

A photograph of a dense tropical forest with a blue rope bridge stretching across the canopy. The bridge is made of multiple blue ropes and is positioned horizontally across the middle of the frame. The forest is filled with green foliage and tall trees, with sunlight filtering through the leaves.

Bridging the forest gap: experimental evaluation of bridges for New World monkeys

Giselle Narváez Rivera^{1,2} Stacy Lindshield^{2,3,4}

Iowa State University

Natural Resources and Ecology Management Department ¹

The Monkey Bridge Project Inc.²

Department of Anthropology ³

Ecology and Evolutionary Biology Program⁴

Human population is increasing...

- Increased urban growth
→ increased habitat fragmentation
- Challenges primate movement
 - Animal-Vehicle collisions
 - Electrocutions
 - Dog attacks



One possible solution: crossings structures

- Crossing Structures (CS) provide a safer travel option
- Have been installed by conservationists all over the world



The research problem



- We installed crossing structures
- Bridges appear to be helping many arboreal mammals but our target species are primates.
- Primates do not use the crossing structures as expected.





Questions: Could it be related to bridge CS design?

- How do monkeys respond to different CS designs?
- Is one design more effective than others?
- Do primate age groups utilize CS differently?

Site

- Puerto Viejo de Talamanca, Limon province in Costa Rica
- Tropical moist forest
- Secondary forest
- Private property near Jaguar Rescue Center (1 hectare)



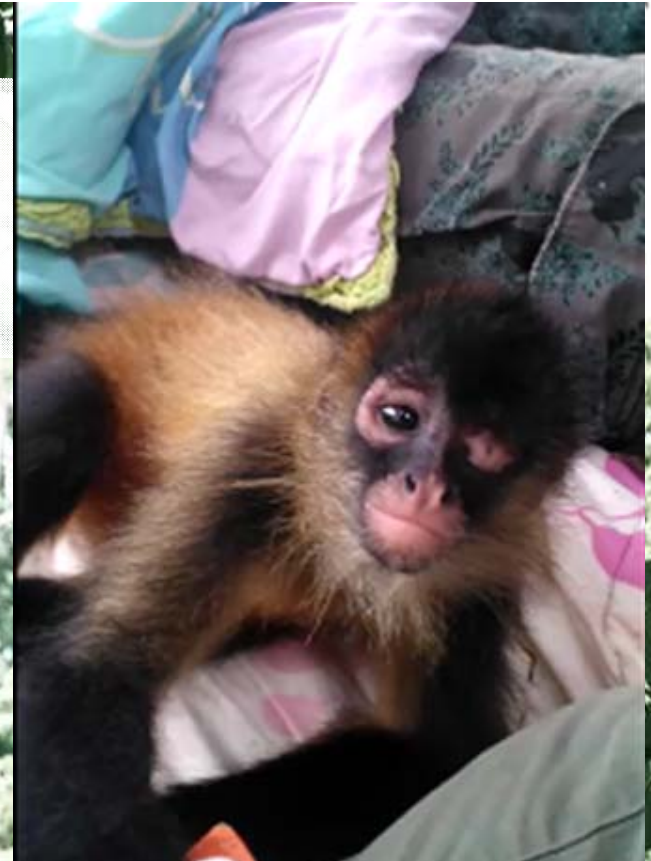
Study site

The Jaguar Rescue
Center
is a wildlife sanctuary
in Puerto Viejo



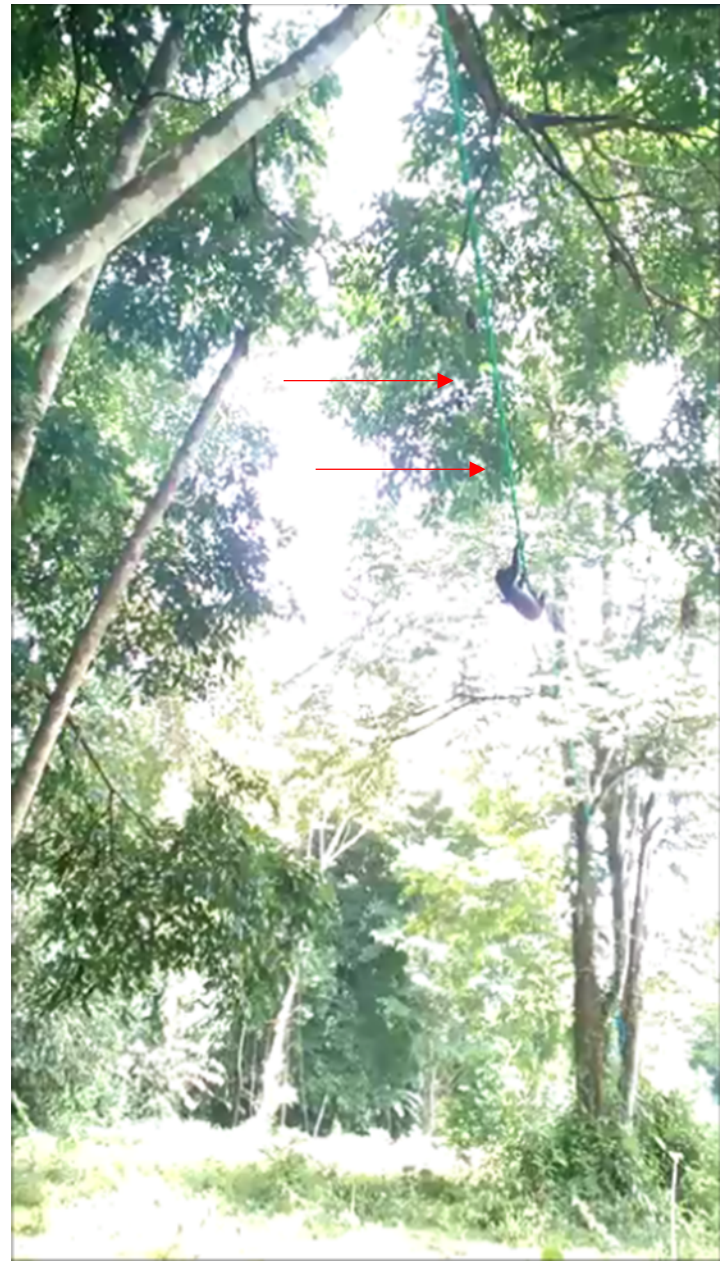
Study subjects

- Black-handed spider monkey
 - *Ateles geoffroyi* (n=2)
 - 2 juveniles
- Mantled howler monkey
 - *Alouatta palliata* (n=13)
 - 7 adults
 - 5 juveniles
 - 1 infant



The bridge models:

1.The twisted liana



The bridge models:

2. The parallel vertical



The bridge models:

3. The horizontal ladder



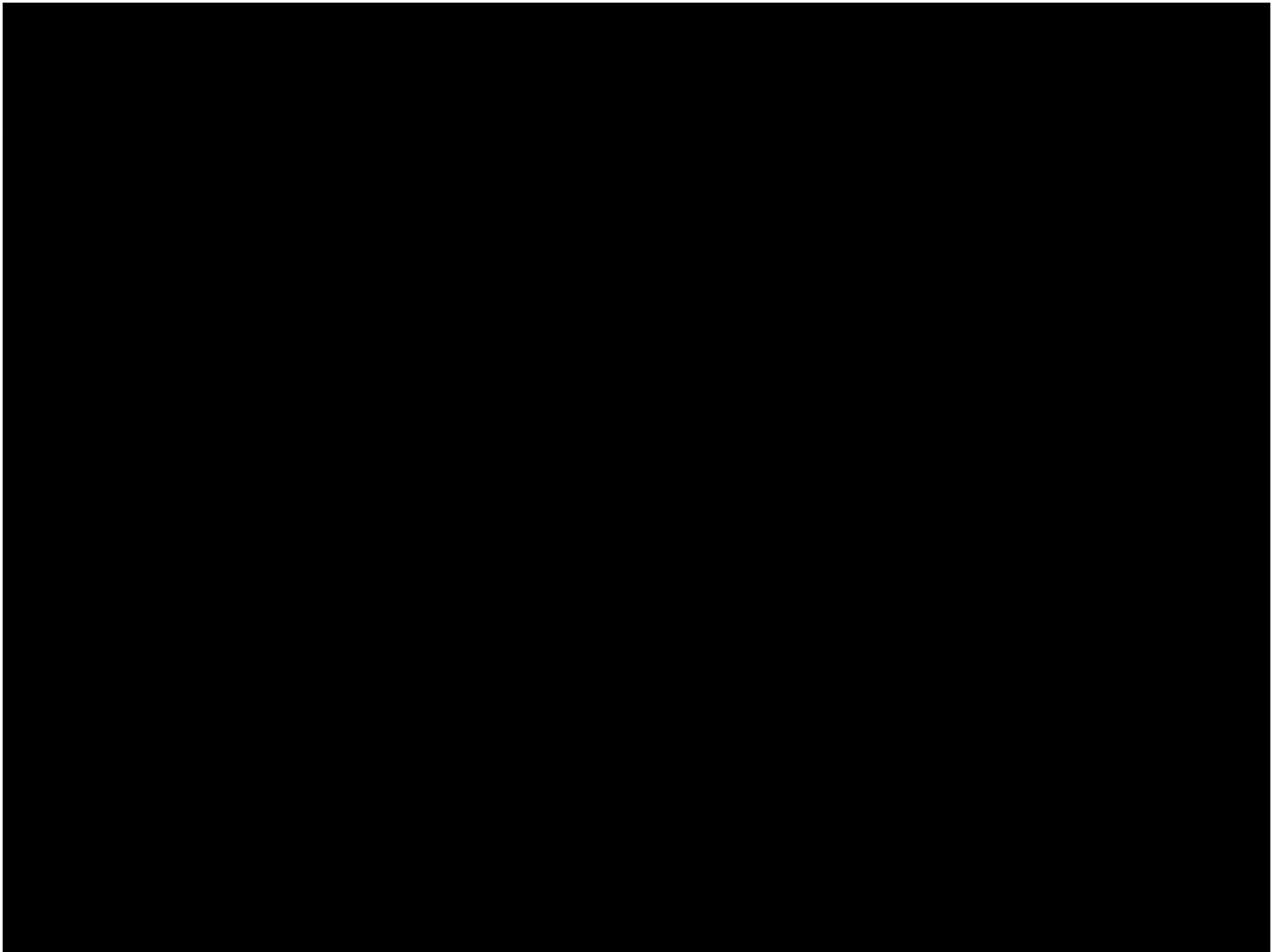
Crossing structure research design

- Materials had similar properties and amount
- Study subjects were given exclusive access to one bridge for a 3 day period
- CS were rotated in a 3 day cycle and repeated for 21 days



Behavior sampling methods

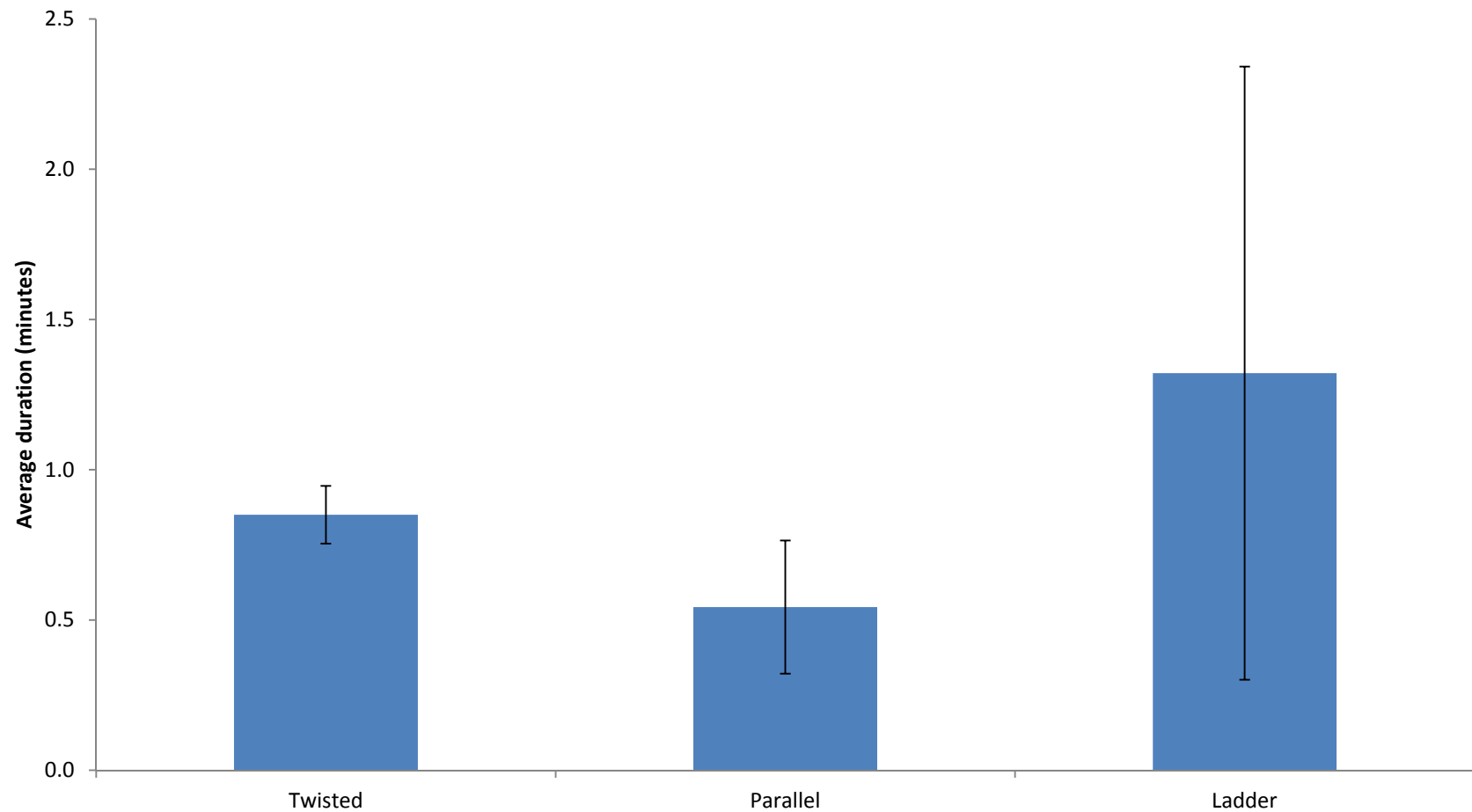
- Standard sampling methods from Altmann, 1974
- Subjects' behavior assessed for CS model preference
 - Focal individual sampling with instantaneous recording at 1-minute time points
 - Group scan every 2 minutes
 - Individuals on/off CS
- Potential CS design strengths or weaknesses as indicated by study subjects' behavior
 - Individuals' time on structure
 - All occurrences of:
 - Missteps and falls
 - Locomotor and postural behavior
 - Fear and agonism



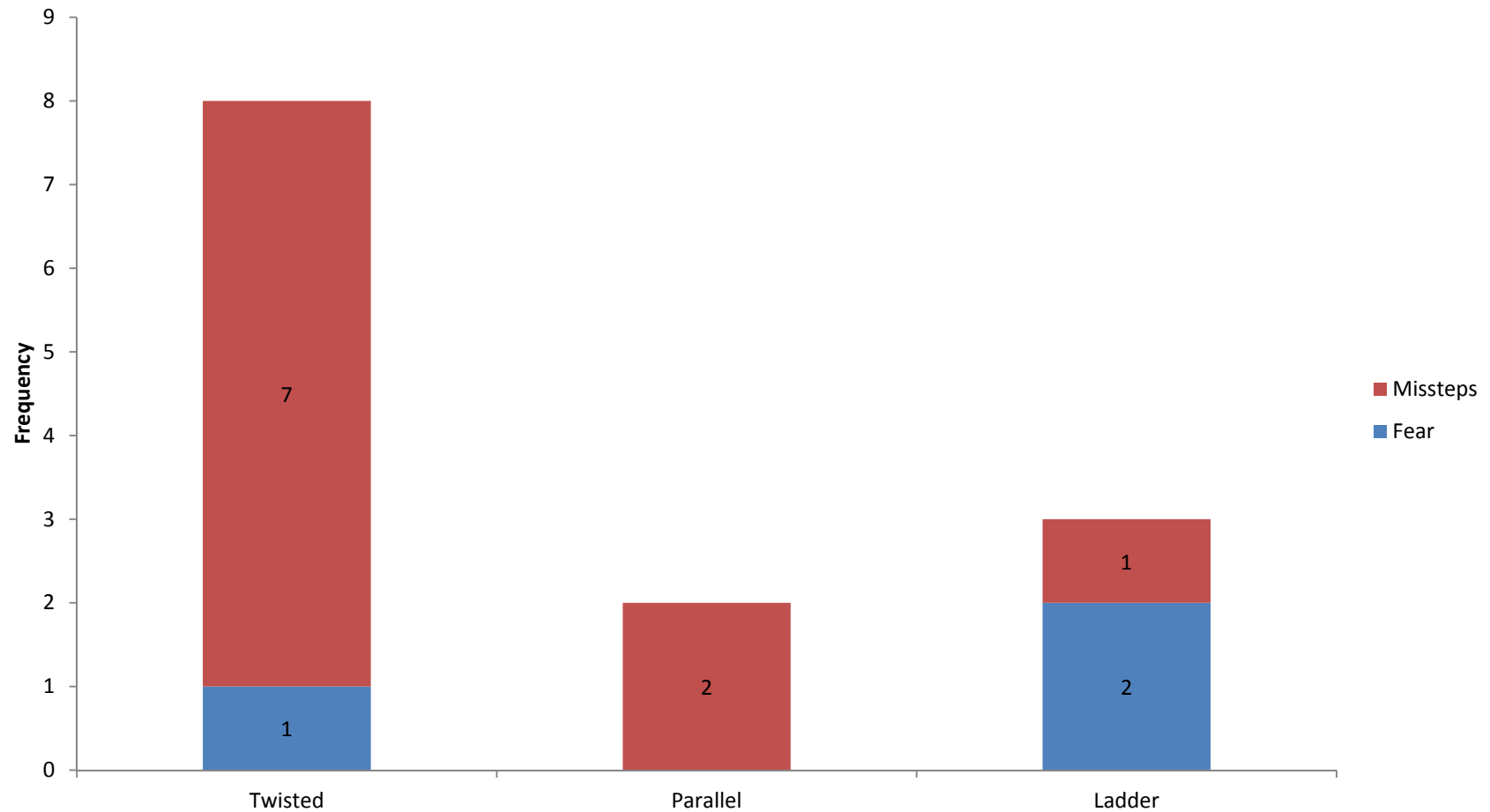
Results: reaction to CS design

- No significant difference in frequency of use among models
- 48% of cases (n=13) study subjects exhibited difficulty and/or fear traveling across the crossing structures.
- 62% of crossing problems were associated with the twisted liana model.

Result: Subjects spent more time crossing the ladder model

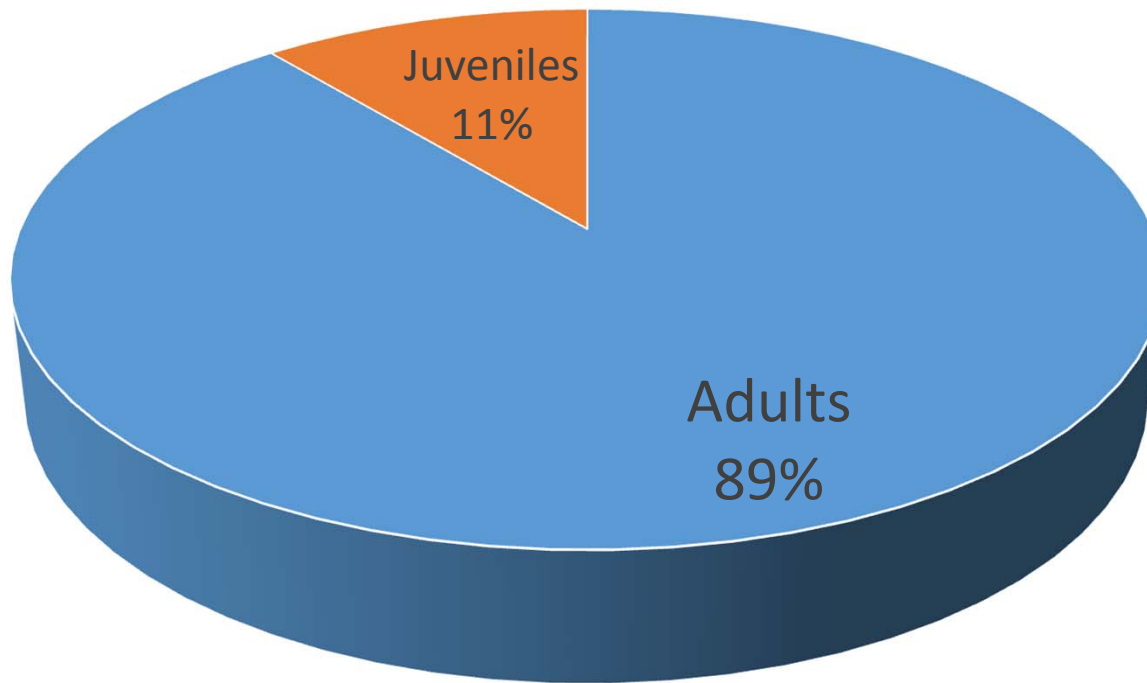


Result: 62% of crossing problems were associated with the twisted liana model.



Result: Adults utilized CS more than juveniles

Percent of crossings by age



Summary

- Q: What is the most effective design for primate crossing?
 - A: Parallel liana and ladder models performed well
 - Fewer missteps
- Q: What is most comfortable CS design?
 - A: They seemed more relaxed in ladder bridge
- Q. Do primate age groups utilize CS differently?
 - A. Juveniles did not use CS as much as adults

What's next?

- Can we find a better balance between CS stability and material flexibility?
- Does adding natural vegetation improve CS effectiveness?
- Are there differences in CS use among primate species?

Acknowledgements



- Jaguar Rescue Center & staff
- Jason Elliot and Annee Caron
- Jill Pruetz
- Support provided in part by American Society of Primatologists, International Primatological Society and Northwest Primate Conservation Society
- Thanks to our generous contributors via the Indiegogo fundraising campaign, *Connecting Primates to Places with Wildlife Bridges*

Questions?

