

Supplementary Information Personality Matching in Giant Pandas

Supplementary Table 1. Four major components of individual behavior variation in captive giant pandas derived from combined score results of caretaker questionnaires on 33 adult giant pandas at the China Conservation and Research Center for Giant Pandas obtained through principal component analysis. Components accounted for 53.3% of the variance seen in individual pandas. Loadings > 0.25 are bold. PCA components are given labels consistent with Réale et al. (2007) when appropriate, but other terminology is used when necessary to provide a convenient descriptor of the PCA component.

Variable	PCA Component			
	I <i>Aggressive</i>	II <i>Playful-Clever</i>	III <i>Fearful</i>	IV <i>Excitable</i>
Vigilant	0.10	- 0.08	- 0.08	0.70
Active	- 0.12	0.34	- 0.29	0.27
Aggressive to conspecifics	0.82	- 0.20	- 0.27	- 0.03
Aggressive to people	0.82	- 0.06	0.12	0.13
Calm	- 0.20	- 0.07	0.03	0.08
Curious	0.08	0.08	- 0.44	0.35
Eccentric	0.02	- 0.03	- 0.07	0.84
Stereotypical	0.15	0.04	0.10	0.85
Friendly to conspecifics	- 0.78	- 0.02	- 0.20	- 0.21
Friendly to people	- 0.48	0.29	- 0.53	0.00
Fearful of conspecifics	- 0.16	- 0.10	0.85	- 0.09
Fearful of people	0.07	0.13	0.81	0.04
Anxious	0.44	0.05	0.20	0.33
Playful	- 0.22	0.83	- 0.9	0.10
Self-confident	0.10	0.56	- 0.64	- 0.10
Clever	0.25	0.79	- 0.27	- 0.01
Innovative	- 0.21	0.74	0.05	- 0.28
Solitary	0.50	- 0.58	0.04	- 0.10
Nervous	0.00	- 0.40	0.50	0.50
Vocal	- 0.03	0.05	- 0.23	0.01
Bad tempered	0.36	- 0.03	0.43	0.38
Not Interested	0.08	- 0.33	0.73	- 0.11
Shy	- 0.46	- 0.39	- 0.03	0.09
Cumulative Proportion of Variance	0.234	0.367	0.449	.533

Supplementary Table 2. Four major components of individual behavior variation in captive giant pandas derived from pooled score results of four novel object tests on 30 adult giant pandas at the China Conservation and Research Center for Giant Pandas obtained through principal component analysis. Components accounted for 59.9% of the variance seen in individual pandas. Loadings > 0.25 are bold.

Variable	PCA Component			
	I <i>Neophobic</i>	II <i>Active- Excitable</i>	III <i>Inactive- Communicative</i>	IV <i>Food anticipatory</i>
<i>Object Interactions</i>				
Latency to touch (sec)	0.31	0.08	-0.01	0.25
Total time (min)	-0.25	0.13	0.06	-0.47
Total visits	-0.27	0.31	0.18	-0.11
<i>Door & Human Directed Behaviors</i>				
Total time at door (min)	-0.31	0.08	0.07	0.36
Total visits to door	-0.36	0.14	0.01	0.28
Total point samples human oriented	-0.30	0.00	-0.30	0.16
<i>Stereotypical Behaviors</i>				
Total time (min)	0.08	0.23	-0.10	-0.19
Total different types	0.17	0.37	-0.18	0.19
Total point samples	0.20	0.41	-0.09	0.02
<i>Total active behaviors</i>	0.14	0.45	0.04	-0.06
<i>Chemical Communication</i>				
Total scent marks	-0.01	0.11	0.32	0.02
Total point samples	0.08	0.08	0.42	0.11
<i>Vocal Communication</i>				
Frequency of positive vocalizations	0.17	0.23	-0.01	-0.08
Frequency of negative vocalizations	0.13	0.09	-0.06	0.05
<i>Maintenance Behaviors</i>				
Total point samples of drinking	0.27	0.08	-0.09	-0.04
Total point samples of resting	0.13	-0.16	0.46	0.21
Total point samples of stationary alert	0.01	0.00	0.25	0.08
Cumulative Proportion of Variance	0.244	0.405	0.509	0.599

Table 3. Sources of within-individual variation in novel object Principle Component Analysis (PCA) scores based on repeated pooled values of four novel object tests pooled within each year. We used GLMMs with test sequence (1st versus 2nd), age, weight, and sex as fixed effects and individual panda ID as a random effect. Estimates of within-individual variances and repeatability calculated from Both Pearson’s r and the Intraclass correlation coefficient (ICC) are reported. Δ AIC refers to the change in the AIC criteria when individual panda ID was included from the best model versus excluded (negative numbers indicate better model fit with inclusion while positive numbers indicate a worse fit).

	Principle Component							
	Neophobic		Active-Excitable		Inactive-Chemical		Food-Anticipatory	
<i>Fixed Effects</i>	β (s.e.)	<i>P</i>	β (s.e.)	<i>P</i>	β (s.e.)	<i>P</i>	β (s.e.)	<i>P</i>
Trial sequence	6.89 (9.36)	0.48	-5.17 (22.90)	0.83	9.60 (9.39)	0.34	-5.53 (14.14)	0.70
Age	–		-0.12 (2.28)	0.96	-0.14 (1.44)	0.93	-0.50 (1.40)	0.73
Weight	-0.04 (0.19)	0.84	0.32 (0.44)	0.48	-0.42 (0.31)	0.22	-0.01 (0.27)	0.98
Sex	11.98 (17.11)	0.50	16.89 (42.59)	0.70	-2.74 (18.18)	0.88	4.18 (26.29)	0.88
Sex*Trial sequence	-4.78 (10.84)	0.67	-6.42 (26.98)	0.82	2.15 (10.87)	0.85	0.47 (16.65)	0.98
Intercept	-10.96 (25.66)	0.68	-23.95 (66.15)	0.73	31.29 (40.06)	0.46	21.76 (40.83)	0.61
<i>Variances</i>	σ^2 (s.d.)	Δ AIC	σ^2 (s.d.)	Δ AIC	σ^2 (s.d.)	Δ AIC	σ^2 (s.d.)	Δ AIC
Between-individual	2.51 (1.58)	-15.77	1.69 (1.3)	-26.99	97.04 (9.85)	-23.26	0.00 (0.00)	-21.19
Within-individual	87.30 (9.29)		455.5 (21.34)		56.73 (7.53)		173.5 (13.17)	
<i>Repeatability</i>								
Pearson’s r (s.e.)	0.03 (0.32)		-0.22 (0.31)		0.41 (0.27)		-0.19 (0.31)	
ICC (95%CI)	0.03 (-0.56-0.62)		-0.22 (-0.71 – 0.43)		0.41 (-0.22 – 0.81)		-0.19 (-0.69 – 0.46)	

Within-individual variation in all PCA component scores was not significantly related to trial sequence, age, weight, sex, or the interaction of sex and trial sequence though these explanatory factors all showed up in the best fit models (Supplementary Table 3). There was significant support for the presence of consistent individual variation in responses to novel objects based on the individual PCA components, as removing the random effect of individual identity resulted in a worse model fit in all cases (Δ AIC ranged between -15.77 - -26.99 for the random effect ‘Individual’; Supplementary Table 3). Repeatabilities show that the PCA components have varying degrees of repeatability with the Neophobic PCA component resulting in very low repeatability and the other three PCA components ranging from -0.22 – 0.41, moderately strong repeatabilities (Supplementary Table 3).