

Table S1. The effects of preceding and following note types on click probability in note sequences of the songs of each subject. **(A)** To test if the male Java sparrow produced bill-clicks before or after particular note types, we fitted the data with logistic regression models, in which the dependent variable was whether or not each transition involved clicks and the explanatory variables were preceding and following note types of the transition (referred to as pre and post note types). The statistical significance of the effects of pre- and post-note types were derived from a log-likelihood ratio test comparing the full model (pre and post) with two models that dropped one of the terms (either pre or post) from the full model. **(B)** We also applied the above analyses to the latter half of note sequences of songs, given the possible confounding effect of note orders (i.e., bill clicks and particular notes tended to be produced in earlier part of songs). In these models, the dependent variable was whether or not each transition involved clicks and the explanatory variables were preceding and following note types of the transition, and note orders. Due to the fact that some birds produced bill clicks only in earlier parts of songs, subject birds were limited compared with (A). **(C)** Comparisons of bill-click syntax between the first and last halves are shown for the songs analyzed in (B)

(A) Whole note sequences of songs

Song		Note	Analysed	Pre note type		Post note type		
family	ID	repertoire	songs	χ^2	p	χ^2	p	
A	js0002	Father	5	n = 20	74.40	< 0.0001	21.93	< 0.0001
A	js0048	Foster son	5	n = 20	22.29	< 0.0001	3.96	0.161
B	js0003	Father	7	n = 20	68.04	< 0.0001	25.88	< 0.0001
B	js0042	Son	7	n = 20	25.26	< 0.0001	3.47	0.435
B	js0044	Foster son	7	n = 20	9.03	0.012	11.26	0.002
D	js0016	Father	6	n = 16	17.65	< 0.0001	33.09	< 0.0001
D	js0069	Son	6	n = 20	20.72	< 0.0001	78.92	< 0.0001
E	js0023	Father	6	n = 20	5.13	0.114	18.14	< 0.0001
E	js0051	Foster son	6	n = 18	40.66	< 0.0001	34.13	< 0.0001
G	js0037	Father	5	n = 18	25.40	< 0.0001	14.32	< 0.0001
G	js0052	Son	5	n = 20	21.60	< 0.0001	11.55	< 0.0004
B2	js0041	Father	6	n = 16	27.67	< 0.0001	7.44	0.021
B2	js0087	Son	6	n = 20	47.33	< 0.0001	14.60	< 0.0001
Untutored	prpl045		11	n = 20	24.32	< 0.0001	21.56	< 0.0001
Untutored	Ltgr142		7	n = 18	9.00	0.012	26.60	< 0.0001
Untutored	Ltgr073		5	n = 20	0.19	0.984	70.68	< 0.0001
Untutored	Ltgr031		10	n = 20	44.92	< 0.0001	51.34	< 0.0001
Untutored	Ltgr047		8	n = 20	23.77	< 0.0001	11.90	< 0.003

(B) Latter half note sequences of songs

Song			Pre note type		Post note type		Order	
family	ID		χ^2	p	χ^2	p	χ^2	p
A	js0002	Father	39.88	< 0.0001	9.75	0.0006	1.23	0.134
B	js0044	Foster son	10.45	0.002	8.46	0.018	0.33	0.417
E	js0051	Foster son	8.73	0.002	13.29	< 0.0001	0.22	0.510
B2	js0087	Son	18.50	< 0.0001	9.78	0.003	1.75	0.062
Untutored	prpl045		13.45	0.003	5.52	0.440	0.81	0.203
Untutored	Ltgr142		23.92	< 0.0001	18.33	< 0.0001	1.61	0.073
Untutored	Ltgr073		0.29	0.900	26.33	< 0.0001	4.39	0.036
Untutored	Ltgr031		23.59	< 0.0001	9.38	0.016	7.29	0.007

(C) Comparisons of bill-click syntax between the first and last halves of the songs analyzed in (B)

JS0002						
Pre note type	First half			Second half		
	n	click		n	click	
start	50%	20	10	-	-	-
a	46%	83	38	47%	100	47
b	0%	28	0	2%	44	1
c	8%	105	8	1%	87	1
d	0%	4	0	0%	11	0
e	93%	14	13	-	0	0
Post note type						
a	47%	92	43	32%	91	29
b	3%	33	1	3%	39	1
c	15%	110	17	20%	82	16
d	0%	5	0	0%	10	0
e	57%	14	8	-	0	0
end	-	-	-	15%	20	3

JS0044						
Pre note type	First half			Second half		
	n	click		n	click	
start	10%	20	2	-	-	-
a	17%	111	19	9%	35	3
b	6%	109	6	2%	81	2
c	10%	82	8	0%	23	0
d	0%	6	0	17%	29	5
e	7%	15	1	18%	50	9
f	7%	15	1	3%	92	3
g	17%	12	2	19%	48	9
post note type						
a	19%	115	22	16%	31	5
b	8%	116	9	4%	74	3
c	6%	86	5	0%	19	0
d	0%	10	0	0%	25	0
e	7%	15	1	8%	50	4
f	7%	15	1	13%	92	12
g	8%	13	1	15%	47	7
end	-	-	-	0%	20	0

JS0051						
Pre note type	First half			Second half		
	n	click		n	click	
start	0%	18	0	-	-	-
a	42%	74	31	-	0	0
b	22%	67	15	7%	55	4
c	1%	184	1	4%	190	8
d	0%	6	0	0%	38	0
e	-	0	0	0%	21	0
f	-	0	0	5%	37	2
post note type						
a	42%	74	31	-	0	0
b	12%	67	8	4%	55	2
c	4%	198	7	2%	176	4
d	0%	8	0	6%	36	2
e	50%	2	1	26%	19	5
f	-	0	0	3%	37	1
end	-	-	-	0%	18	0

JS0087						
Pre note type	First half			Second half		
	n	click		n	click	
start	65%	20	13	-	-	-
a	25%	75	19	16%	62	10
b	0%	77	0	2%	58	1
c	52%	52	27	56%	9	5
d	60%	20	12	23%	13	3
f	0%	37	0	0%	86	0
g	0%	6	0	0%	60	0
Post note type						
a	35%	82	29	11%	55	6
b	51%	81	41	13%	54	7
c	2%	53	1	0%	8	0
d	0%	20	0	0%	13	0
f	0%	42	0	0%	81	0
g	0%	9	0	2%	57	1
end	-	-	-	25%	20	5

prpl045						
Pre note type	First half			Second half		
	n	click		n	click	
start	15%	20	3	-	-	-
a	0%	7	0	0%	2	0
b	1%	77	1	0%	4	0
c	18%	74	13	0%	3	0
d	0%	4	0	0%	13	0
e	0%	11	0	4%	54	2
f	0%	35	0	2%	47	1
g	0%	4	0	0%	12	0
h	60%	5	3	53%	36	19
i	50%	12	6	10%	51	5
j	54%	24	13	38%	24	9
k	-	0	0	0%	18	0
Post note type						
a	29%	7	2	0%	2	0
b	5%	77	4	0%	4	0
c	11%	75	8	0%	2	0
d	0%	4	0	0%	13	0
e	0%	15	0	2%	50	1
f	0%	44	0	3%	38	1
g	0%	5	0	0%	11	0
h	40%	5	2	14%	36	5
i	33%	15	5	29%	48	14
j	69%	26	18	50%	22	11
k	-	0	0	0%	18	0
end	-	-	-	20%	20	4

Ltgr142						
Pre note type	First half			Second half		
	n	click		n	click	
start	33%	18	6	-	-	-
a	20%	5	1	0%	4	0
b	50%	44	22	64%	56	36
c	20%	15	3	19%	37	7
e	100%	1	1	50%	8	4
f	89%	9	8	52%	23	12
g	8%	13	1	-	0	0
h	19%	58	11	4%	23	1
Post note type						
a	33%	6	2	0%	3	0
b	52%	50	26	56%	50	28
c	74%	19	14	61%	33	20
e	100%	2	2	57%	7	4
f	0%	9	0	0%	23	0
g	0%	13	0	-	0	0
h	14%	64	9	6%	17	1
end	-	-	-	39%	18	7

Ltgr073						
Pre note type	First half			Second half		
	n	click		n	click	
start	95%	20	19	-	-	-
a	0%	62	0	0%	33	0
b	40%	63	25	36%	53	19
c	93%	28	26	83%	36	30
d	0%	6	0	0%	15	0
e	67%	3	2	80%	35	28
Post note type						
a	94%	65	61	93%	30	28
b	0%	68	0	0%	48	0
c	0%	36	0	0%	28	0
d	89%	9	8	100%	12	12
e	75%	4	3	88%	34	30
end	-	-	-	35%	20	7

Ltgr031						
Pre note type	First half			Second half		
	n	click		n	click	
start	70%	20	14	-	-	-
a	47%	47	22	28%	46	13
b	83%	42	35	-	0	0
c	0%	61	0	0%	14	0
d	28%	58	16	21%	43	9
e	21%	29	6	0%	13	0
f	47%	15	7	15%	41	6
g	0%	12	0	0%	26	0
h	43%	7	3	0%	14	0
i	-	0	0	0%	26	0
j	0%	1	0	0%	61	0
Post note type						
a	31%	48	15	13%	45	6
b	100%	42	42	-	0	0
c	47%	62	29	0%	13	0
d	0%	61	0	0%	40	0
e	10%	29	3	8%	13	1
f	32%	19	6	8%	37	3
g	42%	19	8	0%	19	0
h	0%	10	0	0%	11	0
i	-	0	0	4%	26	1
j	0%	2	0	13%	60	8
end	-	-	-	45%	20	9