

Socio-behavioral Asymmetries in Colombian Spider Monkeys

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INTRODUCTION

Reports of lateralized behaviors (e.g., functions associated with one brain hemisphere) are widespread in vertebrate and invertebrate animals¹. The left hemisphere has been associated with routine activities while the right hemisphere has been associated with monitoring during social interactions². The cerebral dominance hypothesis² theorizes that all social behaviors are mediated by the right hemisphere. Non-human primates may be of particular importance for testing this hypothesis given their complex social repertoire. We tested the hypothesis that socio-behavior is related to hemispheric specialization in Colombian spider monkeys (*Ateles fusciceps rufiventris*). We predicted a left side bias (right hemisphere) across three species-typical social behaviors: embrace, face-embrace, and groom. We observed whether these behaviors were delineated to the left or right of the body, thus establishing a test of the cerebral dominance hypothesis across various social behaviors that may serve different functions.

METHODS

- Data collected from 15 Colombian spider monkeys at Monkey Jungle in Miami, Florida
- 186 hours of observational data were collected using behavioral animal sampling
- Trained observers input data on iPods using Animal Behaviour Pro software (Fig. 1)
- 3 social behaviors were targeted: embrace, face-embrace, and grooming

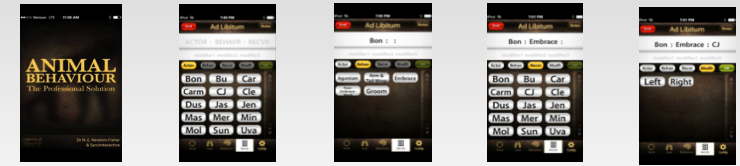


Fig 1. Data Acquisition

RESULTS

A Laterality Index (LI) was calculated for each monkey for each social behavior with the formula $LI=(R-L)/(R+L)$. A significant group-level left side bias was found using one-sample Wilcoxon signed-rank tests for embrace ($N=13$, $Z=-3.180$, $P=0.001$; Fig. 2) and face-embrace ($N=8$, $Z=-2.521$, $P=0.012$; Fig. 2). No bias was found for grooming ($N=7$, $Z=1.183$, $P=0.237$; Fig. 2). Mann-Whitney U tests found no sex differences for any of the behaviors. Individual data are given in Table 1. For embrace, 12 monkeys were left-preferent and 1 monkey had no preference. For face-embrace, 7 monkeys were left-preferent and 1 monkey had no preference. For groom, 4 monkeys were right-preferent, 1 monkey was left-preferent, and 1 monkey had no preference.

Fig 2. Group median LI scores for embrace, face-embrace, and groom.

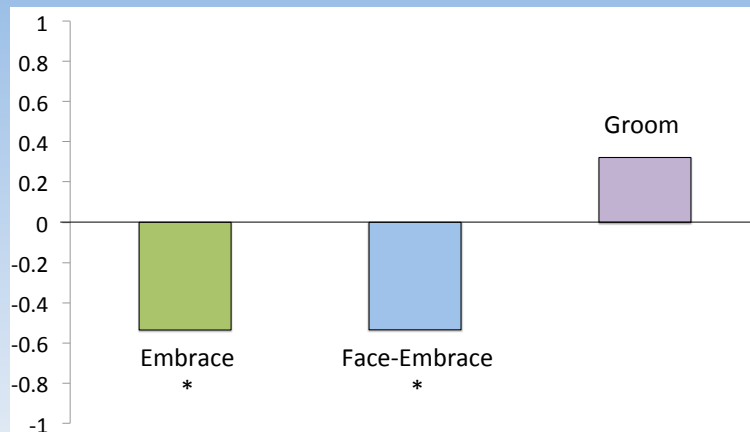


Table 1. Individual data for embrace, face-embrace, and groom.

Subject	Gender	Age	Embrace		Face-Embrace		Groom	
			LI	Preference	LI	Preference	LI	Preference
Bon Jovi	M	A	-0.61	L	-0.88	L	-	-
Butch	M	A	-0.55	L	-0.49	L	0.46	R
Carmelita	F	A	-0.67	L	-0.41	NP	-	-
Cary	F	A	-0.41	L	-	-	0.50	R
CJ	F	A	-0.54	L	-	-	-	-
Cleo	F	A	-0.51	L	-0.52	L	0.37	R
Dusky	F	A	-0.54	L	-0.56	L	0.24	NP
Jasper	M	J	-0.26	NP	-	-	-	-
Jenny	F	J	-	-	-	-	-	-
Mason	M	A	-0.54	L	-0.61	L	-	-
Marley	M	J	-	-	-	-	-	-
Mints	F	A	-0.40	L	-	-	-	-
Molly	F	A	-0.58	L	-	-	0.32	R
Sunday	M	A	-0.44	L	-0.55	L	-	-
Uva	M	A	-0.41	L	-0.43	L	-0.58	L

M = Male, F = Female, J = Juvenile, A = Adult, L = Left preference, R = Right preference, NP = No preference.

Preferences calculated with two-tailed binomial probabilities with an alpha level of 0.05.

Dash indicates subject did not meet the minimum of 15 observed responses to be included in analyses.

CONCLUSIONS

Our data support the division of labor between the left and right hemispheres posited by the cerebral dominance hypothesis but suggest there may be important differences between behaviors traditionally categorized as social. These differences indicate social behaviors may serve different functions, and are thus organized differently at the hemispheric level.

References

- Vallortigara, G., & Rogers, L. J. (2005). Survival with an asymmetrical brain: advantages and disadvantages of cerebral lateralization. *Behavioral and brain sciences*, 28(4), 575-588.
- Rogers, L. J., & Vallortigara, G. (2015). When and why did brains break symmetry? *Symmetry*, 7(4), 2181-2194.



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