

OCR Ortholog Coordinates (mm10)	TACIT P-Value	TACIT Coef.	Permu- lations P-Value	Permu- lations BH Adj. P-Value	Gene Name	RER Conv. Result	Additional Genes
chr15:16107524-16107960	1.71E-02	-10.32	1.40E-05	0.05	Cdh9 (140)	No	-
chr18:65510387-65511111	3.99E-02	-9.46	3.70E-05	0.09	Zfp532	No	Malt1
chr2:131650717-131651399	1.44E-02	-10.89	3.70E-05	0.09	Adra1d	No	Smox
chr9:8176928-8177666	1.56E-02	-9.66	4.20E-05	0.09	Cep126	No	
chr18:68703945-68704585	1.46E-02	-13.68	3.50E-05	0.09	4930546 C10Rik	No	Tcf4 (141),
chr13:48323987-48324750	2.84E-02	15.06	2.90E-05	0.08	Id4	No	
chr10:5735065-5735721	2.73E-02	-10.25	2.50E-05	0.07	Fbxo5	No	VIP
chr19:56747655-56748356	1.70E-02	-9.31	1.10E-05	0.05	Adrb1	No	
chr18:15238033-15239015	2.36E-02	-9.96	6.00E-06	0.04	Kctd1	No	AQP4
chr16:65629047-65629933	2.51E-02	-10.04	9.00E-06	0.04	Chmp2b (142)	No	VGLL3
chr17:94243749-94244469	1.35E-02	-7.06	2.00E-05	0.07	Mettl4	No	
chr8:60393577-60394004	2.54E-02	-9.83	2.60E-05	0.07	Gm10283	No	
chr2:168519584-168519969	3.82E-02	-7.50	3.00E-06	0.04	Nfatc2	No	
chr17:72819735-72820272	6.78E-06	-5.90	4.40E-05	0.10	Ypel5	No	ALK
chr7:37573064-37573594	4.61E-03	-11.53	1.00E-06	0.02	Zfp536	No	Tshz3 (143-145)
	1.33E-02	-12.10	9.00E-06	0.04	NA	No	ZNHIT6, CCN1

	1.10E-02	10.44	2.80E-05	0.08	NA	No	
chr12:75463900-75464505	3.10E-02	12.42	9.00E-06	0.04	Gphb5	No	<u>PPP2R5E</u> (146)
chr2:145057020-145057789	2.14E-02	-5.83	2.00E-06	0.03	Slc24a3 (147)	No	Dtd1
chr15:61299599-61300306	1.91E-02	-10.06	4.50E-05	0.10	A1bg	No	Myc
chr18:25702100-25702785	1.86E-03	-6.47	1.00E-06	0.02	Celf4 (78)	p<0.01	
chr8:100212225-100213081	1.44E-02	-14.07	1.50E-05	0.05	Cdh8 (148)	p<0.1	
chr13:26914286-26915174	1.77E-02	-11.20	1.50E-05	0.05	Prl	No	HDGFL1
chr7:96710377-96711352	2.92E-02	-9.48	3.70E-05	0.09	Tenm4	No	Nars
	3.39E-02	-6.45	1.00E-06	0.02	NA	No	ZNF704
chr14:28101682-28102178	2.39E-02	-10.64	3.20E-05	0.08	Erc2	No	Wnt5a
chr2:61494077-61494853	2.69E-03	15.75	1.00E-06	0.02	Tank (149)	No	Tbr1 (150, 151)
chr17:63914921-63915759	2.01E-02	-11.71	1.40E-05	0.05	Fer	No	
chr12:97833162-97833781	5.23E-03	-14.31	1.50E-05	0.05	Galc (152)	p<0.01	
chr2:33543268-33544008	2.30E-02	13.70	1.00E-05	0.05	Zbtb43	No	<u>Lmx1b</u> (153)
chr8:18790099-18790817	4.64E-02	-10.55	2.50E-05	0.07	Angpt2	No	
	3.85E-02	-9.41	4.00E-06	0.04	NA	No	SORCS3
chr5:20750587-20751246	1.33E-02	-10.20	5.00E-06	0.04	Phtf2	No	Magi2 (154)
	5.68E-03	10.75	8.00E-06	0.04	NA	No	DPPA4
chr12:86795973-86796457	3.78E-07	5.92	5.00E-06	0.04	Lrrc74a	No	
	2.48E-03	6.51	8.00E-06	0.04	NA	p<0.1	Galc (152)

chr17:86429786-86430568	6.81E-03	-11.21	2.50E-05	0.07	Prkce (155)	No	Epas1
chr1:21773189-21773501	1.27E-03	6.73	2.00E-05	0.07	Kcnq5 (156)	No	
chrX:87178627-87179266	3.10E-02	5.49	2.00E-06	0.03	Il1rapl1 (157)	No	
	5.14E-05	7.45	2.00E-06	0.03	NA	p<0.01	DAAM1 (158), DACT1 (159)
chr12:67321023-67321586	5.17E-02	-15.62	1.70E-05	0.06	Mdga2 (160)	No	
chr17:86352256-86352626	7.58E-02	-6.33	5.00E-06	0.04	Prkce (155)	No	Epas1
chr5:18822320-18822911	1.62E-01	-3.66	7.00E-06	0.04	Magi2 (154)	No	
chr8:35222316-35223646	1.23E-01	-10.39	3.40E-05	0.09	Ppp1r3b	No	

Table S1. M1 OCRs whose predicted open chromatin in boreoeutherian mammals is significantly associated with vocal learning.

Coordinates are reported for the mouse genome (mm10). The coefficients shown are those reported by phyloglm for the association between the vocal learning trait and the OCR orthologs' open chromatin prediction. The permutations p-values represent the adjusted p-values after Benjamini-Hochberg correction. Nearest genes are indicated, with genes previously associated (in some cases specifically, in other cases as part of larger deletions) with speech delay or disability underlined (with associated references) and genes previously shown to be convergently regulated in humans and song-learning birds (4) in bold red. Genes that have vocal learning associated specialization in the songbird brain are in bold black (139). A summary of the RERConvege unadjusted p-value for the nearest annotated mouse gene is provided. Human coordinates in the hg38 assembly are used when a mouse ortholog does not exist.