

## Electronic Supplementary Material

### Subjects

We defined a nursery-reared (NR) chimpanzee as an individual that was separated from his or her mother within the first 30 days of life due to unresponsive care, injury, or illness (Bard, 1994; Bard, Platzman, Lester, & Suomi, 1992). NR chimpanzees were placed in incubators, fed standard human infant formula (not supplemented with DHA to our knowledge), and cared for by humans until they could sufficiently care for themselves, at which time they were placed with other infants of the same age until they were three years of age (Bard, 1994; Bard et al., 1992). At three years of age, the NR chimpanzees were integrated into larger social groups of adult and sub-adult chimpanzees. Mother-reared (MR) individuals were defined as individuals that were not separated from their mother for at least the first 2.5 years of life and were raised in social groups of between 4 -20 individuals. Wild caught individuals had unknown rearing history, which may have included pet ownership or use in the entertainment industry.

### MRI Scanning

*In vivo* scans were obtained at the time the chimpanzees were being surveyed for their annual physical examinations. All *in vivo* chimpanzee MRI scans were done prior to the 2015 implementation of United States Fish and Wildlife Service and National Institutes of Health regulations governing research with chimpanzees. Subjects were first immobilized with ketamine (10 mg/kg) or telazol (3-5mg/kg) and subsequently anaesthetized with propofol (40–60 mg/(kg/h)), following standard procedures at the

YNPRC and NCCC facilities. YNPRC subjects were then transported to the MRI facility, while NCCC subjects were wheeled to the mobile imaging unit. The subjects remained anaesthetized for the duration of the scans, as well as the time needed to transport them between their home cage and the imaging facility (between 5 and 10 minutes) or mobile imaging unit (total time ~ 5 minutes). Subjects were placed in the scanner chamber in a supine position with their head fitted inside the human-head coil. Scan duration ranged between 40 and 60 minutes as a function of brain size. After completing MRI procedures, the subjects were temporarily housed in a single enclosure for 6–12 h to allow the effects of the anesthesia to wear off, after which they were returned to their social group.

#### Sulci Extraction and Measurement

To account for the differences in chimpanzee anatomy compared to humans, a number of adjustments were performed before the scans were processed using the pipeline procedure within BrainVisa software (BV). Specifically, chimpanzee MRI volumes were skull-stripped, cropped, bias corrected (Coupé et al., 2008), and reformatted at 0.625 mm isotropic resolution using ANALYZE 11.0 software, and subsequently imported into BV. To align the template brain, the anterior and posterior commissures were manually specified on the MRI at the point where they intersect with the mid-sagittal slice.

#### Heritability Analyses

Total additive genetic variance ( $h^2$ ) is the amount of total phenotypic variance that is attributable to all genetic sources. Total phenotypic variance attributable to genetic and

non-genetic variables is constrained to a value of 1; therefore, all non-genetic contributions to the phenotype are equal to  $1 - h^2$ .

### References

1. Bard, K. A. (1994). Evolutionary roots of intuitive parenting: Maternal competence in chimpanzees. *Early Development and Parenting*, 3(1), 19-28. doi:10.1002/edp.2430030104
2. Bard, K. A., Platzman, K. A., Lester, B. M., & Suomi, S. J. (1992). Orientation to social and nonsocial stimuli in neonatal chimpanzees and humans. *Infant Behavior and Development*, 15(1), 43-56. doi:10.1016/0163-6383(92)90005-q
3. Bard, K. A. (1994). Evolutionary roots of intuitive parenting: Maternal competence in chimpanzees. *Early Development and Parenting*, 3(1), 19-28. doi:10.1002/edp.2430030104
4. Coupé, P., Yger, P., Prima, S., Hellier, P., Kervrann, C., & Barillot, C. (2008). An optimized blockwise nonlocal means denoising filter for 3-D magnetic resonance images. *IEEE transactions on medical imaging*, 27(4), 425-441.

### List of Tables

**Table S1: Descriptive data for planum temporale (PT) surface area and mean depth grouped by non-genetic factors (i.e., rearing history, colony, sex and scanner magnet strength).**

	Mean AQ	s.e.	t	p	#L	#NB	#R
<hr/>							
<b>Scanner Magnet</b>							
<i>Surface Area</i>							
3T	-0.155	.026	-5.92	.000	59	5	13
1.5T	-0.083	.015	-5.68	.000	96	19	37
PM	-0.137	.032	-4.20	.000	42	8	12
<i>Mean Depth</i>							
3T	-0.061	.015	-4.10	.000	44	12	21
1.5T	-0.029	.008	-3.22	.002	81	32	39
PM	-0.053	.022	-2.41	.019	35	12	15

**Colony***Surface Area*

NCCC	-0.155	.026	-5.92	.000	97	19	39
YNPRC	-0.083	.015	-5.68	.000	100	13	23

*Mean Depth*

NCCC	-0.061	.015	-4.10	.000	87	31	37
YNPRC	-0.029	.008	-3.22	.002	73	25	38

**Sex***Surface Area*

Males	-0.155	.026	-5.92	.000	97	14	32
Females	-0.083	.015	-5.68	.000	100	18	30

*Mean Depth*

Males	-0.061	.015	-4.10	.000	82	25	36
Females	-0.029	.008	-3.22	.002	78	31	39

**Rearing***Surface Area*

MR	-.093	.016	-5.58	.000	89	14	32
NR	-.137	.022	-6.32	.000	66	11	15
WC	-.122	.031	-3.91	.000	42	7	15

*Mean Depth*

MR	-.037	.011	-3.15	.001	73	29	33
NR	-.051	.014	-3.52	.001	53	15	24
WC	-.048	.017	-2.76	.007	34	12	18

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**Table S2: Heritability estimates for the planum temporale (PT) of chimpanzees (N = 291)**

Hemisphere	$h^2$	s.e.	p	Covariates	Variance
<b>Surface Area</b>					
Overall (n = 291)					
Mean	.217	.107	.008	Sex	.057
Left	.221	.109	.009	Sex	.039
Right	.215	.105	.006	Sex	.052
AQ	.132	.091	.041	None	
YNPRC (n = 136)					
Mean	.061	.134	.312	Sex	.079
Left	.102	.142	.207	Sex	.072
Right	.112	.148	.197	Sex	.036
AQ	.158	.157	.106	None	
NCCC (n = 155)					
Mean	.471	.152	.001	Sex, Scan	.086
Left	.332	.158	.009	Sex, Scan	.047
Right	.336	.161	.009	Sex	.069
AQ	.000	.500	.500	None	
<b>Mean Depth</b>					
Overall (n = 291)					
Mean	.416	.121	.00008	Sex	.093
Left	.285	.111	.002	Sex, Colony	.084
Right	.306	.133	.003	Sex	.072
AQ	.034	.110	.373	None	
YNPRC (n = 136)					
Mean	.570	.189	.001	Sex	.039
Left	.336	.199	.024	Sex	.029
Right	.423	.196	.015	Sex	.047
AQ	.000	.500	.500	None	
NCCC (n = 155)					
Mean	.332	.153	.005	Sex, Age	.173
Left	.333	.141	.004	All	.220
Right	.259	.174	.091	Sex	.091
AQ	.285	.207	.062	Scan	.034

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**Table S3: Average planum temporale (PT) Surface Area and Mean Depth (+/- s.e.) for the Left and Right Hemisphere as a Function of Scanner Magnet Strength, Colony, Sex and Rearing History.**

**Scanner Magnet**

<i>Surface Area</i>	<i>Left (s.e.)</i>	<i>Right (se)</i>
3T	419.85 (13.43)	362.48 (13.85)
1.5T	434.07 (6.69)	400.12 (6.53)
PM	462.53 (13.59)	405.16 (13.71)
<i>Mean Depth</i>		
3T	11.73 (0.18)	11.03 (0.18)
1.5T	12.01 (0.09)	11.68 (0.11)
PM	12.07 (0.24)	11.36 (0.29)

**Colony**

<i>Surface Area</i>		
NCCC	438.59 (7.09)	401.26 (6.68)
YNPRC	433.94 (9.43)	380.08 (9.85)
<i>Mean Depth</i>		
NCCC	12.11 (0.09)	11.65 (0.11)
YNPRC	11.76 (0.15)	11.21 (0.14)

**Sex**

<i>Surface Area</i>		
Males	433.60 (8.52)	385.94 (8.59)
Females	439.15 (7.90)	396.61 (7.96)
<i>Mean Depth</i>		
Males	11.99 (0.12)	11.45 (0.14)

Females	11.91 (0.12)	11.43 (0.11)
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## **Rearing**

### *Surface Area*

MR	442.64 (8.42)	401.58 (8.17)
NR	419.75 (10.14)	370.71 (11.04)
WC	447.26 (12.72)	399.53 (12.16)

### *Mean Depth*

MR	12.04 (0.12)	11.63 (0.13)
NR	11.75 (0.17)	11.20 (0.13)
WC	12.03 (0.17)	11.40 (0.22)

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