Three-dimensional assessment of hunting strategies in a deep diving predator

Joffrey Jouma'a*, Yves Le Bras, Baptiste Picard, Christophe Guinet

*Corresponding author: joffreyjoumaa@icloud.com

lag of 10 sec

Σ VeDBA (m.s⁻²)	Σ effort (m.s⁻²)	μ speed (m.s⁻¹)	σ²c roll (°)	μc pitch (°)	σ²c heading (°)	PCA rate attempts/min	n
27.68±18.32	23.33±16	1.65±0.36	2.9±0.21	-12.18±3.93	5.82±0.76	0.08±0.69	454
72.19±22.13	67.34±20.59	1.78±0.34	6.24±0.79	51.61±1.77	6.71±0.83	0.05±0.53	127
70.17±26.86	40.77±15.76	1.56±0.29	26.8±1.5	-1.06±3.79	31.27±1.52	1.39±2.92	879

lag of 20 sec

Σ VeDBA (m.s⁻²)	Σ effort (m.s⁻²)	μ speed (m.s⁻¹)	σ²c roll (°)	μc pitch (°)	σ²c heading (°)	PCA rate attempts/min	n
54.77±30.46	45.57±27.76	1.64±0.34	5.06±0.48	-12.04±2.97	9.65±1.03	0.04±0.41	479
132.13±38.83	124.31±33.14	1.76±0.3	8.68±1.04	41.76±1.92	12.56±1.39	0.08±0.48	155
138.15±45.94	80.44±26.03	1.6±0.26	32.49±1.14	-1.47±2.02	37.61±1.08	1.39±2.19	826

lag of 30 sec

Σ VeDBA (m.s⁻²)	Σ effort (m.s⁻²)	μ speed (m.s⁻¹)	σ²c roll (°)	μc pitch (°)	σ²c heading (°)	PCA rate attempts/min	n
76.19±40.89	61.34±35.78	1.63±0.33	5.62±0.43	-14.64±2.09	10.68±0.94	0.08±0.43	411
170.36±59.04	156.29±51.19	1.71±0.29	9.94±0.93	26.22±3.06	15.34±1.34	0.14±0.71	262
199.24±66.04	117.72±37.14	1.62±0.26	32.4±1.08	-2.31±1.65	38.47±0.94	1.3±1.77	787

lag of 40 sec

Σ VeDBA (m.s⁻²)	Σ effort (m.s⁻²)	μ speed (m.s⁻¹)	σ²c roll (°)	μc pitch (°)	σ²c heading (°)	PCA rate attempts/min	n
99±52.31	78.88±45.14	1.62±0.32	5.63±0.37	-15.34±1.82	11.44±0.82	0.11±0.41	375
213.52±77.92	194.15±66.51	1.7±0.29	8.95±0.64	21.24±2.97	15.17±1.05	0.15±0.54	268
250.53±84.13	152.77±48.25	1.63±0.25	30.3±1.06	-2.19±1.56	37.4±0.97	1.19±1.52	817

lag of 50 sec

Σ VeDBA (m.s⁻²)	Σ effort (m.s⁻²)	μ speed (m.s⁻¹)	σ²c roll (°)	μc pitch (°)	σ²c heading (°)	PCA rate attempts/min	n
100.48±53.16	80.79±50.26	1.61±0.33	4.13±0.27	-17.95±1.59	9.79±0.63	0.05±0.25	249
232.03±90.66	204.88±79.9	1.67±0.28	8.86±0.46	9.88±3.04	16.13±0.95	0.2±0.52	397
298.87±99.18	185.37±60.99	1.64±0.25	26.82±0.96	-2.98±1.63	36.32±0.94	1.12±1.29	814

lag of 60 sec

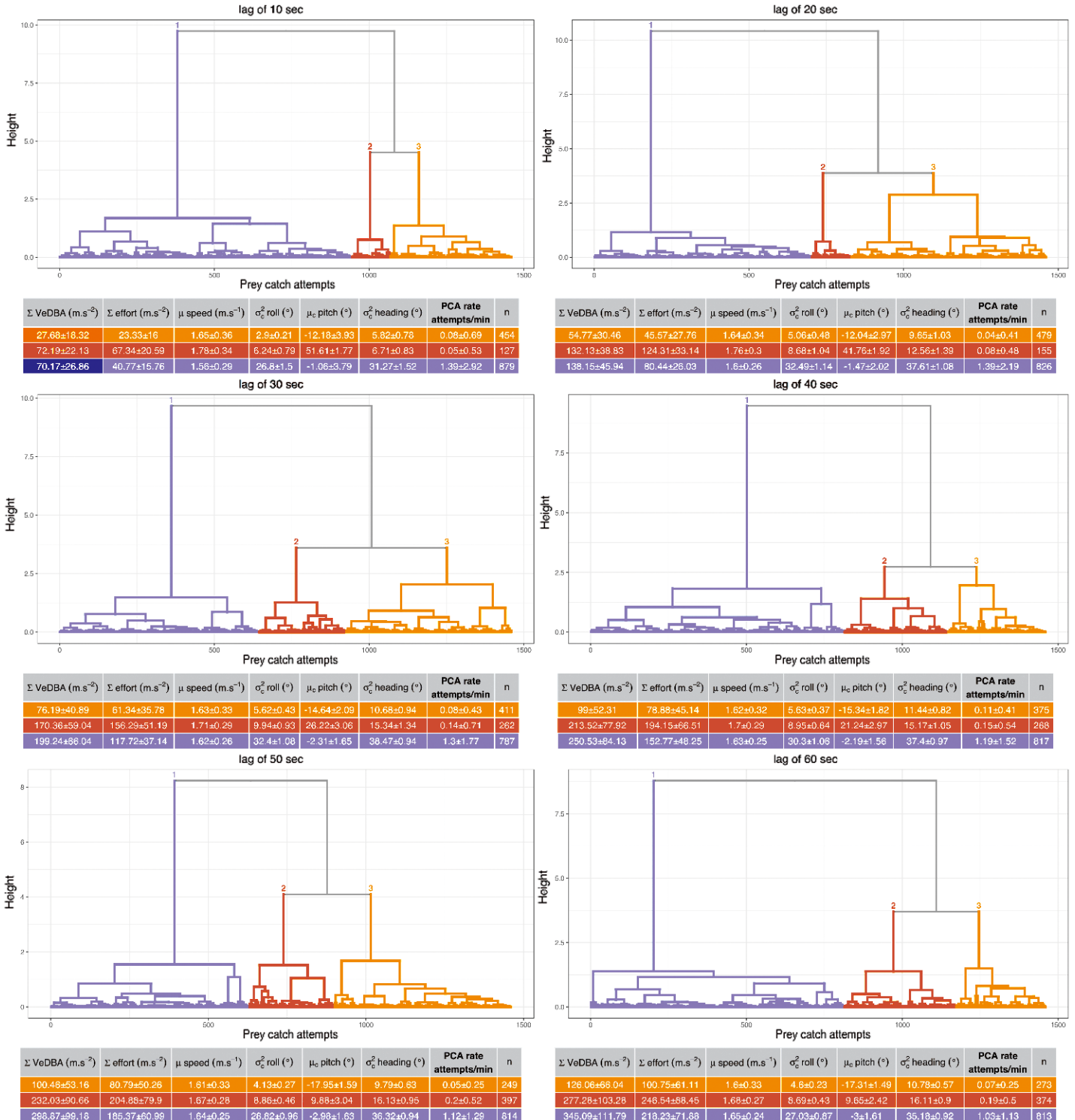| Σ VeDBA (m.s⁻²)	Σ effort (m.s⁻²)	μ speed (m.s⁻¹)	σ²c roll (°)	μc pitch (°)	σ²c heading (°)	PCA rate attempts/min	n
126.06±66.04	100.75±61.11	1.6±0.33	4.8±0.23	-17.31±1.49	10.78±0.57	0.07±0.25	273
277.28±103.28	246.54±88.45	1.68±0.27	8.69±0.43	9.65±2.42	16.11±0.9	0.19±0.52	374
345.09±111.79	218.23±71.88	1.65±0.24	27.03±0.87	-3±1.61	35.18±0.92	1.03±1.13	813

Fig. S1: Hierarchical clustering of prey catch attempts (PCA) performed by six southern elephant seals (*Mirounga leonina*) within area restricted search region based on their behavioural features at the bottom before a PCA considering different time windows ranging from 10 to 60 s. Beyond 40 s, up to 60 s, the classification was still the same except that the proportion of PCA in each cluster was different.
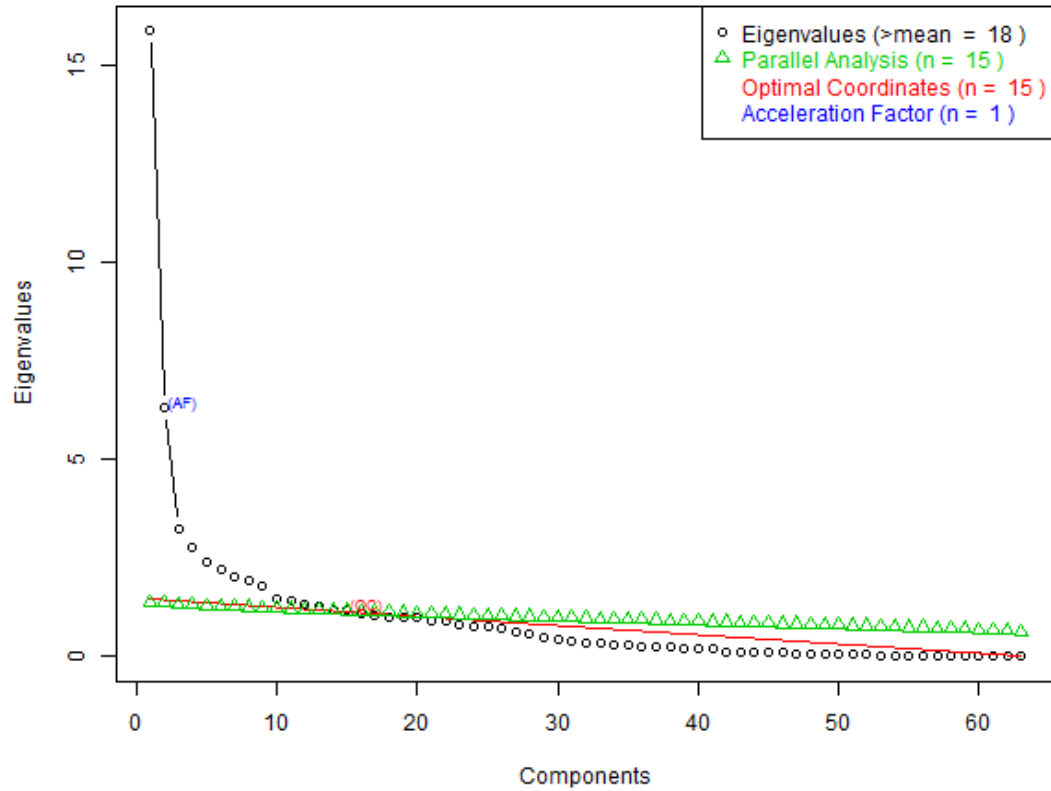
Fig. S2: Determination of the number of scores to keep from the principal component analysis for the unsupervised classification of prey catch attempts performed by six post-breeding female southern elephant seals (*Mirounga leonina*).

Σ VeDBA (m.s^{-2})	Σ effort (m.s^{-2})	μ speed (m.s^{-1})	σ_c^2 roll (°)	μ_c pitch (°)	σ_c^2 heading (°)	PCA rate attempts/min	n
66.27±34.02	53.25±30.73	1.84±0.37	3.44±0.32	-12.27±3.82	7.06±0.63	0.08±0.48	1659
142.54±37.21	131.29±33.25	1.9±0.3	5.75±0.54	41.19±2.25	9.42±0.99	0.15±0.7	732
133.13±46.87	78.25±28.15	1.66±0.37	27.63±1.48	-1.05±3.63	32.5±1.51	1.31±2.06	1312

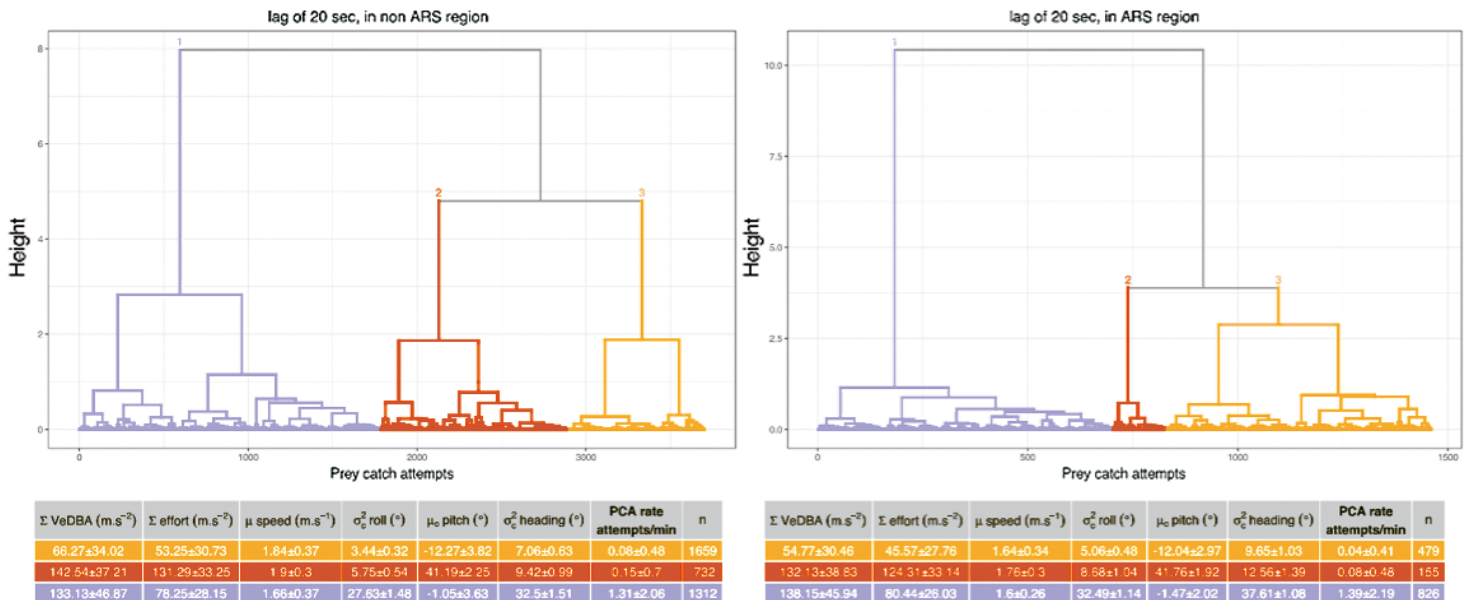| Σ VeDBA (m.s^{-2})	Σ effort (m.s^{-2})	μ speed (m.s^{-1})	σ_c^2 roll (°)	μ_c pitch (°)	σ_c^2 heading (°)	PCA rate attempts/min	n
54.77±30.46	45.57±27.76	1.64±0.34	5.06±0.48	-12.04±2.97	9.65±1.03	0.04±0.41	479
132.13±38.83	124.31±33.14	1.76±0.3	8.68±1.04	41.76±1.92	12.56±1.39	0.08±0.48	155
138.15±45.94	80.44±26.03	1.6±0.26	32.49±1.14	-1.47±2.02	37.61±1.08	1.39±2.19	826

Fig. S3: Hierarchical clustering of prey catch attempts performed by six southern elephant seals (*Mirounga leonina*) inside and outside area restricted search (ARS) during the bottom of dives, based on their behavioural features before a prey catch attempts considering a 20 s time windows.