



Supplementary Information for

Teaching varies with task complexity in wild chimpanzees

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Table S1

Results of the model of tool transfer probability (estimates, together with standard errors, confidence limits, results of tests, as well as minimum and maximum of estimates derived when excluding levels of random effects one at a time)

Term	Estimate	SE	lower CI	upper CI	χ^2	df	P	min	max
Intercept	0.026	0.643	-1.265	1.536			(1)	-0.415	0.676
Population ⁽²⁾	0.811	0.944	-0.862	2.629			(1)	0.058	1.346
Request ⁽³⁾	-2.055	0.585	-4.443	-0.888			(1)	-2.561	-0.871
Recipient sex ⁽⁴⁾	-1.489	0.746	-3.629	-0.110	4.064	1	0.044	-2.057	-1.069
Recipient age, 5-10 ⁽⁵⁾	1.915	1.144	0.067	4.841	7.260	2	0.027	1.459	2.909
Recipient age, 10-15 ⁽⁵⁾	2.833	1.446	0.798	16.046				2.288	18.177
Population:Request	2.773	0.868	1.074	6.005	9.687	1	0.002	1.623	3.616

(1) significance test of intercept not indicated because it has a very limited interpretation

(2) dummy coded with Gombe being the reference level

(3) dummy coded with no request being the reference level

(4) dummy coded with female being the reference level

(5) dummy coded with age 0 to 5 being the reference level; the indicated test refers to the overall effect of age

Table S2

Results of the model of requested tool transfer probability (estimates, together with standard errors, confidence limits, results of tests, as well as minimum and maximum of estimates derived when excluding levels of random effects one at a time)

Term	Estimate	SE	lower CI	upper CI	χ^2	df	P	min	max
Intercept	-1.954	1.500	-12.747	1.231			(¹)	-6.432	-1.163
Population ⁽²⁾	4.579	2.248	1.522	28.332	7.400	1	0.007	3.505	14.742
Recipient sex ⁽³⁾	-0.982	1.503	-17.704	2.151	0.381	1	0.537	-2.263	0.369
Recipient age, 5-10 ⁽⁴⁾	0.365	1.506	-3.160	11.231	0.984	2	0.611	-0.964	1.830
Recipient age, 10-15 ⁽⁴⁾	2.113	2.014	-1.815	18.355				0.605	18.144

(¹) significance test of intercept not indicated because it has a very limited interpretation

(²) dummy coded with Gombe being the reference level

(³) dummy coded with female being the reference level

(⁴) dummy coded with age 0 to 5 being the reference level; the indicated test refers to the overall effect of age

Table S3

Results of the model of resistance probability (estimates, together with standard errors, confidence limits, results of tests, as well as minimum and maximum of estimates derived when excluding levels of random effects one at a time)

Term	Estimate	SE	lower CI	upper CI	χ^2	df	P	min	max
Intercept	-1.782	0.435	-2.973	-1.007			(1)	-2.262	-1.286
Population ⁽²⁾	0.354	0.642	-1.186	1.786			(1)	-0.211	0.786
Request ⁽³⁾	1.743	0.582	0.777	3.076			(1)	0.943	2.606
Recipient sex ⁽⁴⁾	-0.218	0.478	-1.153	0.715	0.221	1	0.639	-0.426	-0.043
Recipient age, 5-10 ⁽⁵⁾	-0.606	0.768	-13.069	0.739	1.889	2	0.389	-1.557	-0.335
Recipient age, 10-15 ⁽⁵⁾	-1.228	1.129	-13.664	0.616				-17.860	-0.884
Population:Request	-1.847	0.892	-3.834	-0.199	4.688	1	0.030	-2.698	-1.057

(1) significance test of intercept not indicated because it has a very limited interpretation

(2) dummy coded with Gombe being the reference level

(3) dummy coded with no request being the reference level

(4) dummy coded with female being the reference level

(5) dummy coded with age 0 to 5 being the reference level; the indicated test refers to the overall effect of age

Supplementary video legends

Video S1 Proactive transfer. Proactive transfer occurs when an object is transferred without a preceding request. These have been observed only rarely, at Goulougo. In this proactive tool transfer between chimpanzees at Goulougo, a juvenile male approaches his mother while self-scratching but without gesturing or vocalizing, at which point his mother divides her fishing probe lengthwise and provides him with one of the resulting tools.

Video S2 Active transfer. An Active transfer occurs when the tool possessor moves to facilitate the transfer or divides the tool so that the recipient can take a portion, following a request by the potential recipient. This transfer type was observed only at Goulougo. In this example, a juvenile reaches toward his mother's tool, at which point she divides her tool lengthwise and provides him with one of the resulting tools.

Video S3 Passive transfer. In a Passive transfer, the recipient requests the tool, and the possessor allows the recipient to take it without facilitation or hesitation. In the first example from Goulougo, an infant female whimpers and then reaches toward her mother's fishing probe, at which point she is permitted to take possession of the tool. In the second example, an infant male at Gombe reaches toward his mother's fishing probe. He extends his finger towards the tool as she extracts the probe from the mound, at which point he is allowed to take possession of the tool.

Video S4 Hesitant transfer. A Hesitant transfer occurs when the recipient begs, then grasps the tool; the possessor then transfers the tool, but only after delay or resistance. In the first example, an infant female at Goulougo whimpers and then grasps her mother's tool. After initially pulling the tool back, the adult female allows her infant to take possession of the fishing probe. In the second example, an infant male at Gombe reaches for his mother's fishing probe several times during a bout of her termite fishing. She does not initially relinquish the tool, twice pulling it out of the infant's reach. Eventually, the adult female puts the tool in her mouth, at which point her infant grasps it; she then allows him to take possession of the tool.

Video S5 Refusal transfer. In a Refusal, the possessor does not transfer the tool despite begging by the potential recipient. In the first example, an infant male at Goulougo makes several gestural requests. His mother does not transfer the fishing probe and uses her hand to block his attempts to reach for the tool. In the second example, an infant male at Gombe reaches for his mother's tool; in response, she pushes his hand away, and the tool does not change possession.

Video S6 Tolerated Take transfer. In a Tolerated Take transfer, the recipient takes the tool without making a preceding request. The possessor allows the transfer, showing neither facilitation nor hesitation. In the first example, from Goulougo, an adult female has transported two fishing probes to a termite nest and set one probe next to her. She does not react as her subadult male son picks up and takes the tool. In the second example, from Gombe, an infant female picks up a fishing probe her mother has set down on the ground, and her mother does not react.

Video S7 Steal transfer. In a Steal, an individual does not request the tool but takes it from the possessor, who reacts negatively, for example by attempting to keep or regain possession of the tool or by threatening the stealer. In the first example, an infant male at Goualougo steals a fishing probe from his older sister, who screams and attempts to reclaim the tool, before then requesting her mother's fishing probe. In the second example, from Gombe, an infant female succeeds, after multiple tries, at grabbing the fishing probe of her older sister, who attempts to hold onto the tool.

Video S8 Failed Steal transfer. In a Failed Steal, an individual does not request the tool but tries unsuccessfully to take it from the possessor, who exhibits a negative reaction, as in a Steal transfer. In the first example, an infant male at Goualougo attempts to grab the fishing probe of his older sister, who turns away from the infant and pulls the fishing probe out of his grasp, preventing him from getting possession of the tool. In the second example, an infant male at Gombe grips and attempts to pull a fishing probe away from his mother, who restrains him and keeps possession of the tool.

Video S9 Failed Attempt transfer. In a Failed Attempt, an individual does not request the tool but tries unsuccessfully to take it from the possessor, who does not react. In the first example, from Goualougo, an adult female extracts a fishing probe from a termite nest, and her infant male son attempts to grasp the probe. She continues feeding and fishing and does not react. In the second example, from Gombe, an infant female attempts to grasp the fishing probe of her older brother, who continues fishing and does not react.