Table S1: PhylANOVA results for song traits when either the maximum or minimum reported values are used. Sorted from most to least significant. Song-Stable and Song-Plastic columns show means. "*" denotes traits with significantly different groups.

Song Trait	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Syllable Rep Min	1.8901	3.8334	40.9429	0.0071	0.001*
Syllable Rep Max	2.0708	4.1622	41.086	0.0071	0.001*
Song Rep Min	1.0193	3.4341	36.1792	0.0083	0.001*
Song Rep Max	1.353	4.3733	33.2005	0.0083	0.001*
Syll Song Max	1.335	2.5406	9.7568	0.01	0.07
Syll Song Min	1.2123	1.8494	5.6926	0.01	0.201
Duration Max	0.8017	1.3853	2.356	0.0125	0.389
Interval Max	1.682	1.2852	1.6894	0.025	0.534
Duration Min	0.7625	1.1234	1.251	0.0125	0.558
Interval Min	1.4033	0.9398	0.8588	0.025	0.655

Table S2: Brownie results for song traits when either the maximum or minimum reported values are used. Sorted from most to least significant. "*" denotes traits where the two-rate model fit the data significantly better than the one-rate model.

Song Trait	One Rate	Two Rates	p-Value
Duration Max	-74.4	-68.0492	0.001*
Syll Song Max	-113.5196	-99.6948	0.001*
Interval Max	-44.2755	-39.3999	0.002*
Duration Min	-65.9076	-62.4134	0.008*
Interval Min	-58.9869	-57.1737	0.057
Syll Song Min	-84.2999	-82.8848	0.093
Song Rep Max	-114.8711	-114.262	0.27
Syllable Rep Max	-119.908	-119.3887	0.308
Song Rep Min	-96.6532	-96.4026	0.479
Syllable Rep Min	-113.6678	-113.4656	0.525

Table S3: PhylANOVA results for syllable repertoire when each bird family is omitted. Sorted from most to least significant. Song-Stable and Song-Plastic columns show means. "*" denotes significantly different groups.

Removed Family	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Acrocephalidae	1.9587	4.1353	49.4976	0.0071	0.001*
Emberizidae	2.0084	4.0433	37.5914	0.0071	0.001*
Fringillidae	1.9532	4.0565	37.5607	0.0071	0.001*
Icteridae	1.9511	4.0708	41.1954	0.0071	0.001*
Mimidae	2.0085	3.6686	32.9261	0.0071	0.001*
Muscicapidae	2.0199	3.9745	37.3105	0.0071	0.001*
Parulidae	2.017	4.2097	47.7262	0.0071	0.001*
Passerellidae	2.1331	4.0814	32.4785	0.0071	0.001*

Table S4: PhylANOVA results for interval when each bird family is omitted. Sorted from most to least significant. Song-Stable and Song-Plastic columns show means. "*" denotes significantly different groups.

Removed Family	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Muscicapidae	1.5987	1.0449	2.5837	0.025	0.331
Acrocephalidae	1.8308	1.3251	2.9201	0.025	0.405
Icteridae	1.5987	1.0659	2.5164	0.025	0.482
Parulidae	1.5718	1.1387	1.3989	0.025	0.612
Fringillidae	1.5728	1.218	1.1043	0.025	0.625
Emberizidae	1.5031	1.218	0.6157	0.025	0.677
Passerellidae	1.4593	1.218	0.3878	0.025	0.732
Mimidae	1.5987	1.6071	9e-04	0.025	0.994

Table S5: PhylANOVA results for duration when each bird family is omitted. Sorted from most to least significant. Song-Stable and Song-Plastic columns show means. "*" denotes significantly different groups.

Removed Family	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Mimidae	0.7858	1.5596	4.6683	0.0125	0.161
Muscicapidae	0.7858	1.3495	2.095	0.0125	0.363
Acrocephalidae	0.6331	1.1605	2.273	0.0125	0.428
Parulidae	0.8125	1.4276	2.5694	0.0125	0.429
Passerellidae	0.8239	1.2927	1.1648	0.0125	0.439
Icteridae	0.7858	1.3928	2.6278	0.0125	0.443
Emberizidae	0.8209	1.2927	1.4742	0.0125	0.489
Fringillidae	0.7874	0.9735	0.3763	0.0125	0.787

Table S6: PhylANOVA results for syllables per song when each bird family is omitted. Sorted from most to least significant. Song-Stable and Song-Plastic columns show means. "*" denotes significantly different groups.

Removed Family	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Acrocephalidae	1.2207	2.422	11.8976	0.01	0.06
Emberizidae	1.2515	2.359	9.036	0.01	0.062
Muscicapidae	1.2871	2.417	9.0216	0.01	0.065
Parulidae	1.2759	2.5087	11.2491	0.01	0.084
Fringillidae	1.2656	2.4274	9.5546	0.01	0.105
Passerellidae	1.4322	2.359	5.3541	0.01	0.11
Icteridae	1.2871	2.436	9.9891	0.01	0.113
Mimidae	1.2871	1.8406	4.5644	0.01	0.168

Table S7: PhylANOVA results for song rate when each bird family is omitted. Sorted from most to least significant. Song-Stable and Song-Plastic columns show means. "*" denotes significantly different groups.

Removed Family	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Muscicapidae	1.8978	2.1768	1.0362	0.05	0.558
Mimidae	1.8978	1.7406	0.7583	0.05	0.605
Icteridae	1.8978	2.1642	0.9841	0.05	0.667
Acrocephalidae	1.9659	2.1804	0.7127	0.05	0.695
Passerellidae	1.8878	2.0971	0.4786	0.05	0.7
Emberizidae	1.9034	2.0971	0.4608	0.05	0.732
Fringillidae	1.9043	2.0971	0.5379	0.05	0.742
Parulidae	1.8839	2.0942	0.5346	0.05	0.768

Table S8: PhylANOVA results for song repertoire when each bird family is omitted. Sorted from most to least significant. Song-Stable and Song-Plastic columns show means. "*" denotes traits different groups.

Removed Family	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Acrocephalidae	1.205	3.8787	29.49	0.0083	0.001*
Emberizidae	1.2576	4.0179	29.2291	0.0083	0.001*
Icteridae	1.1303	4.2353	43.0111	0.0083	0.001*
Mimidae	1.2715	3.4912	20.9511	0.0083	0.001*
Muscicapidae	1.2715	3.799	24.8704	0.0083	0.001*
Parulidae	1.2734	4.2699	36.7003	0.0083	0.001*
Fringillidae	1.2165	3.8563	27.6509	0.0083	0.002*
Passerellidae	1.4049	4.1762	25.9816	0.0083	0.002*

Table S9: Brownie results for syllable repertoire when each bird family is omitted. Sorted from most to least significant. "*" denotes cases where the two-rate model fit the data significantly better than the one-rate model.

Removed Family	One Rate	Two Rates	p-Value
Passerellidae	-94.7092	-92.8835	0.056
Acrocephalidae	-104.5746	-104.1284	0.345
Mimidae	-106.7329	-106.3413	0.376
Emberizidae	-109.9331	-109.7074	0.502
Fringillidae	-105.8758	-105.6551	0.506
Muscicapidae	-106.139	-105.9175	0.506
Icteridae	-108.6157	-108.4003	0.512
Parulidae	-110.3641	-110.1647	0.528

Table S10: Brownie results for interval when each bird family is omitted. Sorted from most to least significant. "*" denotes cases where the two-rate model fit the data significantly better than the one-rate model.

Removed Family	One Rate	Two Rates	p-Value
Acrocephalidae	-38.8204	-32.6546	0.001*
Icteridae	-43.9067	-39.769	0.004*
Fringillidae	-44.687	-41.0652	0.007*
Parulidae	-43.6899	-40.1743	0.008*
Emberizidae	-42.7687	-39.7137	0.013*
Mimidae	-38.2762	-35.3337	0.015*
Passerellidae	-41.7493	-38.8285	0.016*
Muscicapidae	-35.9688	-34.5783	0.095

Table S11: Brownie results for duration when each bird family is omitted. Sorted from most to least significant. "*" denotes cases where the two-rate model fit the data significantly better than the one-rate model.

Removed Family	One Rate	Two Rates	p-Value
Acrocephalidae	-64.257	-57.33	0.001*
Icteridae	-69.5007	-64.2152	0.001*
Muscicapidae	-68.6623	-62.4149	0.001*
Parulidae	-68.2428	-63.3456	0.002*
Mimidae	-64.5013	-59.9448	0.003*
Emberizidae	-68.0418	-64.4014	0.007*
Passerellidae	-64.1314	-60.9289	0.011*
Fringillidae	-53.8896	-52.4634	0.091

Table S12: Brownie results for syllables per song when each bird family is omitted. Sorted from most to least significant. "*" denotes cases where the two-rate model fit the data significantly better than the one-rate model.

Removed Family	One Rate	Two Rates	p-Value
Acrocephalidae	-97.0668	-84.0949	0.001*
Emberizidae	-99.2571	-89.6643	0.001*
Fringillidae	-98.8075	-89.3303	0.001*
Icteridae	-102.4934	-92.4344	0.001*
Muscicapidae	-101.5469	-90.2989	0.001*
Parulidae	-100.3308	-90.9249	0.001*
Passerellidae	-93.2162	-84.7065	0.001*
Mimidae	-67.072	-65.9722	0.138

Table S13: Brownie results for song rate when each bird family is omitted. Sorted from most to least significant. "*" denotes cases where the two-rate model fit the data significantly better than the one-rate model.

Removed Family	One Rate	Two Rates	p-Value
Acrocephalidae	-36.9543	-29.3749	0.001*
Icteridae	-42.0655	-37.4982	0.003*
Fringillidae	-42.6676	-38.5222	0.004*
Parulidae	-41.7483	-37.7895	0.005*
Passerellidae	-39.904	-36.4006	0.008*
Emberizidae	-41.1093	-37.9529	0.012*
Muscicapidae	-36.0979	-33.3061	0.018*
Mimidae	-33.8912	-31.4482	0.027*

Table S14: Brownie results for song repertoire when each bird family is omitted. Sorted from most to least significant. "*" denotes cases where the two-rate model fit the data significantly better than the one-rate model.

Removed Family	One Rate	Two Rates	p-Value
Icteridae	-99.542	-99.0294	0.311
Mimidae	-101.284	-100.9359	0.404
Fringillidae	-95.1424	-94.8671	0.458
Acrocephalidae	-98.2789	-98.0303	0.481
Muscicapidae	-101.437	-101.2221	0.512
Parulidae	-102.3087	-102.1154	0.534
Passerellidae	-93.906	-93.7771	0.612
Emberizidae	-102.3833	-102.2711	0.636

Table S15: Brownie results for syllables per song when each mimid sepcies is omitted. Sorted from most to least significant. "*" denotes cases where the two-rate model fit the data significantly better than the one-rate model.

Removed Mimid	One Rate	Two Rates	p-Value
Toxostoma rufum	-102.932	-92.9691	0.001*
Dumetella carolinensis	-103.0273	-93.1399	0.001*
Mimus polyglottos	-84.376	-82.5821	0.058
Mimus gilvus	-77.7155	-77.4441	0.461

Table S16: PhylANOVA results for all song traits when *Melospiza melodia* is labeled Song-Stable. Song-Stable and Song-Plastic columns show means. Sorted from most to least significant. "*" denotes traits with significantly different groups.

Song Trait	Song-Stable	Song-Plastic	F-Value	Corrected α	p-Value
Syllable Rep	2.0357	4.0814	41.8787	0.0071	0.001*
Song Rep	1.2545	4.1762	38.7502	0.0083	0.001*
Syll Song	1.2871	2.359	9.3669	0.01	0.078
Duration	0.7858	1.2927	1.9851	0.0125	0.432
Continuity	-1.3274	-1.0286	1.9026	0.0167	0.509
Interval	1.5987	1.218	1.3307	0.025	0.579
Song Rate	1.8978	2.0971	0.606	0.05	0.702

Table S17: Brownie results for song traits when *Melospiza melodia* is labeled Song-Stable. Sorted from most to least significant. "*" denotes traits where the two-rate model fit the data significantly better than the one-rate model.

Song Trait	One Rate	Two Rates	p-Value
Duration	-71.446	-66.1294	0.001*
Syll Song	-105.515	-95.4003	0.001*
Interval	-45.7435	-41.7043	0.004*
Syllable Rep	-115.1413	-114.9228	0.509
Song Rep	-108.4187	-108.2635	0.577

Table S18: Adapted from Jenkins 1977 table 2 with new syllable repertoire and syllabels per song data included. Syp Rep is the sum of distinct syllables within each song, while Corrected is the number of unique syllables across the full repertoire (note that SR and VPH shared one syllable). The mean of the latter was used in our paper. Syllables per song was calculated following the definition from our main methods. * marks the individual that was missing from table 2 in the original publication. We deduced the repertoire of the missing male by first looking at table 1, which showed that 16 males had a repertoire size of one song. Only 15 of the males in table 2 had a repertoire size of one song. Thus, the missing male had a repertoire size of one song. We then compared the bands of males present in table 2 to the territory map in figure 7, and A_RW was the only male missing from table 2. A_RW was located in the DC region of figure 7, so we assigned that as his repertoire. Jenkins notes that neighboring males share song types, so the only other song A_RW could have known instead of DC was ZZ, which has the same number of unique syllables as DC.

Song Type	SR	VPH	CC	PH	KS	DC	ZZ	SE			
Syll/Sng	3	2	3	3	2	1	1	4	Syl Rep	Corrected	Syl/Sng
_A	1	1							5	4	2.5
Fern	1	1							5	4	2.5
Knob	1	1							5	4	2.5
BR_A			1						3	3	3
_WA			1						3	3	3
A_RB			1						3	3	3
AW_			1						3	3	3
AG_			1						3	3	3
A_RY			1						3	3	3
m YW_A			1						3	3	3
AT_			1	1					6	6	3
_YA				1					3	3	3
GW_A				1					3	3	3
A_RG				1			1		4	4	2
RA_Y				1					3	3	3
YR_AG				1	1				5	5	2.5
AR_					1	1			3	3	1.5
Y_AR					1	1			3	3	1.5
A_WR						1			1	1	1
A_GW						1			1	1	1
_A							1		1	1	1
H. Gully							1	1	5	5	2.5
G_RA							1	1	5	5	2.5
AY_GR							1	1	5	5	2.5
_AY							1	1	5	5	2.5
B_WA								1	4	4	4
Y_AY								1	4	4	4
A_RW*						1			1	1	1
									3.5	3.393	2.5

Table S19: To count the syllable repertoire of *Geospiza fortis*, recordings from McCauley library (top section of the table) and sonograms published in Grant and Grant (1996) (bottom section of the table) were examined. The first colmn gives the recording or sonogram ID. The second column is the recordist. The third column is the number of syllables we counted, with the mean number of syllables at the bottom of the table. Because this species has a song repertoire of one, the value for syllables per song was the same as the syllable repertoire.

Geospiza fortis		
ML	Recordist	Syllables
86782	Robert I. Bowman	1
86729	Robert I. Bowman	1
86728	Robert I. Bowman	2
86727	Robert I. Bowman	1
86726	Robert I. Bowman	1
86724	Robert I. Bowman	1
86723	Robert I. Bowman	1
86719	Robert I. Bowman	2
86718	Robert I. Bowman	1
86717	Robert I. Bowman	1
86716	Robert I. Bowman	2
86714	Robert I. Bowman	1
82869	Robert I. Bowman	2
82865	Robert I. Bowman	1
82863	Robert I. Bowman	1
82597	Robert I. Bowman	2
82595	Robert I. Bowman	1
82576	Robert I. Bowman	1
82575	Robert I. Bowman	1
82574	Robert I. Bowman	1
46372	Margery R. Plymire	1

Grant and Grant (1996)	Recordist	Syllables
2666	Grant and Grant	1
4446	Grant and Grant	1
10826	Grant and Grant	1
4339	Grant and Grant	1
5555	Grant and Grant	1
5921	Grant and Grant	1
13901	Grant and Grant	1
17835	Grant and Grant	1
3612	Grant and Grant	1
16805	Grant and Grant	1
17103	Grant and Grant	1
5505	Grant and Grant	1
17796	Grant and Grant	1
5578	Grant and Grant	1
15236	Grant and Grant	1

15359	Grant and Grant	1
14963	Grant and Grant	1
10228	Grant and Grant	1
4946	Grant and Grant	1
4913	Grant and Grant	2
714	Grant and Grant	1
16167	Grant and Grant	2
5110	Grant and Grant	2
14687	Grant and Grant	1
5275	Grant and Grant	1
15514	Grant and Grant	1
A	Grant and Grant	1
10081	Grant and Grant	1
2639	Grant and Grant	1
10211	Grant and Grant	1
10550	Grant and Grant	2
14720	Grant and Grant	1
4620	Grant and Grant	2
B	Grant and Grant	2
	Mean:	1.20

Table S20: To count the syllable repertoire of *Geospiza scadens*, recordings from McCauley library were examined. The first colmn gives the recording or sonogram ID. The second column is the recordist. The third column is the number of syllables we counted, with the mean number of syllables at the bottom of the table. Because this species has a song repertoire of one, the value for syllables per song was the same as the syllable repertoire.

Geospiza scandens		
ML	Recordist	Syllables
133749351	Eric DeFonso	1
46235	Robert I. Bowman	1
46234	Robert I. Bowman	2
46233	Robert I. Bowman	2
46228	Robert I. Bowman	2
46224	Robert I. Bowman	2
46222	Robert I. Bowman	2
46220	Robert I. Bowman	1
49219	Robert I. Bowman	2
46218	Robert I. Bowman	1
46217	Robert I. Bowman	1
	Mean:	1.54