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Chimpanzee ethnography reveals unexpected cultural diversity

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Supplementary Information:
Chimpanzee Ethnography Reveals Unexpected Cultural Diversity

Supplementary Table 1: Ethogram of aerial termite fishing technique with the technical elements observed in six chimpanzee communities. For Gombe chimpanzees, no quantification is provided as the data are based on direct observations by CB (observed = +, not observed = -). For each technical element defined, we provide in brackets the short name used in Figure 3. The third column “Variations” lists some variations found within each element. In the column “Community”, we present the number of different video sequences we obtained for each community (a sequence representing all the consecutive one-minute videos filmed from an individual at one location the same day) and the number of reliably identified unique individuals performing the behaviour. Thereby, we control for both identical individuals being captured on different days or at different termite mounds, as well as for instances when more than one individual was fishing in a given sequence). The “Sample size” column indicates the number of sequences where the element was present and the number of sequences where visibility permitted observations. The column “% of individuals performing” provides the percent of unique individuals seen to perform the technical element of all unique individuals recorded.

Technical element (N=17)	Definition	Variations	Community (N= # sequences - # diff. individuals)	Sample size (# sequences positive - # sequences visible)	% of individuals performing technical element
Select rigid stick (Rigid)	Select rigid stick (that do not bend when held in the mouth or hand) to fish the termites		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 11-17 19-19 1-33 5-5 34-38	65% 100% 3% 100% 89%
Select soft stick (Soft)	Select soft stick out of herbs or bark (that bend when held in the mouth or hand) to fish the termites		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(++) 6-17 0-19 32-33 0-5 4-38	35% 0% 97% 0% 10%
Scratch tunnel with finger (Scratch)	Scratch with finger the surface of the termite mound to open a tunnel entrance and to insert the stick	May use different fingers, the index, or the major.	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(+) 6-15 15-17 11-30 2-4 4-14	40% 88% 37% 50% 28%
Use one hand to insert (Insert 1h)	Use only one hand to insert and extract the stick fishing for termites	Can be right or left hand	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(**) 15-15 11-17 32-32 3-3 34-34	100% 65% 100% 100% 100%

Use both hands to insert (Insert 2h)	Use both hands alternatively to insert the stick to fish	Depending on the length of the stick both hands can be used at the same time.	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 0-15 6-17 0-32 0-3 0-34	0% 35% 0% 0% 0%
Shake sideways inserted stick (Shake)	The inserted stick is shaken sideways with the hand during the fishing movement		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(++) 0-7 0-17 7-28 0-3 0-31	0% 0% 25% 0% 0%
Shake up-and-down inserted (Shake u-d)	Once the stick is inserted, the chimpanzee moves it up-and-down with the hand before pulling it out	<u>Dindefelo</u> : The movements are mostly very rapid and abrupt <u>Issa</u> : The movements are mostly soft and slow	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 0-7 0-17 2-28* 0-3 28-30	0% 0% 7% 0% 93%
Sit while fishing (Sit)	Sit in front of the mound to fish without supporting its body		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(++) 15-16 19-19 7-32 0-3 32-36	94% 100% 22% 0% 89%
Lean on elbow while fishing (Lean elbow)	Lean on the elbow of one arm while fishing with the other hand		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 0-16 0-19 25-32 3-3 0-30	0% 0% 78% 100% 0%
Bites with teeth the end of stick to insert (Bite)	Bite with teeth softly the wood along the length of the to-be-inserted extremity of the stick before inserting.	<u>Dindefelo</u> : The stick is bitten so as to flatten it extremity before insertion <u>Issa</u> : The grass extremity is regularly bitten as it wears out quickly	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 5-10 4-19 27-31* 0-3 11-27	50% 21% 87% 0% 41%
Pull through teeth to make a brush (Brush)	Pull sideways one end of the thin stick through teeth pressed together one or more times to produce a more brushy end	Pulling can be done with one or both hands holding the stick	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 0-10 2-19 0-30 0-3 1-23	0% 10% 0% 0% 4%
Support with wrist from below (Wrist help)	Place wrist of free hand under the stick when extracted from the termite hole, so as to collect termites that would fall from stick	<u>Dindefelo</u> : The grass tends to bend when long	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 1-10 1-18 3-29 2-3 6-26	0% 10% 6% 10% 67% 23%
Mop termites with back hand (Mop)	Use the hair on the back of the hand to touch the termites on the ground for them to attach and they eat them.	Can be done for termites on the ground but also when running on the mound	Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 0-10 1-18 0-29 0-3 0-26	0% 0% 6% 0% 0% 0%
Both hands extract stick from mound (Stick 2h)	Use both hands alternatively to pull the stick out of the mound with termites biting on it		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 2-10 16-18 3-29 0-3 1-26	0% 20% 89% 10% 0% 4%

The forearm helps the hand to eat from stick (Forearm)	The forearm upspine is following the movement of the stick to the mouth to catch termites that would release their grip		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 0-10 0-15 21-29 0-3 0-26	0% 0% 0% 72% 0% 0%
One hand takes termites from stick (Hand takes)	Use the free hand to pull the termites away from the stick and bring them to the mouth with this hand		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 0-10 11-18 0-29 0-3 0-26	0% 0% 61% 0% 0% 12%
One hand brings the stick to the mouth (Stick 1h)	The fishing hand alone brings the extremity of the stick with the termites directly in the mouth		Gombe Kayan (15-17) Goualougo (14-21) Issa (20-34) Bafing (2-7) Dindefelo (38-39)	(-) 6-10 0-18 2-29 1-3 19-26	0% 60% 0% 7% 33% 73%

Supplementary Table 2: Ethogram of underground termite fishing with the technical elements

observed in six chimpanzee communities. The third column “Variations” lists variations found within each element. In the column “Community”, we present the number of different independent video sequences obtained for each community (a sequence representing all the consecutive one-minute videos filmed from an individual at one location the same day) and the number of reliably identified unique individuals performing the behaviour. Thereby, we control for both identical individuals being captured on different days or at different termite mounds, as well as for instances when more than one individual was fishing in a given sequence). The “Sample size” column indicates the number of sequences where the element was present and the number of sequences where visibility permitted observations. The column “% of individuals performing” provides the percentage of unique individuals seen to perform the technical element of all unique individuals recorded.

Technical element (N=21)	Definition	Variations	Community (N= # sequences - # diff. individuals)	Sample size (# sequences positive - # sequences visible)	% of individuals performing technical element
Tap ground with stick (Tap)	Tap the ground with the end of the thick stick held vertically in one hand at different locations above the mound before attempting to perforate	(seem to be judging about a sound or a physical information)	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-20 12-54 10-17 2-6 0-11 3-15	0% 22% 59% 33% 0% 20%
Perforate with 2 hands + foot (Perfore 2h)	Hold the thick stick with both hands and one foot to forcefully push the stick into the soil above the termite mound to find a fishing spot	* Goualougo place the foot above both hands, * La Belgique place the foot between the two hands	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	14-20 2-46 1-17 0-5 0-11 1-16	70% 4% 6% 0% 0% 6%
Perforate with 1 hand + foot (Perfore 1h)	Hold the thick stick with one hand and one foot to perforate the soil above the termite mound		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	6-20 43-46 14-17 5-5 11-11 15-16	30% 93% 82% 100% 100% 94%
Use long stick (Long stick)	Use thick sticks of about 1m long to perforate into the mound		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	19-20 1-47 0-17 0-5 13-13 0-18	95% 2% 0% 0% 100% 0%
Lean on elbow (Lean elbow)	Lean on the elbow placed bent on the ground and use the other hand to insert and extract the thin stick from the termite mound		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-23 32-32 0-12 0-6 0-10 0-18	0% 100% 0% 0% 0% 0%

Lay on the side (Lay side)	Lay with its whole body completely on one side with the shoulder touching the ground to fish	Wonga Wongue start fishing sitting and once the hole proves productive will they lay completely on the ground.	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-23 0-32 0-12 0-6 7-10 0-18	0% 0% 0% 0% 70%* 0%
Sit when fish (Sit)	Remain in a sitting position during the fishing for termites and directly fishes without leaning nor support itself to substrate		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	23-23 0-32 12-12 5-6 3-10 18-18	100% 0% 100% 83% 30%* 100%
Pull through teeth to make a brush (Short brush)	Pulls sideways one end of the thin stick through teeth pressed together one or more times to produce a more brushy end	Pulling can be done with one or both hands holding the stick	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	11-22 3-28 0-11 1-4 0-8 0-13	50% 11% 0% 25% 0% 0%
Open fibers to make long brush (Long brush)	Makes a long brush by first biting into the stick to separate the end of the stick into 2 to 4 main fibers and then pull through the teeth a few times to obtain a very long brush.	Cutting the end of the stick in different number of fibers, from 2 to 5.	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 0-28 11-11 3-4 0-10 8-13	0% 0% 100% 75% 0% 61%
Peel the bark from stick (Peel)	Carefully strips the bark away from the thick stick on all sides with the teeth	Sometimes seem to do this after the stick did not perforate very deep into the ground.	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 0-28 2-11 1-4 0-10 0-13	0% 0% 18% 25% 0% 0%
Shake the stick inserted with lips (Lip shake)	Once the stick is inserted with one hand, bends down to push it or shake it with the lips before taking it out with hands.		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 26-26 0-9 0-5 0-10 0-14	0% 100% 0% 0% 0% 0%
Insert stick near elbow (Near elbow)	Insert and extract thin stick close above the elbow (either so that termites fall on forearm and can be eaten directly, or so that individual can bend down more easily to shake with mouth)	Visibility is an issue here to see exactly what is done.	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 25-25 0-9 0-5 7-10 0-14	0% 100% 0% 0% 70% 0%
Insert stick with both hands (Insert 2h)	Insert and extract thin stick with both hands alternatively one after the other to ensure the bending brushy end of the stick is straighten before insertion.	With rigid sticks, possibly in part due to the length of the stick	Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	13-22 0-25 0-9 2-5 0-10 14-14	59% 0% 0% 40% 0% 100%
Support with 2nd hand to eat (Support 2h)	Support the stick with 2nd hand palm up towards the stick to catch and to eat termites		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	20-22 0-25 1-9 5-5 2-9 5-13	91% 0% 11% 100% 22% 38%
Sidewrist supports stick to eat (Sidewrist)	Place wrist/forearm of free hand under the thin stick when inserting and pulling out of the holes, the wrist gains an earth color with time		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 0-25 0-9 0-5 0-9 6-13	0% 0% 0% 0% 0% 46%

Eat termites on support wrist (Wrist eat)	Eat termites on the wrist and forearm of the supporting arm directly brought to the mouth.		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 0-25 9-9 0-5 0-9 1-13	0% 0% 100% 0% 0% 8%
Move head towards supported stick (Head stick)	Move the head forward to eat the termites from the stick supported by the 2nd hand		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-21 0-26 0-9 5-5 6-8 0-13	0% 0% 0% 100% 75% 0%
Move head to eat from stick (Head eat)	Move the head forward to eat the termites directly from the stick with the lips		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-21 26-26 0-9 5-5 6-8 0-13	0% 100% 0% 100% 75% 0%
Mop termite with back hand (Mop)	Uses the hair on the back of the hand to collect termites running on the ground around the hole after extraction of the stick		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 7-25 0-9 0-7 1-9 0-13	0% 28% 0% 0% 11% 0%
Share stick with offspring (Share)	Shares the tool for juv/inf to sniff the end of tool only		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-5 2-6 0-9 0-7 2-2 2-3	0% 33% 0% 0% 100% 67%
Leave stick inserted (Leave)	Leave thin stick inserted for 20" or more before pulling out		Goualougo (18-19) Korup (43-57) La Belgique (15-17) Campo Maan (6-11) Wonga Wongue (9-15) Mt Cristal (17-12)	0-22 1-25 0-9 0-5 0-9 0-13	0% 4% 0% 0% 0% 0%

Supplementary Table 3: List of the technical elements seen used by chimpanzees for termite fishing and their potential physical constraints, either social or ecology, with the justification and potential alternatives seen used by chimpanzees. Technical elements are inferred to be social when alternative technical elements were present and were not constrained by termite nest morphology. Elements related to the same technical aspects of the termite fishing behaviour are grouped together in numbered technical element group.

Fishing technique	Technical element	Constraint	Physical constraint	Justification	Alternative (s)	Technical element group
aerial	Rigid	Ecology	Nest structure	Physical		1
aerial	Soft	Ecology	Nest structure	Physical		1
aerial	Insert 2h	Social	No	Alternative	Insert 1h	2
aerial	Insert 1h	Social	No	Alternative	Insert 2h	2
aerial	Shake u-d	Social	No	Alternative	Shake u-d	3
aerial	Shake	Social	No	Alternative	Shake	3
aerial	Lean elbow	Social	No	Alternative	Sit	4
aerial	Sit	Social	No	Alternative	Lean	4
aerial	Bite	Social	No	Alternative	Brush, nothing	5
aerial	Brush	Social	No	Alternative	Bite, nothing	5
aerial	Stick 2h	Social	No	Alternative	One hand	6
aerial	Stick 1h	Social	No	Alternative	Stick 2h	6
aerial	Wrist help	Social	No	Alternative	Both hand, No support	6
aerial	Hand takes	Social	No	Alternative	with mouth	6
aerial	Forearm	Social	No	Alternative	Wrist help, Hand	6
aerial	Mop	Social	No	Alternative	Mouth or fingers direct	6
aerial	Scratch	Ecology	Access entrance	No alternative		
underground	Perfore 1h	Ecology	Deepness nest	No alternative		7
underground	Perfore 2h	Ecology	Deepness nest	No alternative		7
underground	Sit	Social	No	Alternative	Lay, lean	8
underground	Lay Side	Social	No	Alternative	Sit, lean	8
underground	Lean Elbow	Social	No	Alternative	Sit, lay	8
underground	Long brush	Social	No	Alternative	Short brush, no brush	9
underground	Short brush	Social	No	Alternative	Long brush, no brush	9
underground	Peel	Social	No	Alternative	Short brush, no brush	9
underground	Near elbow	Social	No	Dependent	Goes with Lean on elbow	10
underground	Insert 2h	Social	No	Alternative	One hand	10
underground	Wrist eat	Social	No	Alternative	Head eat, head stick	11
underground	Head eat	Social	No	Alternative	Wrist eat, head stick	11
underground	Head stick	Social	No	Alternative	Wrist eat, head eat	11
underground	Sidewrist	Social	No	Alternative	Support 2h	11
underground	Support 2h	Social	No	Alternative	Sidewrist	11
underground	Mop	Social	No	Alternative	With fingers	
underground	Leave	Social	No	Alternative	No leave	
underground	Lip shake	Social	No	Alternative	No shake	
underground	Tap	Ecology	Deepness nest	No alternative		
underground	Long stick	Ecology	Deepness nest	Dependent	Goes with Perfore 2h	
underground	Share	Demography	offspring present			

Supplementary Table 4: Results of the Cohen’s Kappa test for behaviour elements concerning the behaviour, body parts active, the body parts supporting, and the wrist position (Supplementary Table 1 and 2). Missed behaviour elements were either counted as a mismatch under “Yes”, or were excluded under “No” (see method text).

what	Missed elements (Yes/No)	n	kappa	z	p
behaviour	yes	169	0.818	43.098	0.000
behaviour	no	162	0.855	42.601	0.000
body_part	yes	165	0.862	21.017	0.000
body_part	no	159	0.905	20.650	0.000
supporting_body_part	yes	42	0.762	7.341	0.000
supporting_body_part	no	38	1.000	7.662	0.000
body_part_sbp	yes	41	0.732	5.916	0.000
body_part_sbp	no	37	1.000	6.083	0.000
wrist_position	yes	34	0.440	3.341	0.001
wrist_position	no	30	0.636	3.742	0.000

Supplementary Table 5: Result of the one-tailed binomial test at the element level (see method text).

Behaviour element	Misses included	behaviour code	both	CB	SP	n	p	%
Arrive with tool	yes	31	4	10	4	169	0.000	0.400
Arrive with tool	no	31	4	4	4	162	0.000	1.000
Take tool from ground	yes	32	8	9	8	169	0.000	0.889
Take tool from ground	no	32	8	8	8	162	0.000	1.000
Stamp ground	yes	41	10	10	10	169	0.000	1.000
Stamp ground	no	41	10	10	10	162	0.000	1.000
Perforation: perforate	yes	42	9	9	9	169	0.000	1.000
Perforation: perforate	no	42	9	9	9	162	0.000	1.000
Perforation: moves up-down stick	yes	45	10	10	10	169	0.000	1.000
Perforation: moves up-down stick	no	45	10	10	10	162	0.000	1.000
Tool modification: open up fibers	yes	51	8	9	8	169	0.000	0.889
Tool modification: open up fibers	no	51	8	9	8	162	0.000	0.889
Tool modification: pull through mouth	yes	52	7	8	7	169	0.000	0.875
Tool modification: pull through mouth	no	52	7	8	7	162	0.000	0.875
Tool modification: bite the end part	yes	54	9	10	9	169	0.000	0.900
Tool modification: bite the end part	no	54	9	10	9	162	0.000	0.900
Fishing with head movement	yes	56	10	10	10	169	0.000	1.000
Fishing with head movement	no	56	10	10	10	162	0.000	1.000
Fishing: insert	yes	61	15	15	30	169	0.000	1.000
Fishing: insert	no	61	15	15	30	162	0.000	1.000
Fishing: shake stick laterally	yes	62	5	13	5	169	0.000	0.385
Fishing: shake stick laterally	no	62	5	13	5	162	0.000	0.385
Fishing: clean tool	yes	65	11	11	12	169	0.000	1.000
Fishing: clean tool	no	65	11	11	12	162	0.000	1.000
Bring fibers together before insert	yes	66	10	11	10	169	0.000	0.909
Bring fibers together before insert	no	66	10	11	10	162	0.000	0.909

Fishing: shake laterally with mouth	yes	67	9	9	12	169	0.000	1.000
Fishing: shake laterally with mouth	no	67	9	9	12	162	0.000	1.000
Fishing: shake vertically with mouth	yes	68	7	10	7	169	0.000	0.700
Fishing: shake vertically with mouth	no	68	7	10	7	162	0.000	0.700
Eat: mop termite from ground	yes	73	7	7	7	169	0.000	1.000
Eat: mop termite from ground	no	73	7	7	7	162	0.000	1.000
Eat: mop termite from mound	yes	74	1	1	1	169	0.000	1.000
Eat: mop termite from mound	no	74	1	1	1	162	0.000	1.000
hand	yes	112	60	65	63	165	0.000	0.923
hand	no	112	60	64	63	159	0.000	0.938
hand	yes	112	1	1	1	42	0.000	1.000
hand	no	112	1	1	1	38	0.000	1.000
hand	yes	112	7	7	7	41	0.000	1.000
hand	no	112	7	7	7	37	0.000	1.000
both hands	yes	113	27	30	32	165	0.000	0.900
both hands	no	113	27	30	32	159	0.000	0.900
one hand + foot	yes	114	7	7	7	165	0.000	1.000
one hand + foot	no	114	7	7	7	159	0.000	1.000
both hands + foot	yes	115	4	4	4	165	0.000	1.000
both hands + foot	no	115	4	4	4	159	0.000	1.000
hand, second after mouth	yes	116	39	42	40	165	0.000	0.929
hand, second after mouth	no	116	39	42	40	159	0.000	0.929
mouth	yes	117	5	11	5	165	0.000	0.455
mouth	no	117	5	6	5	159	0.000	0.833
wrist	yes	123	4	4	4	165	0.000	1.000
wrist	no	123	4	4	4	159	0.000	1.000
wrist	yes	123	30	34	30	41	0.033	0.882
wrist	no	123	30	30	30	37	0.013	1.000
wrist and forearm	yes	124	1	1	1	165	0.000	1.000
wrist and forearm	no	124	1	1	1	159	0.000	1.000
palm up	yes	145	5	9	5	34	0.002	0.556
palm up	no	145	5	9	5	30	0.003	0.556
angled	yes	147	21	25	25	34	0.141	0.840

angled	no	147	21	21	25	30	0.067	1.000
follow the tool mvt with 2nd body part	yes	152	30	34	30	42	0.024	0.882
follow the tool mvt with 2nd body part	no	152	30	30	30	38	0.009	1.000
perforation: amplify by grabbing	yes	154	1	1	1	165	0.000	1.000
perforation: amplify by grabbing	no	154	1	1	1	159	0.000	1.000
perforation: amplify by grabbing	yes	154	1	1	1	42	0.000	1.000
perforation: amplify by grabbing	no	154	1	1	1	38	0.000	1.000
perforation: support body weight	yes	155	6	6	6	42	0.000	1.000
perforation: support body weight	no	155	6	6	6	38	0.000	1.000