

Tool assisted task on touchscreen: a case study on drawing behaviour in chimpanzees (*Pan troglodytes*)

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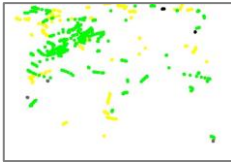



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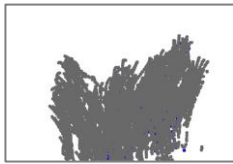

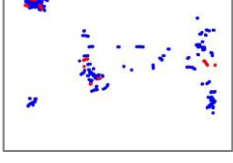

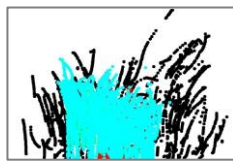
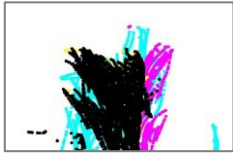
Supplementary material

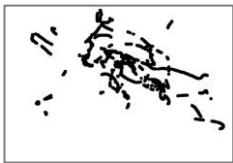
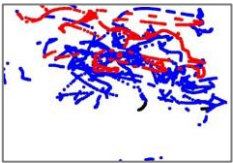
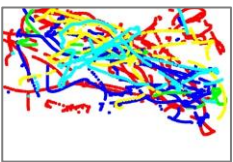

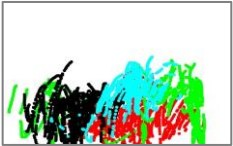


Video S1. Short sequences of drawing sessions of Pan and Ai (attached video file):






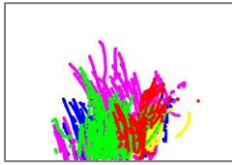

<https://youtu.be/ZhDv2eT4G4c>

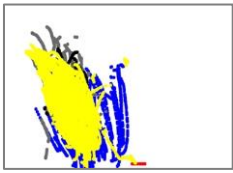



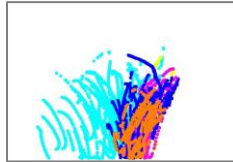
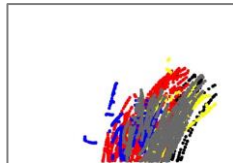
Table S1. Drawings, duration and tools used by the two Primate Research Institute females, Ai and Pan, during the test sessions using their fingers (F), longer chopstick (LC), shorter chopstick (SC), wooden stick (W) and metal bar (MB). Different tools were used for some drawings.

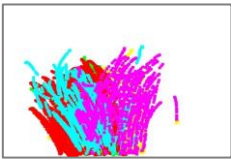
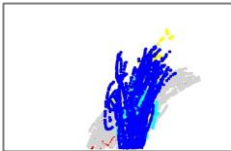
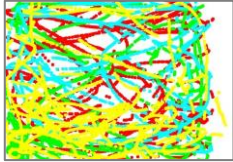


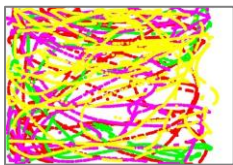
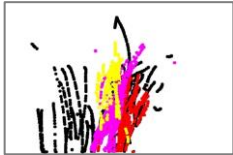
Days	Individuals	Drawings	Drawing made with	Drawing duration (minutes and seconds)
Day 1	Ai		FINGER	3 min and 17 sec
			FINGER	35 sec
	Pan		FINGER	2 min and 19 sec
			FINGER	1 min and 7 sec

			LONGER CHOPSTICK	3 min and 46 sec
			LONGER CHOPSTICK	5 min and 35 sec
Day 2	Ai		LONGER CHOPSTICK	40 sec
			FINGER	3 min and 2 sec
			LONGER CHOPSTICK	1 min and 30 sec
	Pan		LONGER CHOPSTICK	8 min and 34 sec
			LONGER CHOPSTICK	7 min and 57 sec

Day 3	Ai		METAL BAR	47 sec
			METAL BAR	1 min and 22 sec
			METAL BAR	2 min and 8 sec
	Pan		WOODEN STICK - LONGER CHOPSTICK	47 sec – 4 min and 8 sec
			LONGER CHOPSTICK	3 min and 56 sec
			LONGER CHOPSTICK	2 min and 14 sec
			SHORTER CHOPSTICK	1 min and 13 sec

			WOODEN STICK	5 min and 18 sec
Day 4	Ai		METAL BAR	3 min and 40 sec
			METAL BAR	4 min and 29 sec
			METAL BAR	3 min and 50 sec
	Pan		LONGER CHOPSTICK	6 min and 1 sec
			WOODEN STICK	5 min and 16 sec
			LONGER CHOPSTICK	3 min and 32 sec

			WOODEN STICK	4 min
Day 5	Ai	Drawing not available	METAL BAR	2 min and 4 sec
			METAL BAR	2 min and 36 sec
			METAL BAR	1 min and 51 sec
			METAL BAR	2 min and 52 sec
	Pan		LONGER CHOPSTICK	3 min and 22 sec
			LONGER CHOPSTICK	3 min and 49 sec

			LONGER CHOPSTICK	3 min and 40 sec
			LONGER CHOPSTICK	4 min and 32 sec
Day 6	Ai		METAL BAR	3 min and 39 sec
			METAL BAR	4 min and 33 sec
			METAL BAR	3 min and 41 sec
			METAL BAR	2 min and 33 sec
	Pan		LONGER CHOPSTICK	2 min and 12 sec

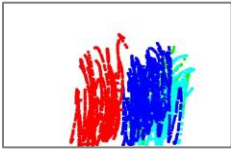

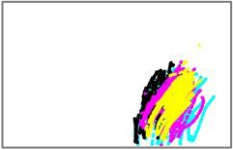
			SHORTER CHOPSTICK	1 min and 59 sec
			METAL BAR - LONGER CHOPSTICK	1 min and 36 sec – 1 min and 25 sec
			LONGER CHOPSTICK – SHORTER CHOPSTICK - LONGER CHOPSTICK	25 sec – 1 min and 33 sec – 36 sec

Table S2. Pairwise comparisons of the percentage of time spent drawing between females, using a Kruskal-Wallis test (chi-squared = 34.1, df = 6, p-value < 0.0001). The Shaded boxes indicate significant results.

	Ai	Hatsuka	Iroha	Misaki	Mizuki	Natsuki
Hatsuka	p = 0.0356	—	—	—	—	—
Iroha	p = 0.0074	p = 0.0356	—	—	—	—
Misaki	p = 1.0000	p = 0.0728	p = 0.0356	—	—	—
Mizuki	p = 0.0256	p = 1.0000	p = 0.0356	p = 0.0728	—	—
Natsuki	p = 0.0356	p = 0.644	p = 0.1234	p = 0.1758	p = 0.9415	—
Pan	p = 0.8194	p = 0.0055	p = 0.0055	p = 0.9415	p = 0.0055	p = 0.0062

Table S3. Pairwise comparisons of the average time spent drawing (i.e., marking duration) between females, using Kruskal-Wallis test (chi-squared = 39.8, df = 6, p-value < 0.0001). Shaded boxes indicate significant results.

	Ai	Hatsuka	Iroha	Misaki	Mizuki	Natsuki
Hatsuka	p = 0.1246	—	—	—	—	—
Iroha	p = 0.0291	p = 0.0193	—	—	—	—
Misaki	p = 0.2259	p = 0.7546	p = 0.0513	—	—	—
Mizuki	p = 0.0193	p = 0.0193	p = 0.7252	p = 0.0676	—	—
Natsuki	p = 0.0364	p = 0.0266	p = 0.7321	p = 0.0727	p = 0.7546	—
Pan	p = 0.0193	p = 0.0004	p = 0.0008	p = 0.0030	p < 0.0001	p = 0.0002

Table S4. Pairwise comparisons of the percentage of time spent looking at the screen between females made using a Kruskal-Wallis test (chi-squared = 46.4, df = 6, p-value < 0.0001). Shaded boxes indicate statistically significant results.

	Ai	Hatsuka	Iroha	Misaki	Mizuki	Natsuki
Hatsuka	p = 0.1300	–	–	–	–	–
Iroha	p = 0.0319	p = 0.0340	–	–	–	–
Misaki	p = 0.0144	p = 0.0262	p = 0.1533	–	–	–
Mizuki	p = 1.0000	p = 0.0862	p = 0.0862	p = 0.0333	–	–
Natsuki	p = 0.0262	p = 0.0319	p = 0.2357	p = 0.5636	p = 0.0440	–
Pan	p < 0.0001	p = 0.0262	p = 0.0067	p = 0.0043	p = 0.0144	p = 0.0022

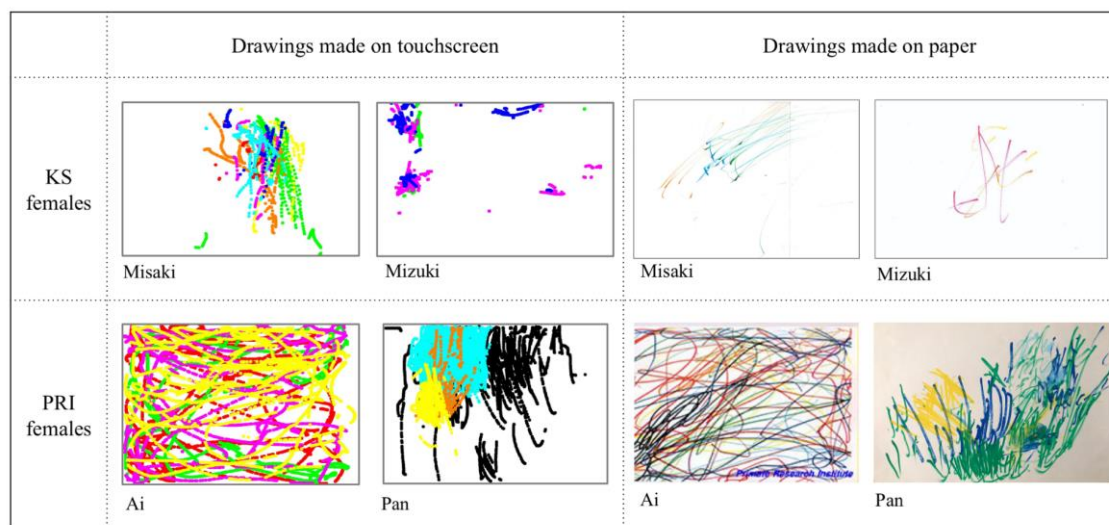


Figure S1. Examples of drawings made with pencils on paper and drawings made on the touchscreen by KS and PRI females. Drawings made on paper by Ai were provided by the University of Kyoto and those made by Pan with markers were provided by Tetsuro Matsuzawa.

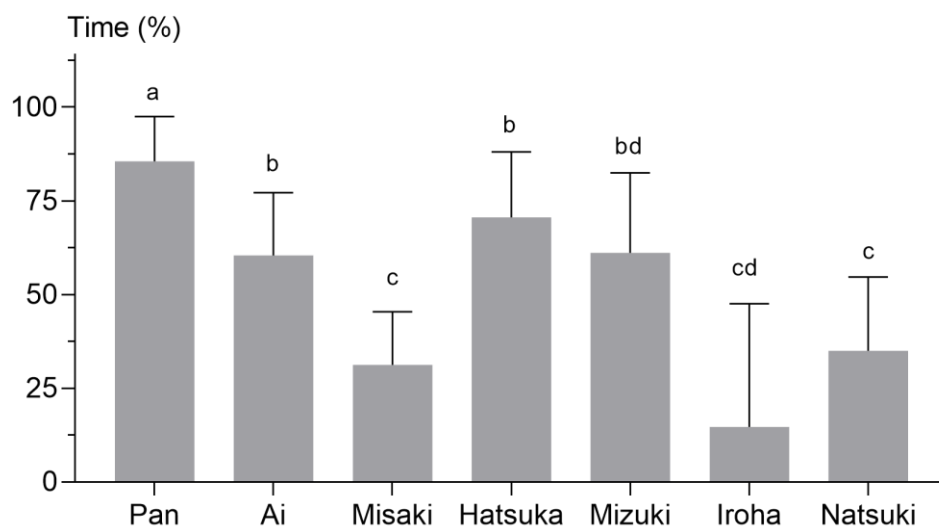


Figure S2. Percentage time spent looking at the screen while drawing. Letters indicates similar values (e.g., no statistical differences between two subjects).

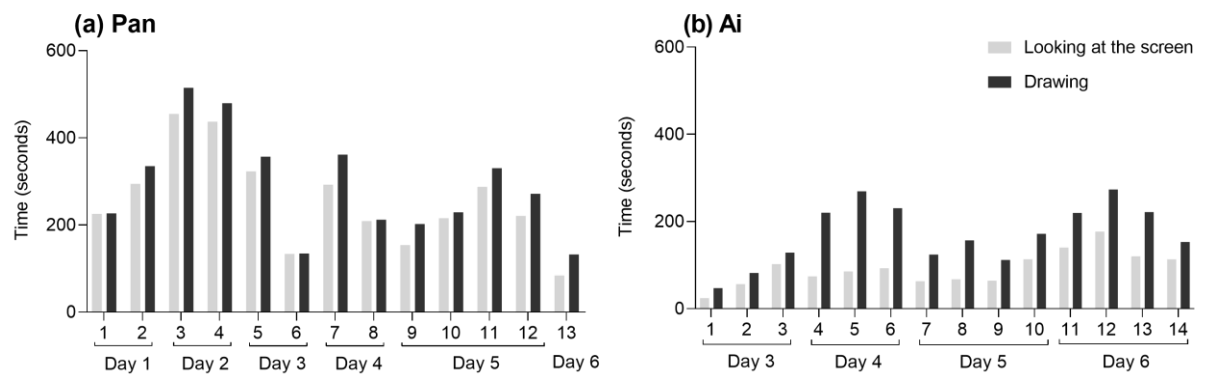


Figure S3. Time spent drawing and looking at the screen (seconds) for each drawing made with the selected tool by (a) Pan, who began to draw with the long chopstick from the Day 1 and (b) Ai, who began using the metal bar only on Day 3.

