

Appendix

Logger implantation procedure

Meerkats were caught by the base of their tails and placed into a sterilised pillow case. They were then anaesthetised using 4% isoflurane-oxygen mix administered through a gas mask with a portable vaporiser using equipment on the back of a car parked 100-200m from the group. Once fully sedated, isoflurane was turned down to 1-2% and pain relief was subcutaneously administered (Metacam, 5mg/ml: 0.06ml). Temperature and breathing were assessed throughout the procedure to monitor the wellbeing of the individual. When necessary, heat or cool packs were used to maintain a safe body temperature. The meerkats chest was cleaned and sterilised using F10 and a sterile sheet was placed over the animal. We implanted the logger subcutaneously by making a small incision (~1cm) in the skin just below the sternum and sliding the logger in. The incision was then closed with intradermal sutures. We subcutaneously administered 5ml of Ringer's lactate intravenous solution to replenish fluids and electrolytes, and 0.3ml of Baytril antibiotic (5%) to reduce risk of infection to the incision wound. Some of the meerkats experienced a reaction to the Baytril antibiotics, developing a plaque at the site of injection, so we stopped administering the antibiotics with no adverse effects or signs of infection during healing. Individuals were also fitted with a custom-built VHF radio collar (info) for tracking. We then placed the meerkat in a dark box to recover, and once fully awake with full locomotory ability, released them back to their group. We monitored the individual closely for at least three hours post-surgery and checked again in the evening and every morning for the next three days. Generally, individuals resumed normal foraging behaviour within an hour after being released. After 30 days the loggers were removed using the same capture and anaesthesia protocol. We made a small incision by the end of the logger (~1cm) to slide the logger out and then closing the incision with external sutures.

Table A1 – Descriptions and definitions of the acoustic parameters extracted and analysed.

Extracted parameter	Units	Definition
sound_duration	(s)	Duration of a single call
f0_frames		Number of frames with F0
Mean_F0	(Hz)	Mean F0
SD_F0	(Hz)	Standard deviation of F0 points
F0_start	(Hz)	First F0 point (at the start of the call)
F0_end	(Hz)	Last F0 point (at the end of the call)
F0_tips	(Hz)	Difference between F0 at the start and end of the call (F0_Start – F0_End)
Max_F0	(Hz)	Maximum F0
Time_MaxF0	(s)	Time when Max_F0 occurs
RelDistMaxF0	%	Percentage of time through the call duration when Max_F0 occurs
Min_F0	(Hz)	Minimum F0
F0_Diff	(Hz)	Difference between maximum and minimum F0 (Max_F0 – Min_F0)

F0_abs_slope	(Hz/s)	Mean absolute slope of F0. Measure of average local variability of F0, i.e. frequency difference between F0 points; higher values indicate higher average frequency difference between points
F0_CV		Coefficients of F0 variation (F0_SD/F0_Mean)
infl_asc	(inflections/s)	Number of ascending inflection F0 points
infl_desc	(inflections/s)	Number of descending inflection F0 points
inflex		Number of ascending and descending F0 points divided by call duration ((infl_asc+infl_desc)/sound_duration); larger values indicate larger F0 variation across the call
sumvar	(Hz/s)	Absolute value of the sum of the difference between consecutive F0 points
variationtot	(Hz/s)	Sum of absolute difference in consecutive F0 points
Time_of_max_intensity	(s)	Time when maximum amplitude occurs
Time_of_max_intensity%	%	Percentage of time in call duration when maximum amplitude occurs
Q25_all	(Hz)	25% quantile of energy over the whole call. Measured from power spectrum, i.e. frequency below which 25% of energy found below this frequency point
Q50_all	(Hz)	Same as above, but for 50%
Fpeak_all	(Hz)	Peak frequency (frequency with the strongest amplitude) over the whole call, i.e. dominant frequency
Q25_maxAMP	(Hz)	25% quantile of energy at the point of maximum amplitude (0.01 s slice around maxAmp point)
Q50_maxAMP	(Hz)	Same as above but for 50%
harm	(dB)	Degree of acoustic periodicity, i.e. Harmonics to Noise Ratio; higher values indicate more harmonic (tonal), less noisy calls
jitter	%	Average absolute difference between the frequency of consecutive periods, divided by the average period, i.e. cycle to cycle variation in the frequency of F0
shimmer	%	Average absolute difference between the amplitude of consecutive periods, divided by average period, i.e. cycle to cycle variation in the amplitude of F0

Table A2 – Counts of the number of calls analysed per individual, per day, and per treatment for each call type (CC – close call, CCPV – post-vigilance close call, MoveLead – move/lead call, SenShort – short-note sentinel call, SenLong – long-note sentinel call).

Individual	Day	Treatment	CC	CCPV	MoveLead	SenShort	SenLong
VECM013	Before	CORT	19	9	9	3	10
VECM013	Before	CTRL	20	9	3	NA	5
VECM013	On	CORT	21	9	9	NA	NA
VECM013	On	CTRL	19	9	14	NA	2
VECM016	Before	CORT	20	10	NA	7	5
VECM016	Before	CTRL	18	10	2	20	10
VECM016	On	CORT	20	10	13	14	10
VECM016	On	CTRL	20	10	5	17	10
VJXM137	Before	CORT	19	4	NA	NA	NA
VJXM137	Before	CTRL	20	5	NA	NA	NA
VJXM137	On	CORT	20	7	NA	NA	NA
VJXM137	On	CTRL	20	9	NA	NA	NA
VJXM138	Before	CORT	19	4	4	5	NA
VJXM138	Before	CTRL	20	10	11	10	3
VJXM138	On	CORT	19	3	13	9	10
VJXM138	On	CTRL	19	7	NA	20	4
VL244	Before	CORT	3	NA	11	7	NA
VL244	Before	CTRL	5	NA	NA	10	5
VL246	Before	CORT	4	NA	2	NA	2
VL246	Before	CTRL	6	NA	5	NA	NA
VMPM034	Before	CORT	5	NA	2	NA	6
VMPM034	On	CORT	13	NA	NA	NA	10
VMPM036	Before	CORT	19	5	NA	NA	NA
VMPM036	Before	CTRL	20	3	6	19	10
VMPM036	On	CORT	16	4	5	20	NA
VMPM036	On	CTRL	13	3	2	20	10
VUBF023	Before	CORT	20	10	8	NA	NA
VUBF023	Before	CTRL	20	8	NA	19	NA
VUBF023	On	CORT	20	9	4	20	NA
VUBF023	On	CTRL	20	10	3	NA	NA
VUBF026	Before	CORT	20	10	NA	NA	NA
VUBF026	Before	CTRL	20	9	4	6	2
VUBF026	On	CORT	20	10	3	NA	NA
VUBF026	On	CTRL	20	9	NA	20	10
VZUF051	Before	CORT	20	10	NA	14	7
VZUF051	Before	CTRL	20	8	NA	19	10
VZUF051	On	CORT	20	10	8	20	10
VZUF051	On	CTRL	20	8	2	20	10

VZUF052	Before	CORT	20	2	NA	4	NA
VZUF052	Before	CTRL	20	10	4	NA	NA
VZUF052	On	CORT	19	3	NA	NA	NA
VZUF052	On	CTRL	20	3	8	NA	NA

a) *Physiological measurements*

Table A3 – Model summaries for the effect of the interaction between cortisol treatment (cortisol or no cortisol) and behavioural category (Vig – vigilance, DigBH – dig bolthole, Move- move, Groom – groom, Rest – rest) on mean heart rate and standard deviation in heart rate.

term	estimate	std.error	statistic	conf.low	conf.high
Mean heart rate					
(Intercept)	238.300	7.833	30.421	222.95	253.65
TreatmentNoCort	-0.725	8.647	-0.084	-17.67	16.22
BhrVig	-14.251	8.647	-1.648	-31.20	2.70
BhrDigBH	7.308	9.413	0.776	-11.14	25.76
BhrMove	12.450	8.983	1.386	-5.16	30.06
BhrGroom	-0.091	9.405	-0.010	-18.52	18.34
BhrGenRest	-14.587	10.774	-1.354	-35.70	6.53
TreatmentNoCort:BhrVig	2.170	12.229	0.177	-21.80	26.14
TreatmentNoCort:BhrDigBH	-16.241	16.857	-0.963	-49.28	16.80
TreatmentNoCort:BhrMove	-1.766	14.072	-0.125	-29.35	25.82
TreatmentNoCort:BhrGroom	-17.074	13.695	-1.247	-43.92	9.77
TreatmentNoCort:BhrRest	-5.567	14.529	-0.383	-34.04	22.91
Standard deviation heart rate					
(Intercept)	28.757	3.688	7.797	21.53	35.99
TreatmentNoCort	-1.080	5.216	-0.207	-11.30	9.14
BhrDigBH	-3.780	5.216	-0.725	-14.00	6.44
BhrMove	-8.313	5.947	-1.398	-19.97	3.34
BhrGroom	-4.159	7.062	-0.589	-18.00	9.68
BhrGenRest	-11.312	6.388	-1.771	-23.83	1.21
TreatmentNoCort:BhrVig	-13.166	7.062	-1.864	-27.01	0.68
TreatmentNoCort:BhrDigBH	-3.813	7.376	-0.517	-18.27	10.64
TreatmentNoCort:BhrMove	15.863	12.561	1.263	-8.76	40.48
TreatmentNoCort:BhrGroom	6.098	9.523	0.640	-12.57	24.76
TreatmentNoCort:BhrRest	7.260	9.034	0.804	-10.45	24.97
BhrDigBH	0.630	9.987	0.063	-18.95	20.20

Table A4 – Tukey HSD results for the effect of the interaction between cortisol treatment treatment (cortisol or no cortisol) and behavioural category (Vig – vigilance, DigBH – dig bolthole, Move- move, Groom – groom, Rest – rest) on mean heart rate and standard deviation in heart rate.

contrast	Behaviour	estimate	SE	t.ratio	p.value
Mean heart rate					
NoCort - CORT	Forage	-0.725	8.647	-0.084	1.000
NoCort - CORT	Vig	1.445	8.647	0.167	1.000
NoCort - CORT	DigBH	-16.966	14.470	-1.172	0.990
NoCort - CORT	Move	-2.491	11.102	-0.224	1.000
NoCort - CORT	Groom	-17.800	10.620	-1.676	0.874
NoCort - CORT	Rest	-6.292	11.676	-0.539	1.000
Standard deviation in heart rate					
NoCort - CORT	Forage	-1.080	5.216	-0.207	1.000
NoCort - CORT	Vig	-4.893	5.216	-0.938	0.999
NoCort - CORT	DigBH	14.783	11.427	1.294	0.978
NoCort - CORT	Move	5.018	7.967	0.630	1.000
NoCort - CORT	Groom	6.179	7.376	0.838	1.000
NoCort - CORT	Rest	-0.451	8.517	-0.053	1.000

b) *Vigilance behaviour*

Table A5 – Model summary and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the proportion of time spent vigilant over the recording period.

PBtest	term	estimate	std.error	statistic	conf.low	conf.high
stat	404.470 (Intercept)	-1.654	0.222	-7.445	-2.090	-1.219
p.value	<0.001 DayOn	-0.042	0.182	-0.231	-0.399	0.315
	TreatmentCORT	-0.487	0.015	-32.150	-0.517	-0.457
	DayOn:TreatmentCORT	0.417	0.021	20.109	0.376	0.458

Table A6 – Tukey HSD results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the proportion of time spent vigilant over the recording period. Significant p values in bold.

contrast	estimate	std.error	statistic	p.value
On.CTRL - Before.CTRL	-0.042	0.182	-0.231	0.994
Before.CORT - Before.CTRL	-0.487	0.015	-32.150	<0.001
On.CORT - Before.CTRL	-0.112	0.182	-0.615	0.905
Before.CORT - On.CTRL	-0.445	0.182	-2.441	0.045
On.CORT - On.CTRL	-0.070	0.014	-4.953	<0.001
On.CORT - Before.CORT	0.375	0.182	2.057	0.120

c) *Rate of the different call types*

Table A7 – Model summary and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on call rate for the different call types (CC – close call, CCPV – post-vigilance close call, MoveLead – move/lead call, SenSH – short-note sentinel call, SenLO – long-note sentinel call).

		term	estimate	std.error	statistic	conf.low	conf.high
Close call rate							
PBtest		(Intercept)	0.819	0.140	5.856	0.545	1.093
stat	5749.595	DayOn	-0.224	0.086	-2.592	-0.393	-0.055
p.value	<0.001	TreatmentCORT	-0.131	0.070	-1.869	-0.268	0.006
		DayOn:TreatmentCORT	0.231	0.099	2.326	0.036	0.425
Post-vigilance close call rate							
PBtest		(Intercept)	0.110	0.031	3.575	0.050	0.171
stat	2.562	DayOn	-0.026	0.029	-0.891	-0.082	0.031
p.value	0.138	TreatmentCORT	-0.011	0.023	-0.480	-0.055	0.034
		DayOn:TreatmentCORT	0.050	0.032	1.569	-0.013	0.113
Move/Lead call rate							
PBtest		(Intercept)	0.076	0.024	3.214	0.030	0.123
stat	0.814	DayOn	-0.007	0.032	-0.209	-0.070	0.057
p.value	0.404	TreatmentCORT	-0.027	0.030	-0.883	-0.086	0.033
		DayOn:TreatmentCORT	0.037	0.043	0.862	-0.047	0.121
All sentinel call rate							
PBtest		(Intercept)	1.521	0.299	5.080	0.934	2.108
stat	0.583	DayOn	0.120	0.299	0.400	-0.466	0.705
p.value	0.515	TreatmentCORT	-0.788	0.283	-2.783	-1.343	-0.233
		DayOn:TreatmentCORT	0.293	0.401	0.732	-0.492	1.078
Short-note sentinel call rate							
PBtest		(Intercept)	1.349	0.279	4.839	0.803	1.896
stat	1.070	DayOn	0.069	0.283	0.242	-0.486	0.623
p.value	0.359	TreatmentCORT	-0.805	0.265	-3.036	-1.324	-0.285
		DayOn:TreatmentCORT	0.373	0.375	0.996	-0.361	1.108
Long-note sentinel call rate							
PBtest		(Intercept)	0.360	0.115	3.135	0.135	0.586
stat	90.767	DayOn	0.132	0.107	1.227	-0.079	0.342
p.value	0.785	TreatmentCORT	-0.154	0.107	-1.440	-0.365	0.056
		DayOn:TreatmentCORT	-0.040	0.152	-0.263	-0.337	0.257

Table A8 - Tukey HSD results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on close call rate. Significant p values in bold.

contrast	null.value	estimate	std.error	statistic	p.value
On.CTRL - Before.CTRL	0	-0.224	0.086	-2.592	0.046
Before.CORT - Before.CTRL	0	-0.131	0.070	-1.869	0.237
On.CORT - Before.CTRL	0	-0.124	0.086	-1.440	0.468
Before.CORT - On.CTRL	0	0.093	0.086	1.076	0.699
On.CORT - On.CTRL	0	0.100	0.070	1.420	0.481
On.CORT - Before.CORT	0	0.007	0.086	0.075	1.000

d) Acoustic structure of the different call types

Table A9 – Principal component loadings for close call acoustic structure, for PCs with eigenvalue >1. Highest loading parameters in bold.

	PC1	PC2	PC3	PC4	PC5	PC6
Mean_F0	-0.80	-0.31	-0.10	-0.17	0.22	0.10
jitter	0.78	-0.24	0.20	0.09	-0.15	0.02
harm	-0.77	0.20	-0.18	-0.15	0.23	0.06
F0_start	-0.75	-0.28	0.01	-0.45	-0.14	-0.08
Q25._all	-0.68	-0.56	-0.15	0.21	0.04	-0.02
shimmer	0.60	-0.29	0.33	0.03	-0.21	0.21
Fpeak_all	-0.54	-0.43	-0.04	0.01	0.15	0.24
F0_abs_slope	0.52	-0.54	-0.56	-0.23	0.02	-0.03
StDev_F0	0.49	-0.53	-0.37	-0.24	0.06	-0.16
sumvar	0.34	0.12	-0.64	0.07	0.21	-0.42
variationtot	0.33	-0.76	-0.25	-0.22	0.14	0.09
Q50._maxAMP	-0.31	-0.47	-0.06	0.64	-0.29	-0.21
Q50._all	-0.31	-0.44	0.01	0.63	-0.36	-0.27
Time_Max_F0	0.21	-0.14	0.13	0.39	0.62	0.24
f0_tips	-0.15	-0.18	0.30	-0.60	-0.48	-0.29
sound_duration	0.08	-0.48	0.57	-0.12	0.38	-0.28
inflex	0.06	-0.57	0.11	-0.04	-0.21	0.59
Time_of_max_intensity	0.05	-0.33	0.56	-0.04	0.42	-0.40
Standard deviation	2.13	1.77	1.38	1.34	1.21	1.08
Proportion of Variance	0.25	0.17	0.11	0.10	0.08	0.07
Cumulative Proportion	0.25	0.43	0.53	0.63	0.71	0.78

Table A10 - Principal component loadings for post-vigilance close call acoustic structure, for PCs with eigenvalue >1. Highest loading parameters in bold.

	PC1	PC2	PC3	PC4	PC5	PC6
F0_start	-0.83	0.12	0.04	0.19	-0.15	0.34
Max_F0	-0.82	0.24	0.05	0.26	0.02	0.01
Mean_F0	-0.81	-0.33	0.02	0.31	0.03	-0.05
Q25._all	-0.66	-0.20	-0.17	-0.23	0.00	-0.46
Q25._maxAMP	-0.63	-0.01	-0.34	-0.50	-0.08	-0.10
jitter	0.59	0.53	-0.19	-0.12	0.06	-0.11
harm	-0.52	-0.56	0.18	0.29	-0.07	0.06
Fpeak_all	-0.50	-0.02	-0.12	0.06	0.33	-0.39
shimmer	0.46	0.46	-0.37	-0.05	0.12	-0.03
variationtot	-0.43	0.73	0.28	0.23	0.10	-0.07
Q50._maxAMP	-0.42	0.09	-0.46	-0.60	-0.25	0.00
Q50._all	-0.41	0.15	-0.42	-0.55	-0.34	-0.14
Min_F0	-0.40	-0.68	-0.33	0.31	0.10	0.03
f0_tips	-0.34	0.47	-0.07	-0.02	-0.29	0.60
Time_Max_F0	0.34	0.01	-0.37	0.28	0.10	-0.50
StDev_F0	-0.34	0.74	0.36	-0.10	-0.10	-0.06
inflex	-0.33	0.48	-0.28	0.23	0.43	-0.15
F0_abs_slope	-0.29	0.59	0.63	-0.07	0.11	-0.27
infl_asc	-0.20	0.67	-0.45	0.32	0.27	-0.04
Time_of_max_intensity	0.15	0.30	-0.18	0.51	-0.71	-0.22
X.Time_of_max_intensity	0.12	-0.09	0.04	0.41	-0.69	-0.42

sound_duration	0.09	0.62	-0.31	0.21	-0.17	0.22
sumvar	-0.02	0.13	0.67	-0.38	-0.14	-0.32
Standard deviation	2.29	2.08	1.57	1.51	1.33	1.27
Proportion of Variance	0.23	0.19	0.11	0.10	0.08	0.07
Cumulative Proportion	0.23	0.42	0.52	0.62	0.70	0.77

Table A11 – principal component loadings for move/lead call acoustic structure, for PCs with eigenvalue >1. Highest loading parameters in bold.

	PC1	PC2	PC3	PC4	PC5	PC6
Q25._all	-0.72	-0.01	-0.42	0.18	-0.20	-0.19
Q25._maxAMP	-0.66	-0.20	-0.54	-0.01	-0.10	0.17
Mean_F0	-0.66	-0.31	0.20	0.12	0.51	-0.13
infl_asc	0.61	0.00	-0.17	0.68	0.18	0.19
Fpeak_all	-0.60	-0.09	-0.26	0.23	0.35	-0.29
inflex	0.60	-0.12	-0.21	0.23	0.48	0.15
Min_F0	-0.58	0.37	0.25	0.11	0.60	0.00
shimmer	0.57	-0.44	0.03	-0.09	0.55	0.04
jitter	0.52	-0.52	-0.20	-0.11	0.20	-0.20
F0_start	-0.50	-0.54	0.47	0.40	0.15	0.06
harm	-0.47	0.73	0.20	0.24	-0.13	0.05
sumvar	-0.41	-0.45	0.40	-0.27	-0.06	0.08
Q50._maxAMP	-0.40	-0.40	-0.58	0.08	0.05	0.25
Q50._all	-0.38	-0.39	-0.60	0.22	-0.04	-0.01
F0_abs_slope	0.30	-0.77	-0.16	-0.19	-0.17	-0.13
sound_duration	0.30	0.17	-0.07	0.82	-0.25	0.12
StDev_F0	-0.23	-0.72	0.48	0.07	-0.16	-0.03
Time_of_max_intensity	0.22	0.02	0.26	0.55	-0.14	-0.58
Time_Max_F0	0.18	0.12	-0.33	-0.14	0.01	-0.60
f0_Diff	0.02	-0.81	0.22	0.30	-0.36	0.05
Standard deviation	2.16	1.98	1.54	1.46	1.31	1.04
Proportion of Variance	0.23	0.20	0.12	0.11	0.09	0.05
Cumulative Proportion	0.23	0.43	0.55	0.65	0.74	0.79

Table A12 – Principal component loadings for single-note sentinel call acoustic structure, for PCs with eigenvalue >1. Highest loading parameters in bold.

	PC1	PC2	PC3	PC4
StDev_F0	0.78	0.44	0.01	-0.32
harm	-0.75	0.17	0.51	0.10
F0_abs_slope	0.67	0.17	-0.51	-0.24
Mean_F0	-0.63	0.10	-0.41	-0.41
Q25._all	-0.63	0.29	0.00	-0.52
Q50._all	-0.61	0.16	-0.34	-0.60
f0_tips	0.59	0.58	0.38	-0.19
sumvar	0.56	0.61	-0.13	-0.16
shimmer	0.40	-0.42	-0.57	0.06
infl_asc	0.39	-0.71	0.04	-0.31
sound_duration	0.37	-0.27	0.76	-0.23
infl_desc	0.24	-0.76	0.02	-0.39

Time_Max_F0	-0.13	-0.48	-0.04	-0.14
X.Time_of_max_intensity	0.05	-0.11	0.57	-0.46
Standard deviation	2.06	1.94	1.45	1.34
Proportion of Variance	0.24	0.21	0.12	0.10
Cumulative Proportion	0.24	0.45	0.56	0.66

Table A13 – Principal component loadings for long-note sentinel call acoustic structure, for PCs with eigenvalue >1. Highest loading parameters in bold.

	PC1	PC2	PC3	PC4	PC5
Mean_F0	0.86	-0.12	-0.27	-0.26	0.12
Fpeak_all	0.77	-0.17	-0.13	-0.24	0.07
F0_start	0.70	0.25	-0.58	0.04	0.10
Q25._all	0.67	-0.37	0.01	0.08	-0.35
Q50._all	0.64	-0.10	0.16	-0.07	-0.11
StDev_F0	0.58	0.63	-0.12	-0.05	-0.09
Q25._maxAMP	0.58	-0.29	0.26	0.64	0.01
Q50._maxAMP	0.47	-0.20	0.28	0.62	0.12
f0_Diff	0.42	0.77	-0.16	0.14	-0.30
sound_duration	-0.39	0.07	-0.61	0.46	-0.26
F0_abs_slope	0.31	0.84	0.18	0.00	-0.17
Min_F0	0.31	-0.65	-0.42	-0.14	0.43
Time_of_max_intensity	-0.25	0.22	-0.52	-0.44	-0.31
inflex	-0.22	0.51	-0.10	0.45	0.12
sumvar	0.18	-0.09	0.61	-0.41	-0.06
harm	-0.13	-0.79	-0.33	0.10	-0.24
Time_Max_F0	0.08	-0.03	0.36	-0.18	-0.40
shimmer	-0.03	0.55	0.05	-0.08	0.74
Standard deviation	2.06	1.94	1.45	1.34	1.20
Proportion of Variance	0.24	0.21	0.12	0.10	0.08
Cumulative Proportion	0.24	0.45	0.56	0.66	0.74

Close call

Table A14 – Model summaries and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the principal components for PC1-6 for close call acoustic structure.

	term	estimate	std.error	statistic	conf.low	conf.high
PC1						
PBtest	(Intercept)	0.028	0.428	0.065	-0.812	0.867

stat	3.014	DayOn	-0.296	0.232	-1.275	-0.750	0.159
p.value	0.079	TreatmentCORT	-0.008	0.160	-0.048	-0.321	0.306
		DayOn:TreatmentCORT	0.395	0.227	1.739	-0.050	0.841
PC2							
PBtest		(Intercept)	-0.077	0.265	-0.292	-0.60	0.44
stat	0.329	DayOn	0.097	0.249	0.392	-0.39	0.58
p.value	0.542	TreatmentCORT	0.220	0.164	1.337	-0.10	0.54
		DayOn:TreatmentCORT	-0.134	0.233	-0.574	-0.59	0.32
PC3							
PBtest		(Intercept)	-0.247	0.215	-1.151	-0.668	0.174
stat	2.971	DayOn	0.299	0.126	2.373	0.052	0.547
p.value	0.087	TreatmentCORT	0.218	0.121	1.807	-0.018	0.455
		DayOn:TreatmentCORT	-0.298	0.173	-1.726	-0.637	0.040
PC4							
PBtest		(Intercept)	-0.134	0.167	-0.800	-0.461	0.194
stat	0.034	DayOn	0.119	0.134	0.888	-0.144	0.383
p.value	0.850	TreatmentCORT	-0.004	0.131	-0.028	-0.260	0.252
		DayOn:TreatmentCORT	-0.035	0.187	-0.185	-0.401	0.332
PC5							
PBtest		(Intercept)	-0.099	0.184	-0.537	-0.458	0.261
stat	1.940	DayOn	0.053	0.162	0.329	-0.265	0.371
p.value	0.175	TreatmentCORT	-0.230	0.114	-2.021	-0.452	-0.007
		DayOn:TreatmentCORT	0.226	0.162	1.401	-0.090	0.543
PC6							
PBtest		(Intercept)	0.127	0.150	0.846	-0.167	0.420
stat	8.192	DayOn	-0.312	0.168	-1.850	-0.642	0.019
p.value	0.004	TreatmentCORT	-0.166	0.104	-1.592	-0.370	0.038
		DayOn:TreatmentCORT	0.426	0.148	2.875	0.135	0.716

Table A15 – Tukey HSD results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on close call PC6. Significant p values in bold.

contrast	estimate	std.error	statistic	p.value
On.CTRL - Before.CTRL	-0.312	0.168	-1.850	0.235
Before.CORT - Before.CTRL	-0.166	0.104	-1.592	0.364
On.CORT - Before.CTRL	-0.052	0.167	-0.313	0.989
Before.CORT - On.CTRL	0.146	0.168	0.866	0.811
On.CORT - On.CTRL	0.260	0.106	2.440	0.064
On.CORT - Before.CORT	0.114	0.166	0.687	0.895

Post-vigilance close call

Table A16 - Model summaries and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on)

on the principal components for PC1-6 for post-vigilance close call acoustic structure.

		term	estimate	std.error	statistic	conf.low	conf.high
PC1							
PBtest		(Intercept)	-0.098	0.525	-0.187	-1.128	0.931
stat	1.324	DayOn	-0.218	0.462	-0.472	-1.124	0.688
p.value	0.231	TreatmentCORT	-0.208	0.310	-0.674	-0.815	0.398
		DayOn:TreatmentCORT	0.507	0.437	1.160	-0.350	1.364
PC2							
PBtest		(Intercept)	0.279	0.455	0.613	-0.612	1.170
stat	11.105	DayOn	-0.728	0.475	-1.534	-1.658	0.202
p.value	0.001	TreatmentCORT	-0.472	0.285	-1.655	-1.030	0.087
		DayOn:TreatmentCORT	1.361	0.403	3.380	0.572	2.150
PC3							
PBtest		(Intercept)	0.179	0.333	0.539	-0.473	0.832
stat	0.361	DayOn	-0.106	0.248	-0.426	-0.592	0.381
p.value	0.547	TreatmentCORT	-0.311	0.222	-1.404	-0.746	0.123
		DayOn:TreatmentCORT	0.188	0.312	0.603	-0.424	0.801
PC4							
PBtest		(Intercept)	-0.280	0.267	-1.046	-0.803	0.244
stat	0.300	DayOn	0.127	0.267	0.477	-0.397	0.652
p.value	0.564	TreatmentCORT	0.105	0.243	0.433	-0.370	0.580
		DayOn:TreatmentCORT	0.188	0.342	0.549	-0.483	0.858
PC5							
PBtest		(Intercept)	0.102	0.275	0.372	-0.437	0.642
stat	0.013	DayOn	-0.220	0.210	-1.044	-0.632	0.193
p.value	0.911	TreatmentCORT	-0.090	0.208	-0.430	-0.498	0.319
		DayOn:TreatmentCORT	0.033	0.293	0.113	-0.541	0.607
PC6							
PBtest		(Intercept)	0.013	0.208	0.065	-0.393	0.420
stat	0.592	DayOn	-0.180	0.204	-0.883	-0.581	0.220
p.value	0.448	TreatmentCORT	0.193	0.208	0.928	-0.215	0.602
		DayOn:TreatmentCORT	0.226	0.293	0.771	-0.349	0.801

Table A17 – Tukey HSD results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on post-vigilance close call PC2. Significant p values in bold.

contrast	estimate	std.error	statistic	p.value
On.CTRL - Before.CTRL	-0.728	0.475	-1.534	0.395
Before.CORT - Before.CTRL	-0.472	0.285	-1.655	0.327
On.CORT - Before.CTRL	0.162	0.478	0.338	0.985
Before.CORT - On.CTRL	0.256	0.480	0.534	0.947
On.CORT - On.CTRL	0.889	0.286	3.112	0.009
On.CORT - Before.CORT	0.633	0.483	1.310	0.534

Table A18 – Model summaries and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the three top loading parameters for PC2 for post-vigilance close call acoustic structure.

		term	estimate	std.error	statistic	conf.low	conf.high
StDev_F0							
PBTest		(Intercept)	68.878	5.417	12.714	57.845	79.911
stat	3.785	DayOn	3.709	7.645	0.485	-11.867	19.284
p.value	0.065	TreatmentCTRL	7.569	4.781	1.583	-1.845	16.983
		DayOn:TreatmentCTRL	-13.362	6.815	-1.961	-26.781	0.057
Min_F0							
PBTest		(Intercept)	443.005	18.991	23.327	403.974	482.037
stat	9.250	DayOn	-29.906	21.388	-1.398	-73.705	13.894
p.value	0.005	TreatmentCTRL	-37.213	13.641	-2.728	-64.074	-10.353
		DayOn:TreatmentCTRL	59.320	19.292	3.075	21.333	97.308
variationtot							
PBTest		(Intercept)	891.741	154.081	5.787	577.835	1205.647
stat	3.497	DayOn	176.126	192.382	0.916	-225.035	577.287
p.value	0.063	TreatmentCTRL	197.935	118.663	1.668	-35.715	431.584
		DayOn:TreatmentCTRL	-316.351	168.062	-1.882	-647.281	14.580

Table A19 – Tukey HSD results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on post-vigilance close call for the top loading raw acoustic parameters for PC2 (minimum F0) with a significant effect of the interaction between treatment recording. Significant p values in bold.

Contrast	estimate	std.error	statistic	p.value
Min_F0				
On.CORT - Before.CORT	-29.91	21.39	-1.40	0.48
Before.CTRL - Before.CORT	-37.21	13.64	-2.73	0.03
On.CTRL - Before.CORT	-7.80	21.25	-0.37	0.98
Before.CTRL - On.CORT	-7.31	21.13	-0.35	0.98
On.CTRL - On.CORT	22.11	13.70	1.61	0.35
On.CTRL - Before.CTRL	29.41	20.95	1.40	0.48

Move/Lead call

Table A20 – Model summaries and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the principal components for PC1-6 for move/lead call acoustic structure.

		term	estimate	std.error	statistic	conf.low	conf.high
PC1							
PBtest		(Intercept)	-0.136	0.488	-0.279	-1.092	0.820
stat	2.203	DayOn	0.145	0.439	0.331	-0.716	1.006
p.value	0.143	TreatmentCORT	0.855	0.485	1.761	-0.097	1.806

		DayOn:TreatmentCORT	-0.945	0.634	-1.490	-2.188	0.298
PC2							
PBtest		(Intercept)	0.222	0.415	0.536	-0.590	1.035
stat	2.763	DayOn	-0.218	0.570	-0.383	-1.335	0.899
p.value	0.122	TreatmentCORT	-0.854	0.506	-1.686	-1.846	0.138
		DayOn:TreatmentCORT	1.098	0.643	1.709	-0.161	2.358
PC3							
PBtest		(Intercept)	-0.304	0.302	-1.007	-0.896	0.288
stat	0.073	DayOn	0.497	0.420	1.182	-0.327	1.320
p.value	0.796	TreatmentCORT	0.016	0.378	0.043	-0.724	0.757
		DayOn:TreatmentCORT	-0.160	0.478	-0.335	-1.098	0.777
PC4							
PBtest		(Intercept)	-0.060	0.335	-0.180	-0.718	0.597
stat	2.852	DayOn	0.018	0.327	0.056	-0.622	0.659
p.value	0.107	TreatmentCORT	-0.445	0.327	-1.361	-1.085	0.195
		DayOn:TreatmentCORT	0.720	0.424	1.698	-0.111	1.551
PC5							
PBtest		(Intercept)	-0.017	0.312	-0.056	-0.630	0.595
stat	0.139	DayOn	-0.036	0.323	-0.112	-0.669	0.597
p.value	0.707	TreatmentCORT	0.205	0.329	0.623	-0.440	0.850
		DayOn:TreatmentCORT	-0.162	0.427	-0.379	-0.999	0.675
PC6							
PBtest		(Intercept)	0.057	0.181	0.312	-0.299	0.412
stat	0.035	DayOn	-0.022	0.224	-0.098	-0.461	0.417
p.value	0.854	TreatmentCORT	-0.079	0.245	-0.322	-0.560	0.402
		DayOn:TreatmentCORT	-0.062	0.323	-0.190	-0.695	0.572

Single-note sentinel call

Table A21 – Model summaries and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the principal components for PC1-4 for single-note sentinel call acoustic structure.

		term	estimate	std.error	statistic	conf.low	conf.high
PC1							
PBtest		(Intercept)	0.480	0.462	1.038	-0.425	1.385
stat	0.598	DayOn	-0.212	0.287	-0.739	-0.774	0.350
p.value	0.481	TreatmentCORT	-0.263	0.364	-0.723	-0.976	0.450
		DayOn:TreatmentCORT	0.356	0.458	0.778	-0.542	1.254
PC2							
PBtest		(Intercept)	0.166	0.3265	0.5069	-0.4745	0.8055
stat	0.004	DayOn	-0.242	0.243	-0.997	-0.718	0.234
p.value	0.958	TreatmentCORT	-0.259	0.318	-0.813	-0.883	0.365
		DayOn:TreatmentCORT	0.027	0.401	0.068	-0.759	0.813
PC3							

PBtest		(Intercept)	0.202	0.394	0.512	-0.570	0.974
stat	0.073	DayOn	0.383	0.383	1.000	-0.368	1.134
p.value	0.797	TreatmentCORT	-0.369	0.420	-0.879	-1.193	0.454
		DayOn:TreatmentCORT	-0.154	0.549	-0.280	-1.230	0.922
PC4							
PBtest		(Intercept)	0.293	0.293	0.999	-0.281	0.867
stat	0.152	DayOn	-0.167	0.222	-0.751	-0.602	0.268
p.value	0.754	TreatmentCORT	0.038	0.276	0.139	-0.502	0.578
		DayOn:TreatmentCORT	-0.141	0.350	-0.402	-0.826	0.545

Long-note sentinel call

Table A22 – Model summaries and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the principal components for PC1-5 for long-note sentinel call acoustic structure.

		term	estimate	std.error	statistic	conf.low	conf.high
PC1							
PBtest		(Intercept)	-0.425	0.552	-0.770	-1.506	0.656
stat	0.066	DayOn	-0.326	0.390	-0.838	-1.090	0.437
p.value	0.813	TreatmentCORT	0.602	0.409	1.471	-0.200	1.404
		DayOn:TreatmentCORT	-0.143	0.554	-0.258	-1.230	0.943
PC2							
PBtest		(Intercept)	-0.199	0.428	-0.464	-1.038	0.640
stat	11.647	DayOn	0.487	0.483	1.007	-0.460	1.434
p.value	0.001	TreatmentCORT	0.908	0.452	2.011	0.023	1.794
		DayOn:TreatmentCORT	-2.247	0.637	-3.530	-3.495	-1.000
PC3							
PBtest		(Intercept)	0.202	0.394	0.512	-0.570	0.974
stat	0.018	DayOn	0.383	0.383	1.000	-0.368	1.134
p.value	0.905	TreatmentCORT	-0.369	0.420	-0.879	-1.193	0.454
		DayOn:TreatmentCORT	-0.154	0.549	-0.280	-1.230	0.922
PC4							
PBtest		(Intercept)	0.019	0.301	0.062	-0.571	0.608
stat	0.024	DayOn	-0.057	0.280	-0.203	-0.606	0.492
p.value	0.893	TreatmentCORT	0.034	0.303	0.112	-0.560	0.628
		DayOn:TreatmentCORT	0.063	0.409	0.153	-0.739	0.865
PC5							
PBtest		(Intercept)	0.300	0.280	1.072	-0.249	0.849
stat	0.389	DayOn	-0.164	0.332	-0.494	-0.815	0.486
p.value	0.543	TreatmentCORT	-0.213	0.280	-0.760	-0.761	0.336
		DayOn:TreatmentCORT	-0.254	0.405	-0.626	-1.048	0.541

Table A23 – Tukey HSD results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on long-note sentinel calls PC2.

contrast	estimate	std.error	statistic	p.value
On.CORT - Before.CORT	-1.761	0.599	-2.942	0.017

Before.CTRL -					
Before.CORT	-0.908	0.452	-2.011	0.179	
On.CTRL - Before.CORT	-0.422	0.578	-0.730	0.882	
Before.CTRL - On.CORT	0.852	0.537	1.586	0.380	
On.CTRL - On.CORT	1.339	0.482	2.779	0.027	
On.CTRL - Before.CTRL	0.487	0.483	1.007	0.740	

Table A24 – Model summaries and parametric bootstrap results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on the three top loading parameters for PC2 for long-note sentinel calls acoustic structure.

	term	estimate	std.error	statistic	conf.low	conf.high
<i>F0_abs_slope</i>						
PBTest	(Intercept)	4502.391	690.643	6.519	3093.904	5910.877
stat	5.410 DayOn	-1948.279	789.629	-2.467	-3559.606	-336.951
p.value	0.030 TreatmentCTRL	-1266.773	572.731	-2.212	-2397.628	-135.918
	DayOn:TreatmentCTRL	1969.093	814.892	2.416	351.188	3586.998
<i>harm</i>						
PBTest	(Intercept)	14.037	1.400	10.024	11.157	16.916
stat	8.100 DayOn	4.642	1.705	2.723	1.141	8.144
p.value	0.009 TreatmentCTRL	2.143	1.134	1.891	-0.095	4.382
	DayOn:TreatmentCTRL	-5.059	1.663	-3.043	-8.356	-1.762
<i>f0_Diff</i>						
PBTest	(Intercept)	473.850	31.152	15.211	409.216	538.485
stat	11.661 DayOn	-92.475	29.657	-3.118	-153.672	-31.278
p.value	0.003 TreatmentCTRL	-81.216	25.998	-3.124	-132.769	-29.663
	DayOn:TreatmentCTRL	123.698	34.472	3.588	54.675	192.721

Table A25 – Tukey HSD results for the effect of the interaction between treatment (cortisol or control) and recording day (before or on) on long-note sentinel calls for the top loading raw acoustic parameters for PC2 (F0 absolute slope, harmonicity, F0 difference) with a significant effect of the interaction between treatment recording. Significant p values in bold.

Contrast	estimate	std.error	statistic	p.value
<i>F0_abs_slope</i>				
On.CORT - Before.CORT	-1948.28	789.63	-2.47	0.06
Before.CTRL - Before.CORT	-1266.77	572.73	-2.21	0.12
On.CTRL - Before.CORT	-1245.96	764.97	-1.63	0.35
Before.CTRL - On.CORT	681.51	717.78	0.95	0.77
On.CTRL - On.CORT	702.32	633.05	1.11	0.68
On.CTRL - Before.CTRL	20.81	641.99	0.03	1.00
<i>harm</i>				
On.CORT - Before.CORT	4.64	1.71	2.72	0.03
Before.CTRL - Before.CORT	2.14	1.13	1.89	0.22

On.CTRL - Before.CORT	1.73	1.65	1.04	0.71
Before.CTRL - On.CORT	-2.50	1.59	-1.58	0.38
On.CTRL - On.CORT	-2.92	1.33	-2.18	0.12
On.CTRL - Before.CTRL	-0.42	1.43	-0.29	0.99

f0_Diff

On.CORT - Before.CORT	-92.48	29.66	-3.12	0.01
Before.CTRL - Before.CORT	-81.22	26.00	-3.12	0.01
On.CTRL - Before.CORT	-49.99	28.72	-1.74	0.30
Before.CTRL - On.CORT	11.26	24.90	0.45	0.97
On.CTRL - On.CORT	42.48	23.86	1.78	0.28
On.CTRL - Before.CTRL	31.22	22.54	1.38	0.51
