

Supplemental Material S3. Details of the selected optimal GAMM for *F0* contours.

Family: gaussian

Formula: $f_0 \sim \text{tonegradegroup} + s(\text{normTime}, \text{by} = \text{tonegradegroup}) + s(\text{normTime}, \text{word}, \text{bs} = "re") + s(\text{normTime}, \text{speaker}, \text{bs} = "re")$

Parametric coefficients:

	Estimate	Std. Error	<i>t</i> value	<i>p</i> value
(Intercept)	4.18222	0.0899	46.519	< .001 ***
tonegradegroupTone2.Grade1.HL	-0.51334	0.06658	-7.71	< .001 ***
tonegradegroupTone3.Grade1.HL	-1.55709	0.0671	-23.204	< .001 ***
tonegradegroupTone4.Grade1.HL	-0.59285	0.06895	-8.598	< .001 ***
tonegradegroupTone1.Grade3.HL	0.02543	0.13316	0.191	.849
tonegradegroupTone2.Grade3.HL	-0.49615	0.13864	-3.579	< .001 ***
tonegradegroupTone3.Grade3.HL	-1.28246	0.13925	-9.21	< .001 ***
tonegradegroupTone4.Grade3.HL	-0.75808	0.16369	-4.631	< .001 ***
tonegradegroupTone1.Grade5.HL	-0.23292	0.13076	-1.781	.0749
tonegradegroupTone2.Grade5.HL	-0.94278	0.13619	-6.922	< .001 ***
tonegradegroupTone3.Grade5.HL	-1.41311	0.13708	-10.308	< .001 ***
tonegradegroupTone4.Grade5.HL	-1.09354	0.14944	-7.318	< .001 ***
tonegradegroupTone1.Grade1.L2	-0.3804	0.13788	-2.759	.006 **
tonegradegroupTone2.Grade1.L2	-1.72661	0.1532	-11.27	< .001 ***
tonegradegroupTone3.Grade1.L2	-2.10087	0.13838	-15.182	< .001 ***
tonegradegroupTone4.Grade1.L2	-1.09241	0.16033	-6.813	< .001 ***
tonegradegroupTone1.Grade3.L2	-0.22076	0.12867	-1.716	.086
tonegradegroupTone2.Grade3.L2	-1.34614	0.13547	-9.937	< .001 ***
tonegradegroupTone3.Grade3.L2	-1.83165	0.13472	-13.596	< .001 ***
tonegradegroupTone4.Grade3.L2	-0.97589	0.14541	-6.712	< .001 ***
tonegradegroupTone1.Grade5.L2	-0.32136	0.13232	-2.429	.015 *
tonegradegroupTone2.Grade5.L2	-1.33157	0.13424	-9.919	< .001 ***
tonegradegroupTone3.Grade5.L2	-1.38186	0.13847	-9.979	< .001 ***
tonegradegroupTone4.Grade5.L2	-1.06527	0.14293	-7.453	< .001 ***

Significant codes: *** $p < .001$, ** $p < .01$, * $p < .05$

Approximate significance of smooth terms:

	edf	Ref.df	<i>F</i>	<i>p</i> value
$s(\text{normTime}):\text{tonegradegroupTone1.Grade1.HL}$	2.439	3.189	1.578	.189
$s(\text{normTime}):\text{tonegradegroupTone2.Grade1.HL}$	3.884	4.991	8.706	< .001 ***

s(normTime):tonegradegroupTone3.Grade1.HL	8.008	8.677	113.209	< .001 ***
s(normTime):tonegradegroupTone4.Grade1.HL	4.422	5.303	38.41	< .001 ***
s(normTime):tonegradegroupTone1.Grade3.HL	1.12	1.232	0.544	.574
s(normTime):tonegradegroupTone2.Grade3.HL	3.96	4.975	10.566	< .001 ***
s(normTime):tonegradegroupTone3.Grade3.HL	7.167	7.736	92.779	< .001 ***
s(normTime):tonegradegroupTone4.Grade3.HL	3.646	4.367	31.86	< .001 ***
s(normTime):tonegradegroupTone1.Grade5.HL	1.886	2.436	1.028	.36
s(normTime):tonegradegroupTone2.Grade5.HL	4.173	5.235	11.496	< .001 ***
s(normTime):tonegradegroupTone3.Grade5.HL	6.673	7.459	65.5	< .001 ***
s(normTime):tonegradegroupTone4.Grade5.HL	4.068	4.814	46.196	< .001 ***
s(normTime):tonegradegroupTone1.Grade1.L2	2.634	3.452	1.946	.111
s(normTime):tonegradegroupTone2.Grade1.L2	4.345	5.579	12.428	< .001 ***
s(normTime):tonegradegroupTone3.Grade1.L2	7.235	8.361	57.126	< .001 ***
s(normTime):tonegradegroupTone4.Grade1.L2	3.427	4.32	32.419	< .001 ***
s(normTime):tonegradegroupTone1.Grade3.L2	1.706	2.19	1.234	.271
s(normTime):tonegradegroupTone2.Grade3.L2	5.109	6.468	15.999	< .001 ***
s(normTime):tonegradegroupTone3.Grade3.L2	6.728	7.977	50.533	< .001 ***
s(normTime):tonegradegroupTone4.Grade3.L2	4.336	5.197	37.656	< .001 ***
s(normTime):tonegradegroupTone1.Grade5.L2	2.101	2.74	1.227	.295
s(normTime):tonegradegroupTone2.Grade5.L2	4.851	6.047	18.543	< .001 ***
s(normTime):tonegradegroupTone3.Grade5.L2	5.559	6.697	26.986	< .001 ***
s(normTime):tonegradegroupTone4.Grade5.L2	3.991	4.875	35.837	< .001 ***
s(normTime,word)	19.8	28	3.805	< .001 ***
s(normTime,speaker)	71.947	76	21.41	< .001 ***

Significant codes: *** $p < .001$, ** $p < .01$, * $p < .05$

$R\text{-sq.}(adj) = .548$ Deviance explained = 55.5%

$fREML = 6925.5$ Scale est. = 0.31033 $n = 14570$