monkeys, and prosimians. Thus, we were able to compare a number of factors related to subjects' success including condition, species, and prior research experience.

Moving forward, we will continue to collaboratively decide on research agendas. We are open to all interested in primate cognition and welcome people/research centers to join our project. Currently, data collection is ongoing, with additional data being collected for the short-term memory study.

Interested in Joining ManyPrimates?

- Visit our website: <https://manyprimates.github.io/>
- Email us: manyprimates@gmail.com
- Follow us on Twitter: [@ManyPrimates](https://twitter.com/ManyPrimates)



Acknowledgments and References

The data reported herein were contributed by: Drew Altschul, Michael Beran, Manuel Bohn, Josep Call, Sarah DeTroy, Shona Duguid, Crystal Egelkamp, Claudia Fichtel, Julia Fischer, Molly Flessert, Daniel Hanus, Daniel Haun, Lou Haux, R. Adriana Hernandez-Aguilar, Esther Herrmann, Lydia Hopper, Marine Joly, Fumihiro Kano, Stefanie Keupp, Alicia Melis, Alba Motes-Rodrigo, Stephen Ross, Alejandro Sánchez-Amaro, Yutaro Sato, Vanessa Schmitt, Manon Schweinfurth, Amanda Seed, Derry Taylor, Christoph Völter, Elizabeth Warren and Julia Watzek.

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