ESM 1 - Table of occurrence of elements types across populations

Sturdy et al. 1999	JH	QB	R	QP	**Leadbeater et al. 2005**		**Zann 1993**		**Holveck et al. 2008**		**Price 1979**	
	*	*	*	*		#		*		*		*
combination note	36	3	4	14	combination note	60	distance call	16	-		long call	27
slide note	9	35	22	16	slide note	95	downslur	2	down sweep	53	-	
flat note	9	20	21	10	flat note	90	tone	1	tone	17	medium call	9
							stack	17	stack	9		
short slide	*37*	*35*	*44*	*44*	-		*introductory element*	*24*	-		*short call*	*31*
							introductory dyad	*2*				
high	9	7	9	16	inspiratory high	45	high	10	high	3	non-call type	32
					expiratory high	60						
									high sweep	1		
-					noise	10	noise-noise	7	noisy	11		
							noise-structure	*4*	short noisy	1		
							ladder-noise	*4*				
							tone-niose	*3*				
							noise-DC	*3*				
							noise-tone	*3*				
							n-n-DC	*1*				
-					buzz	5	-		trill	3		

ESM Table 1. Elements described in the literature. The different studies used different classification systems causing some categories to fall into two categories in one study and into one category in another study (for instance inspiratory and expiratory high notes in Leadbeater et al., are grouped in to 'high notes' according to Sturdy et al.'s classification. In order to compare studies, Sturdy et al. is used as a reference point and element types on the same row are expected to be similar to a certain extend. This table was used as an estimate to classify elements into 'more' or 'less' common for constructing the stimuli. Introduction notes and/or short slides are indicated in *italic* since introduction notes are not always included in the motif thus this makes comparison not ideal. Frequency of note types from different colonies are given in % (* : % of total nr of elements, #: % of motives containing a specific element). The investigated colonies are from Pennsylvania, U.S.A. (1), Alice Springs and Murray River, Australia (2, 3), Utah, U.S.A. (4), Leiden, the Netherlands (5) and the following 4 colonies by Sturdy et al. (6): JH: John Hopkins, QB: Queen's biology, R: Rockefeller, QP: Queen's psychology.

References

1. Price PH (1979) Developmental determinants of structure in zebra finch song *Journal of Comparative and Physiological Psychology* 93(2):260-277.
2. Zann R (1993) Structure, sequence and evolution of song elements in wild Australian zebra finches. *Auk* 110(4):702-715.
3. Zann R (1996) *The zebra finch : a synthesis of field and laboratory studies* (Oxford Ornithology Series, New York).
4. Leadbeater E, Goller F, & Riebel K (2005) Unusual phonation, covarying song characteristics and song preferences in female zebra finches. *Animal Behaviour* 70:909-919.
5. Holveck MJ, de Castro ACV, Lachlan RF, ten Cate C, & Riebel K (2008) Accuracy of song syntax learning and singing consistency signal early condition in zebra finches. *Behav. Ecol.* 19(6):1267-1281.
6. Sturdy CB, Phillmore LS, & Weisman RG (1999) Note types, harmonic structure, and note order in the songs of zebra finches (Taeniopygia guttata). *Journal of Comparative Psychology* 113(2):194-203.

ESM2 - Statistical details

Preference test 35dph

16 birds were tested, of which 4 did not show a response and had to be excluded for the statistics for 35days. When a bird sat on the same perch during a whole test this was counted as a lack of response and the test was excluded. Several subtests also had to be excluded throughout age groups due to lack of response. Statistics were performed on the remaining 12 birds with 27 subtests in total. A linear mixed effect model was performed with time spent on each side of the cage as dependent variable, stimulus type (common/uncommon) as fixed factor, subject as random factor and subtest nested within subject.

Results for model comparison with (model2) or without (model1) stimulus type are listed below:

	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
Model1	1	4	740.2076	748.1635	-366.1038			
Model2	2	5	735.3988	745.3437	-362.6994	1 vs 2	6.808736	0.0091

Preference test from age 35dph to 55dph

A linear mixed effect model was performed for test on all ages, with time spent on each side of the cage as dependent variable, stimulus type (common/uncommon), tutor type (common tutor/uncommon tutor), age(35,45,55dph) and tutor/nontutor as fixed factors, subject as random factor and subtest nested within subject.

Model comparison for an interaction between stimulus type x tutor type x age x tutor/non-tutor:

	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
Model 1	1	25	3607.139	3696.347	-1778.57			
Model 2	2	27	3603.703	3700.048	-1774.85	1 vs 2	7.435687	0.0243

Age 55

Since a 4-way interaction as found, data were split in order to inspect the 55dph in more detail. A linear mixed effect model was performed with time spent on each side of the cage as dependent variable, stimulus type (common/uncommon), tutor type (common tutor/uncommon tutor) and tutor/non-tutor as fixed factors, subject as random factor and subtest nested within subject.

Model comparison for an interaction between stimulus type x tutor type x tutor/non-tutor:

	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
Model 1	1	10	1577.137	1604.499	-778.568			
Model 2	2	11	1565.085	1595.183	-771.542	1 vs 2	14.05206	2.00E-04

We further spilt up the data to see if the difference in preference between common song stimuli and uncommon song stimuli was similar for tutor songs and non-tutor song. A linear mixed effect model was performed with time spent on each side of the cage as dependent variable, stimulus type (common/uncommon) and tutor type (common tutor/uncommon tutor) as fixed factors, subject as random factor and subtest nested within subject.

Model comparison for tutor songs stimulus type x tutor type:

	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
Model 1	1	6	375.3506	382.8992	-181.675			
Model 2	2	7	357.1205	365.9271	-171.56	1 vs 2	20.23017	<.0001

Model comparison for non-tutor songs stimulus type x tutor type:

	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
Model 1	1	6	1210.555	1225.419	-599.278			
Model 2	2	7	1212.326	1229.667	-599.163	1 vs 2	0.229157	0.6321

We also tested the difference between tutor song and non-tutor song stimuli was similar for birds tutored with common song and those tutored with uncommon song. . A linear mixed effect model was performed with time spent on each side of the cage as dependent variable, stimulus type (common/uncommon) and tutor/non-tutor as fixed factors, subject as random factor and subtest nested within subject.

Model comparison for the group tutored with common songs testing for an interaction between stimulus type x tutor/non-tutor:

	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
Model 1	1	6	742.3163	754.2502	-365.158			
Model 2	2	7	737.9239	751.8468	-361.962	1 vs 2	6.392436	0.0115

Model comparison for the group tutored with uncommon songs testing for an interaction between stimulus type x tutor/non-tutor:

	Model	df	AIC	BIC	logLik	Test	L.Ratio	p-value
Model 1	1	6	838.2477	850.8138	-413.124			
Model 2	2	7	832.3889	847.0493	-409.194	1 vs 2	7.858835	0.0051

ESM 3 - Spectrograms of tutor-tutee pairs

Each page represents on tutor-tutee-pair, first birds tutored with less common songs (LC) then birds tutored with more common songs (MC). All spectrograms are presented here without introductory notes.

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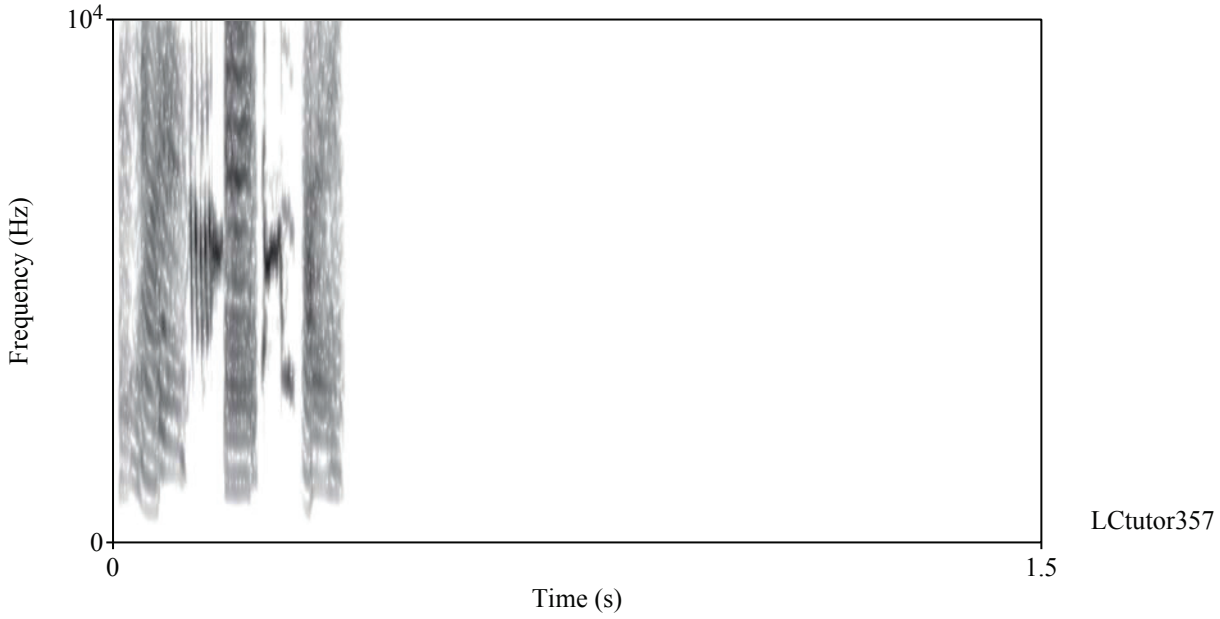

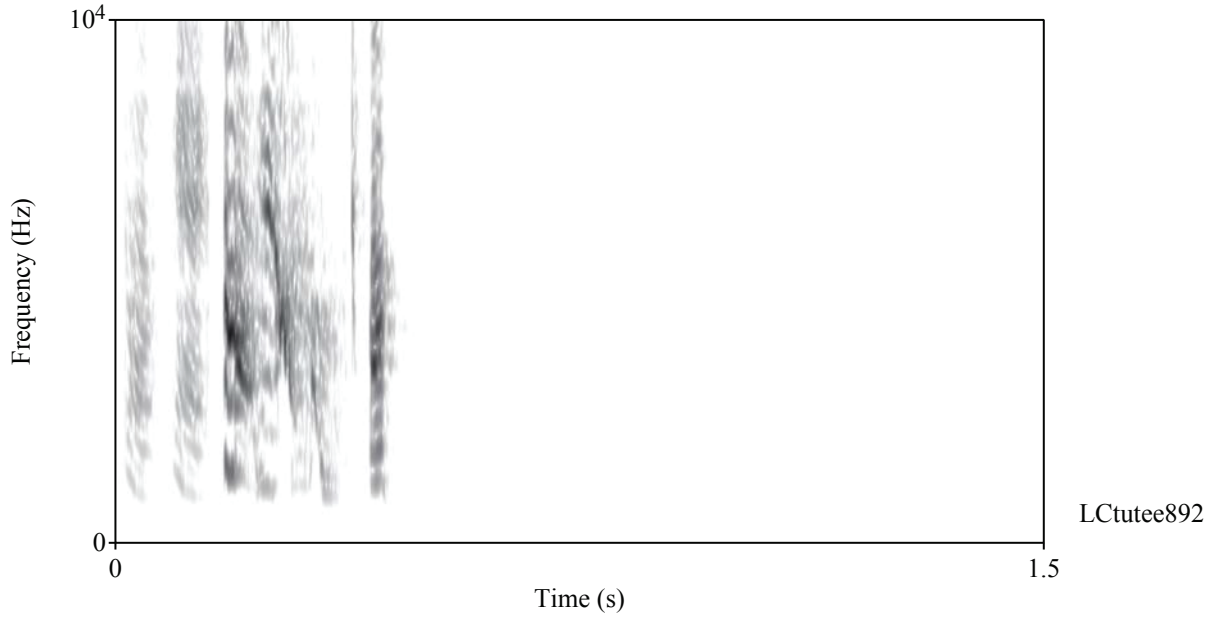
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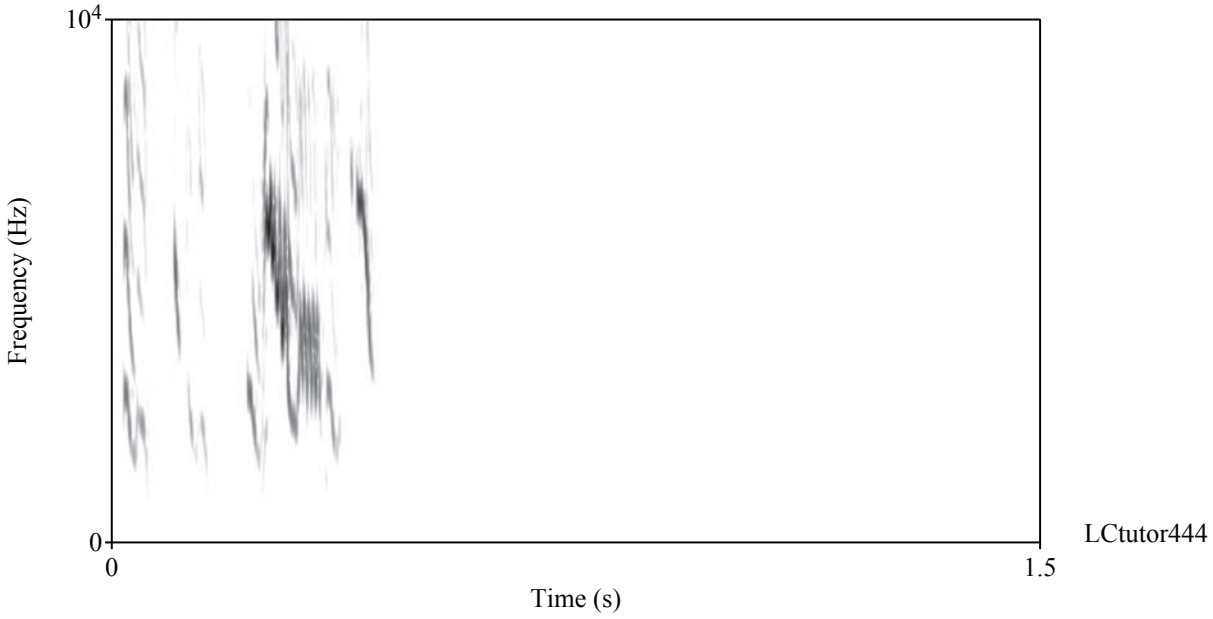
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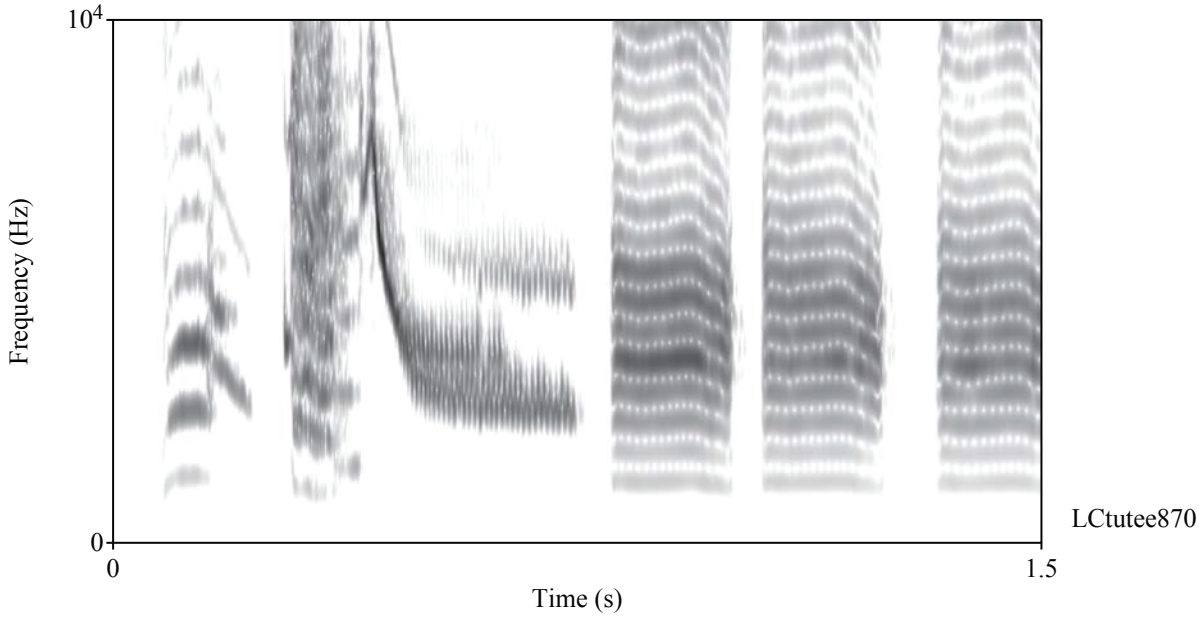
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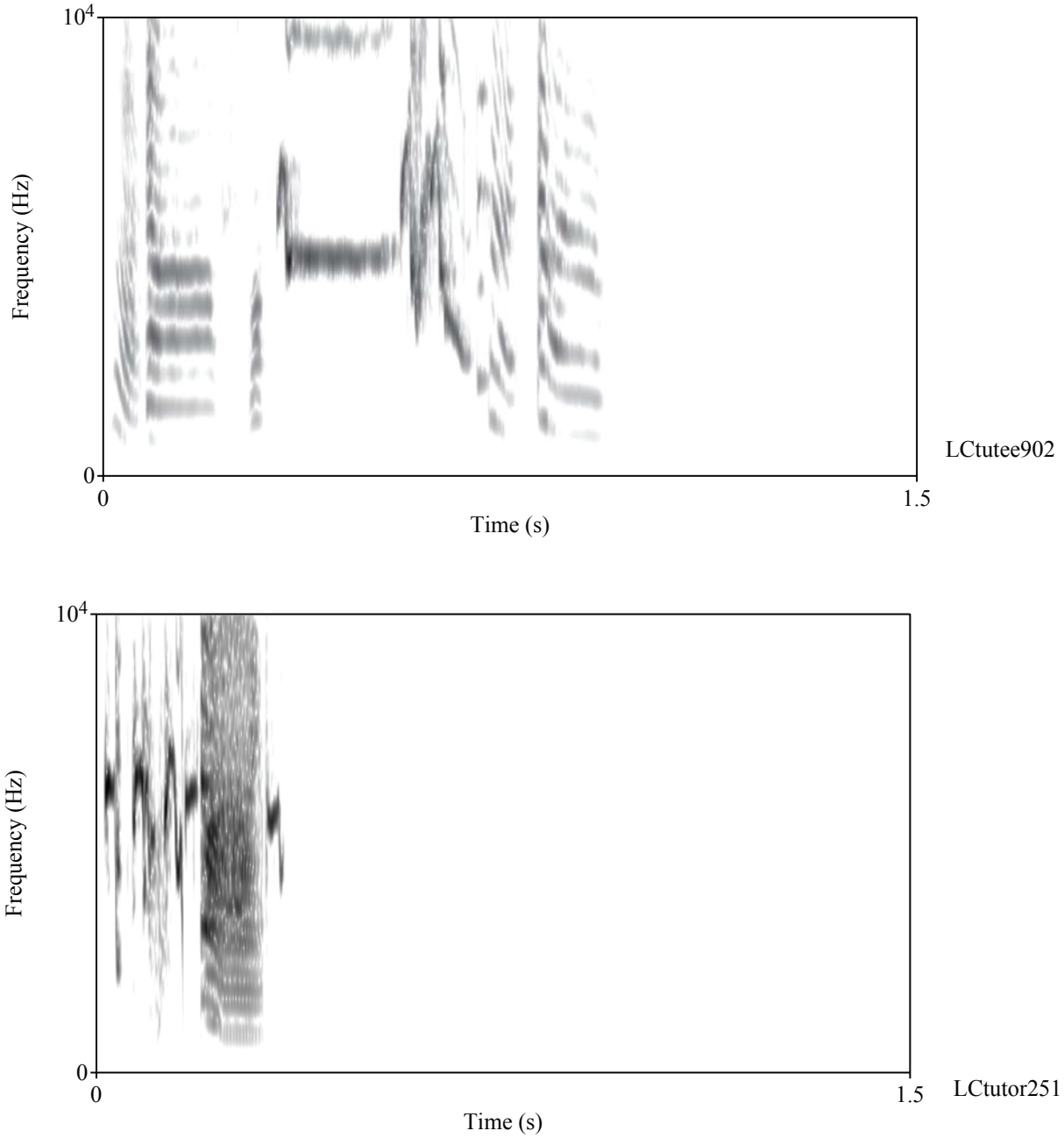
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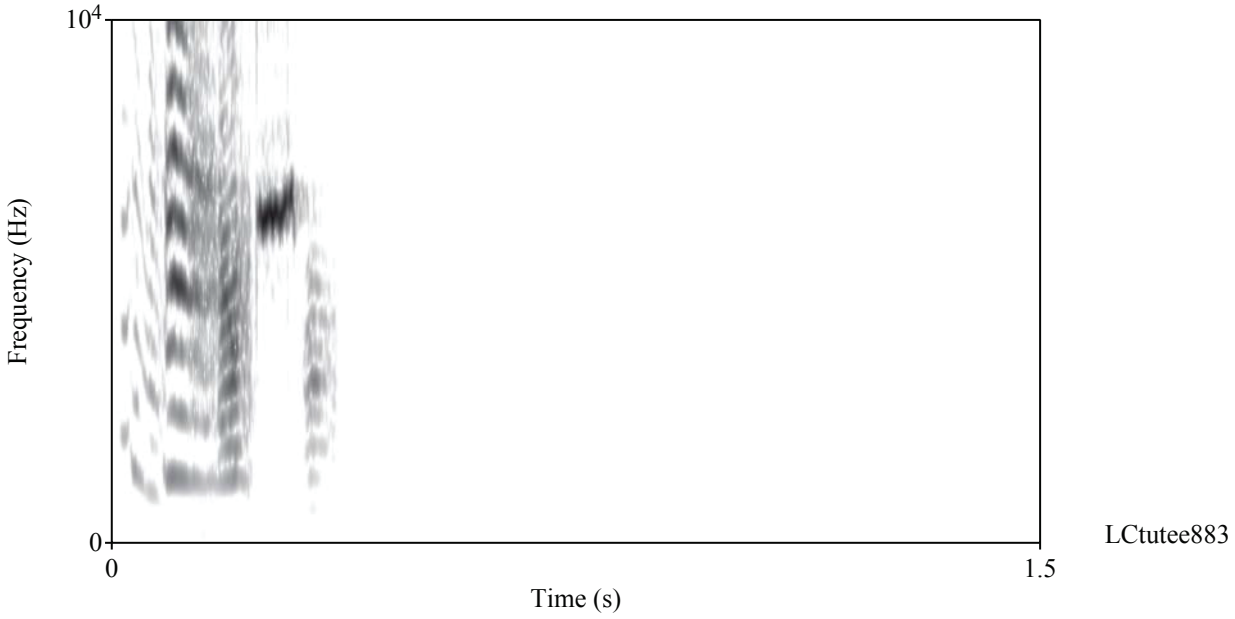
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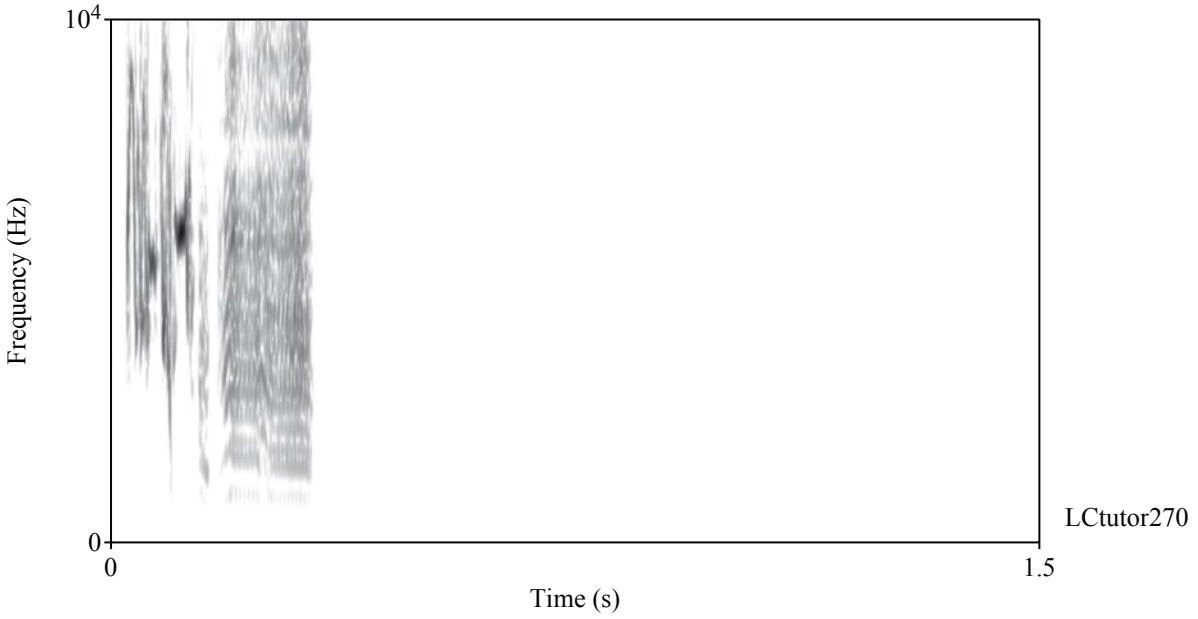
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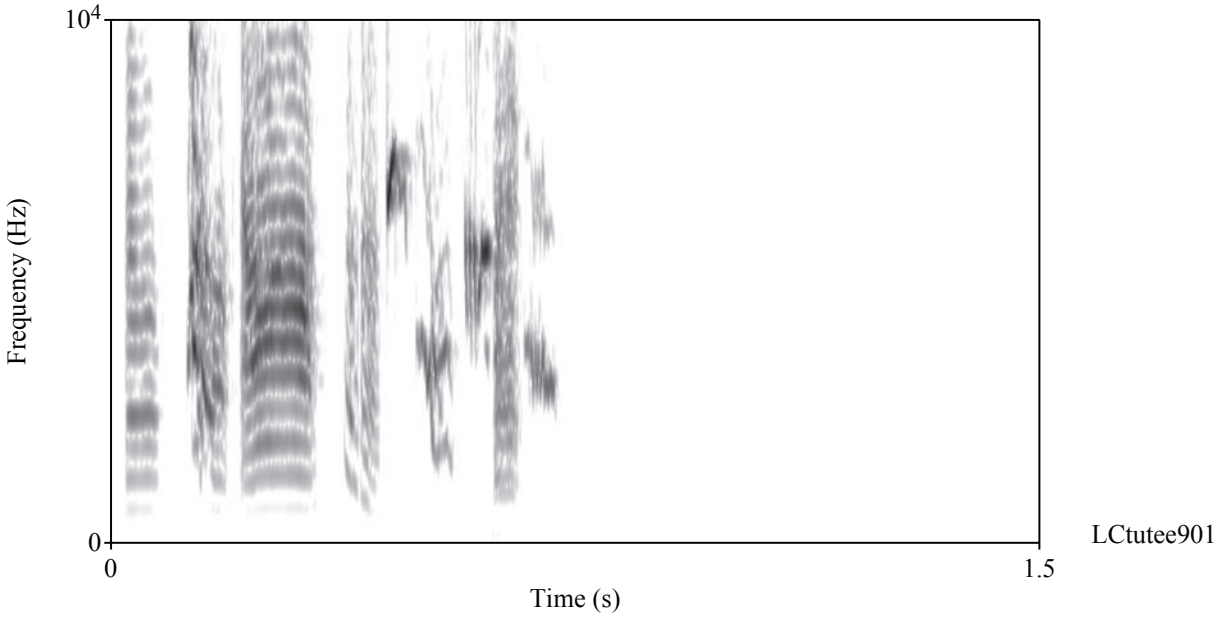
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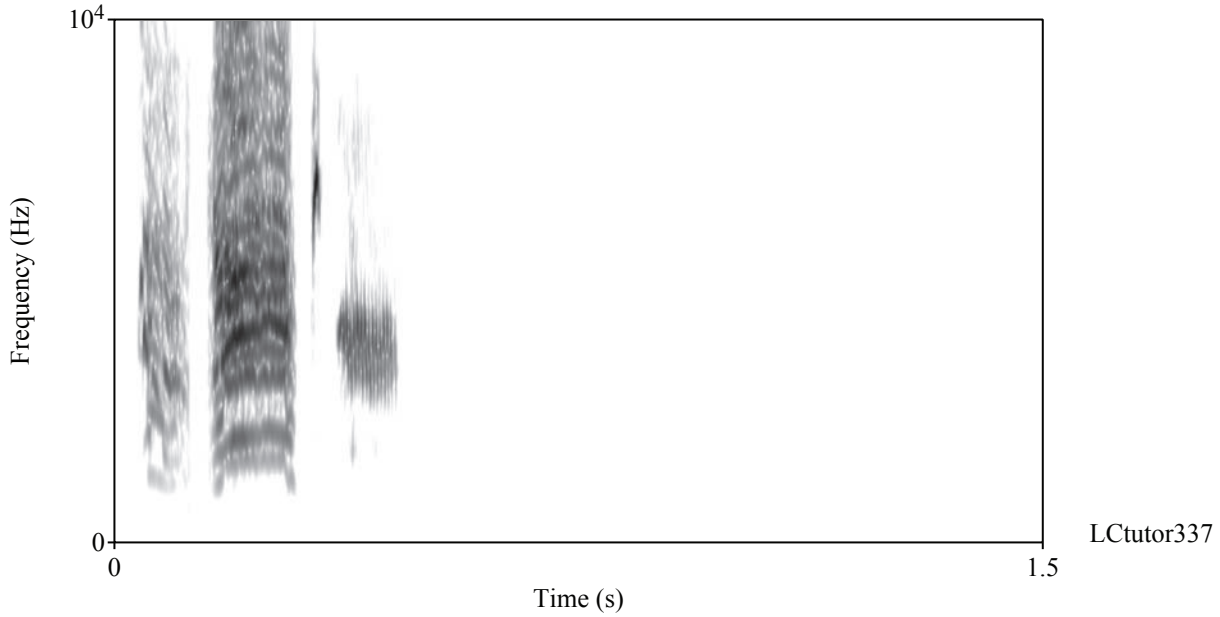
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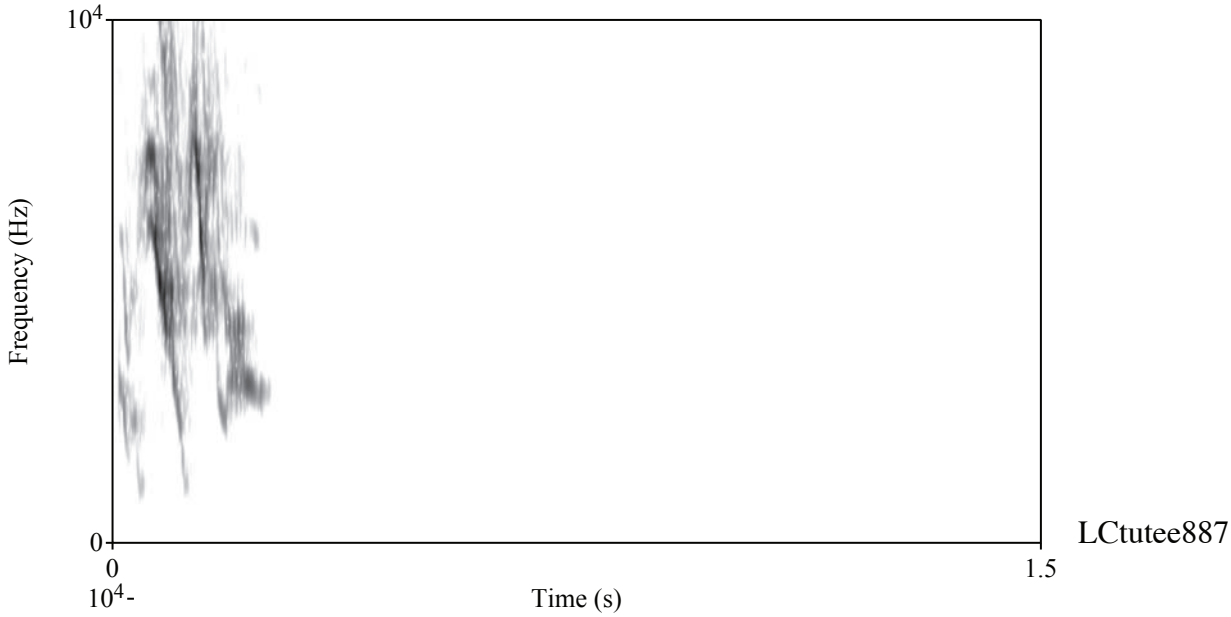
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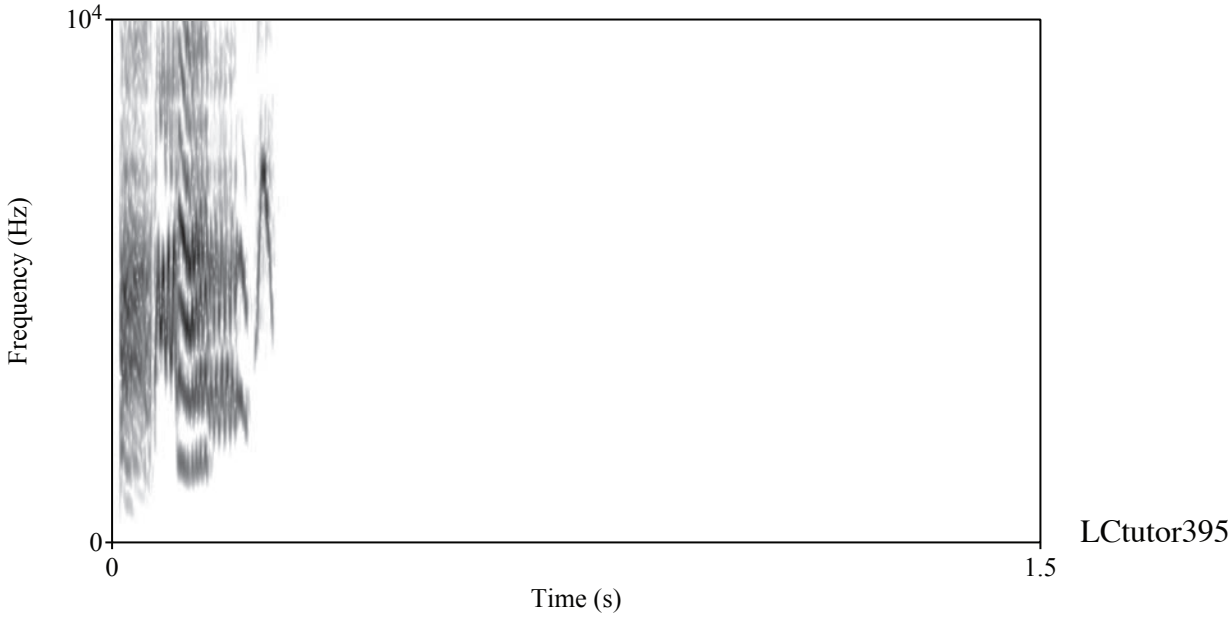
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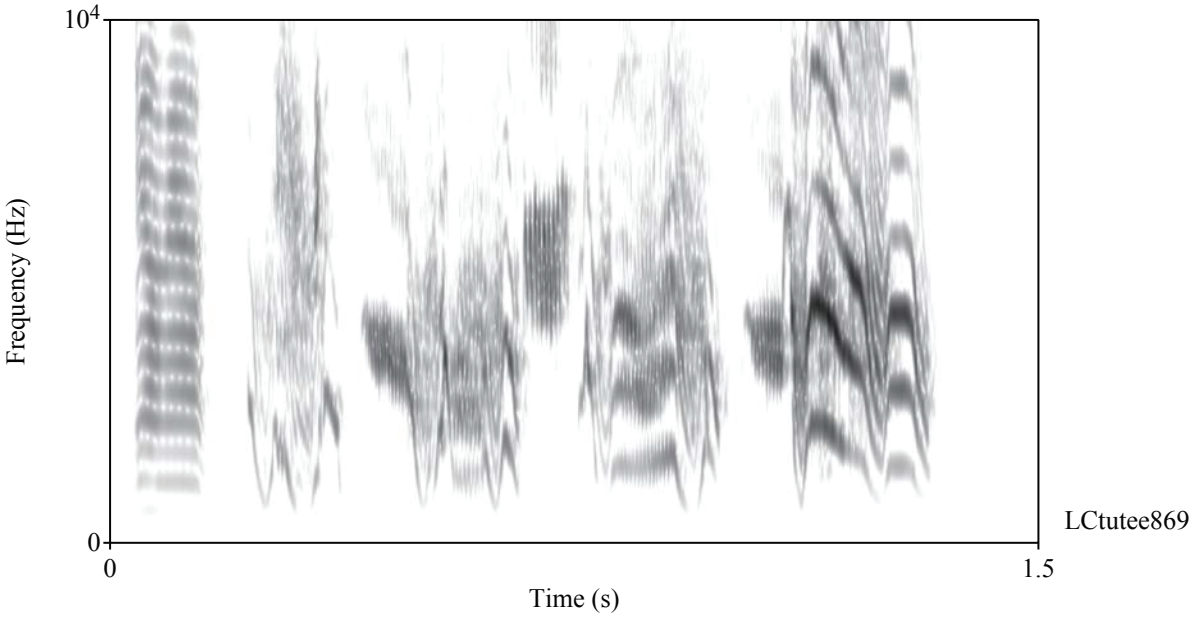
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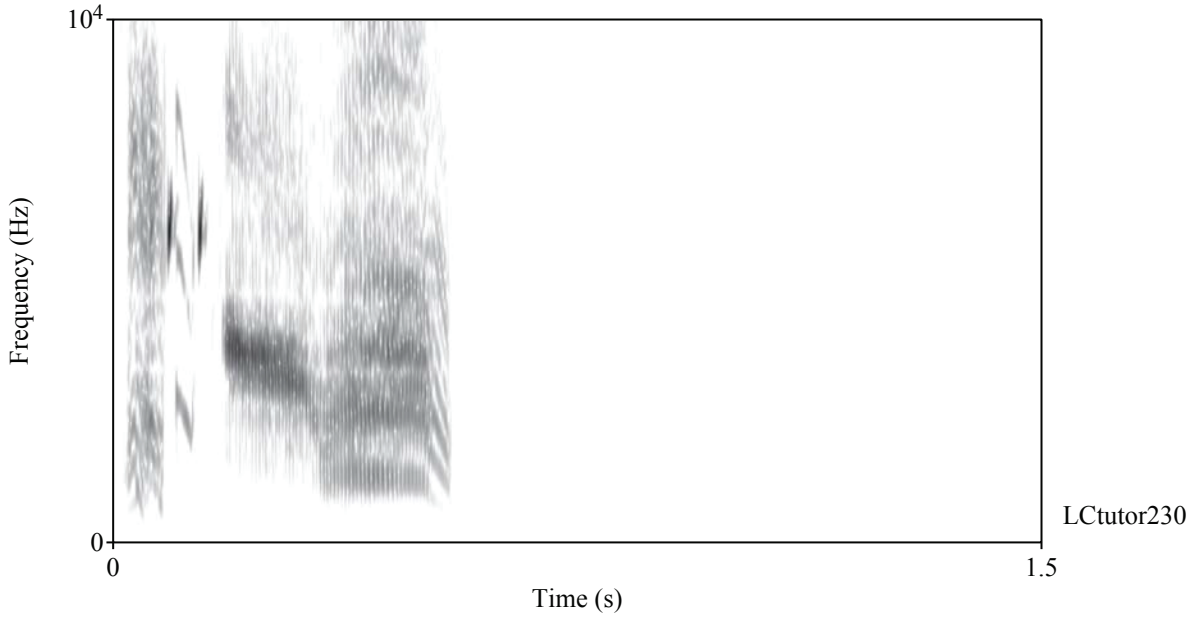
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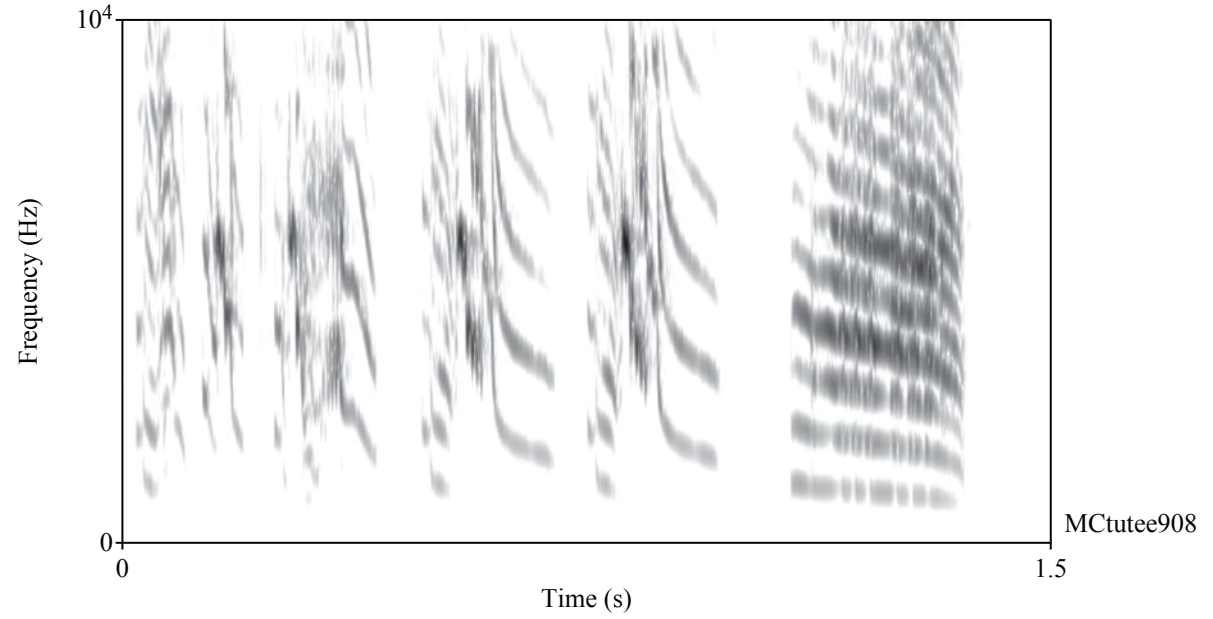
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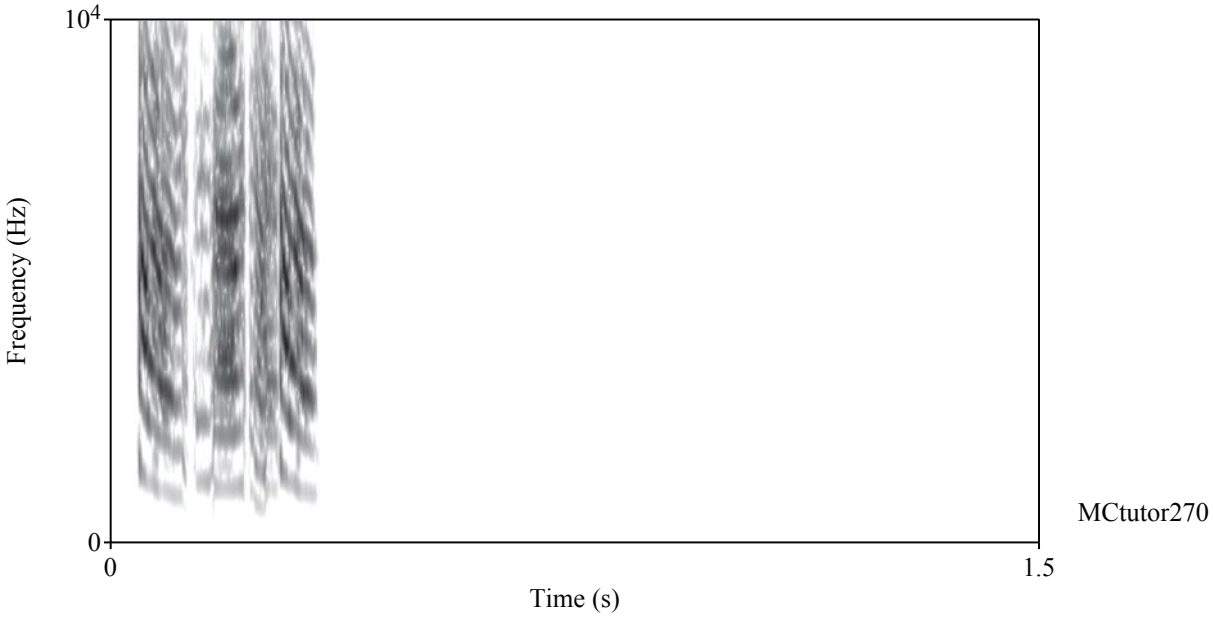
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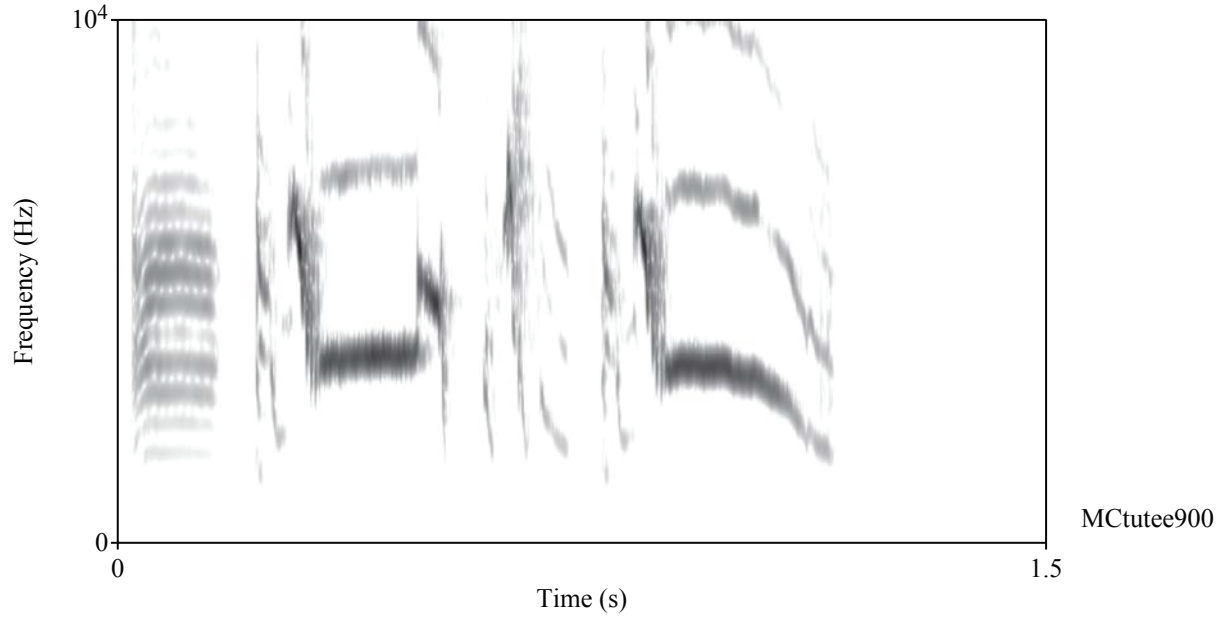
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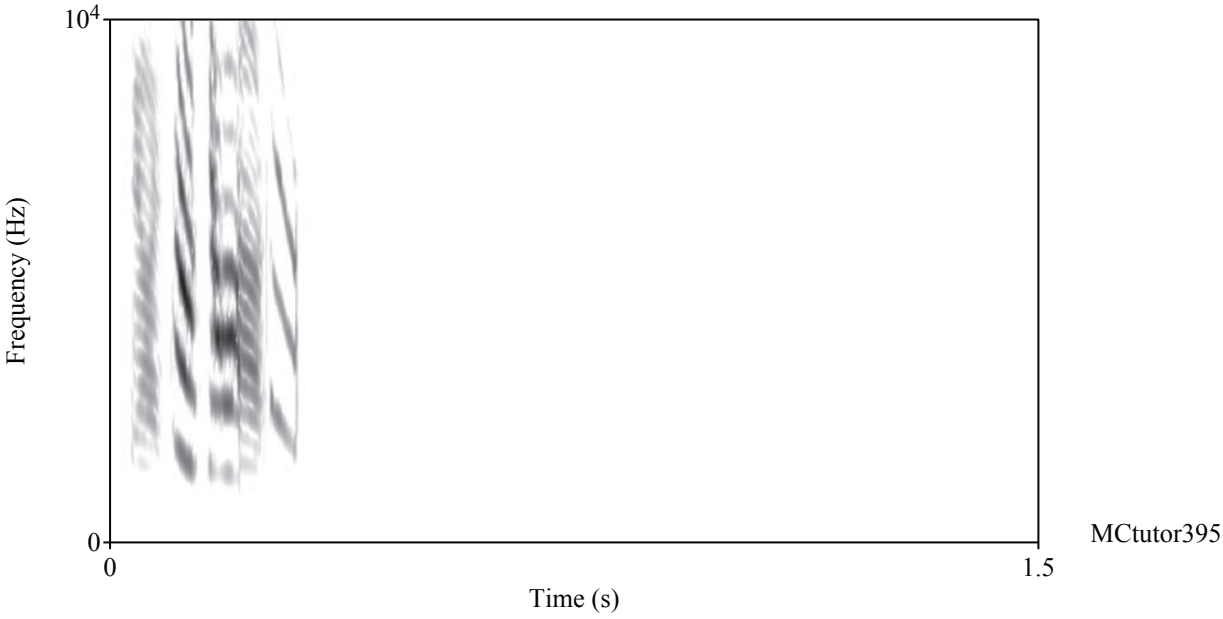
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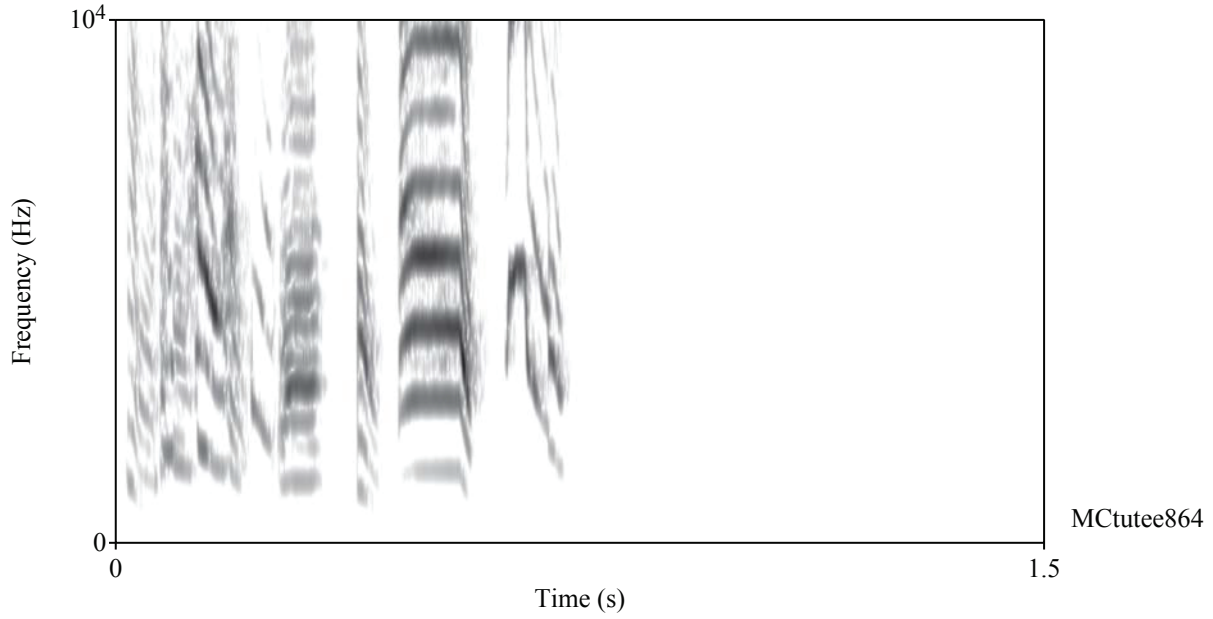
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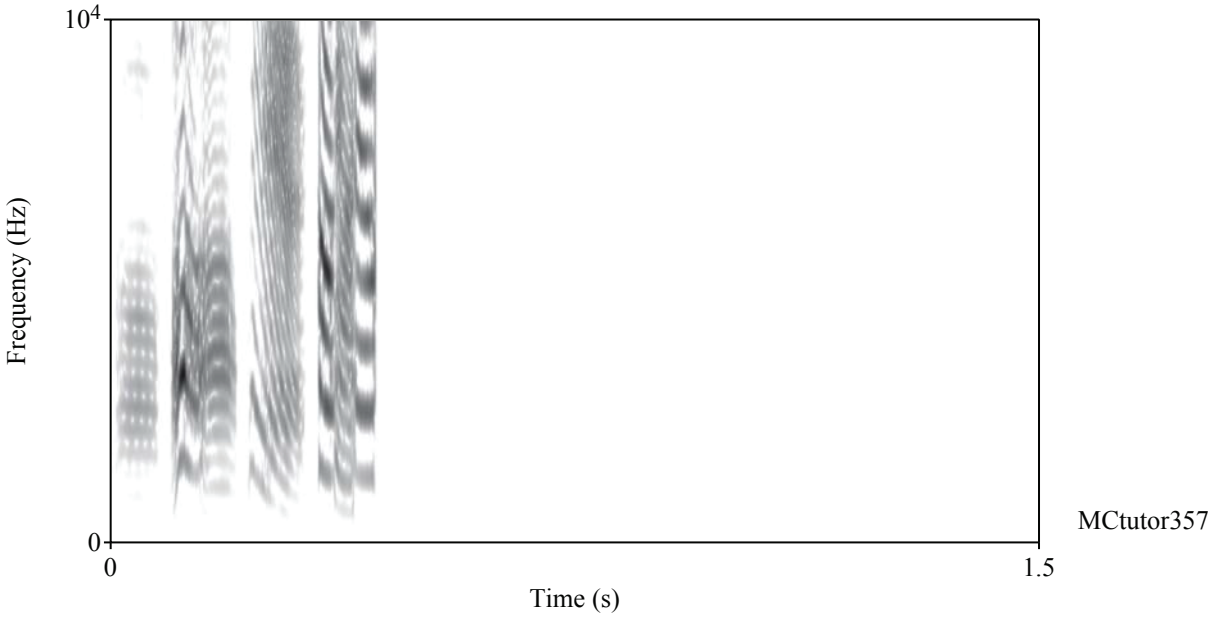
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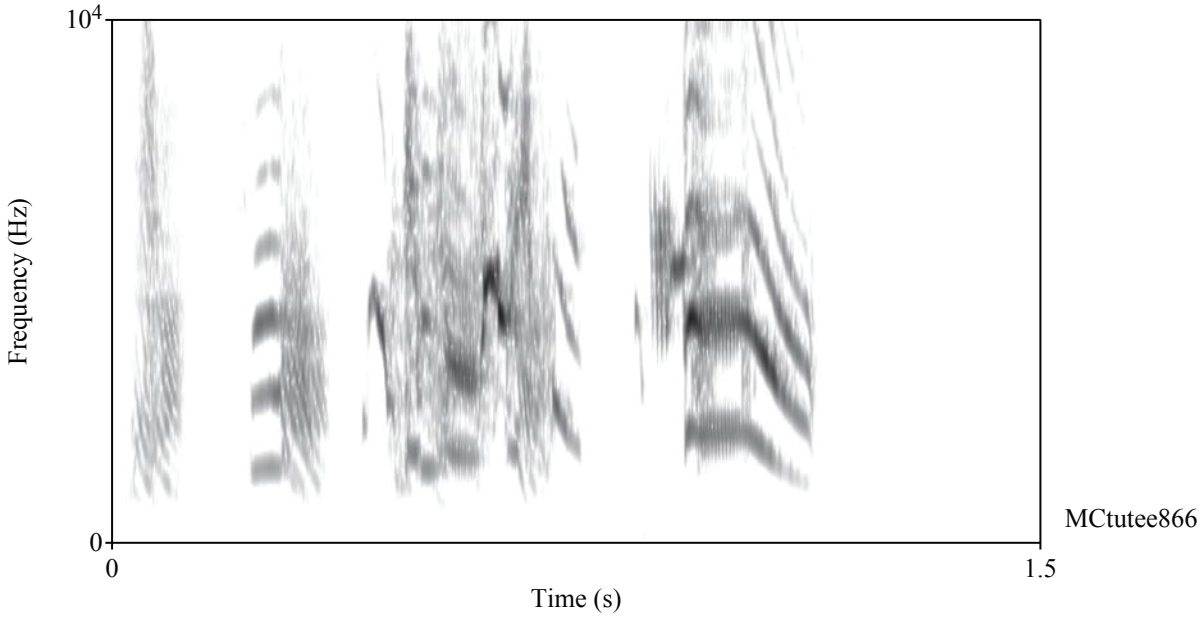
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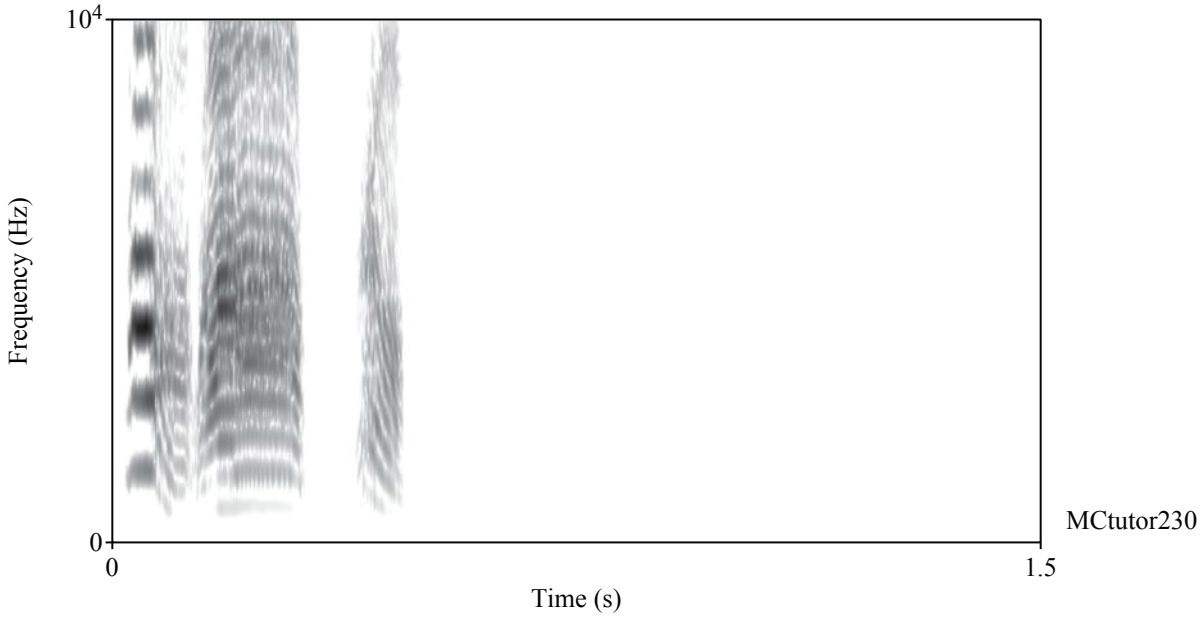
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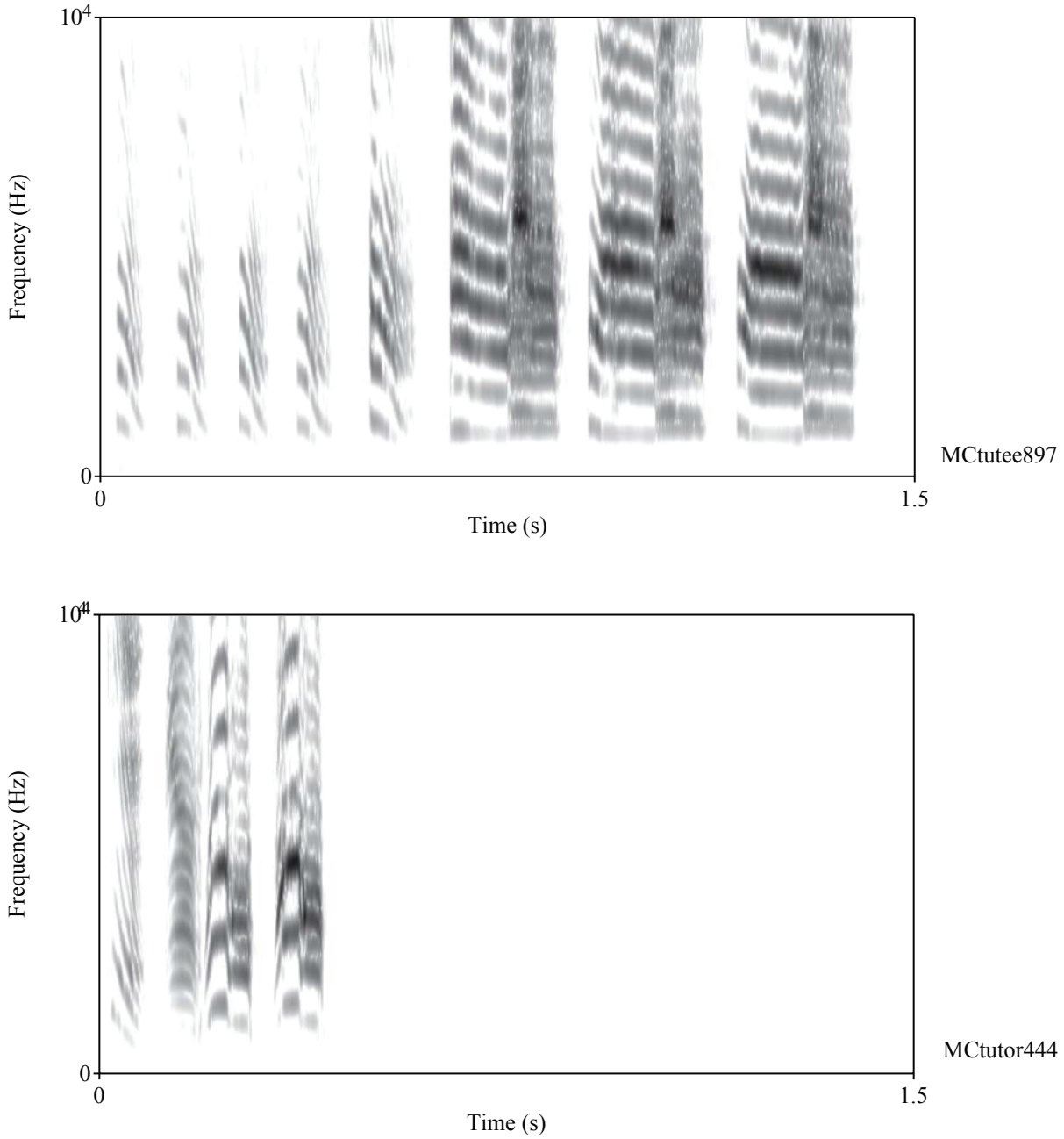
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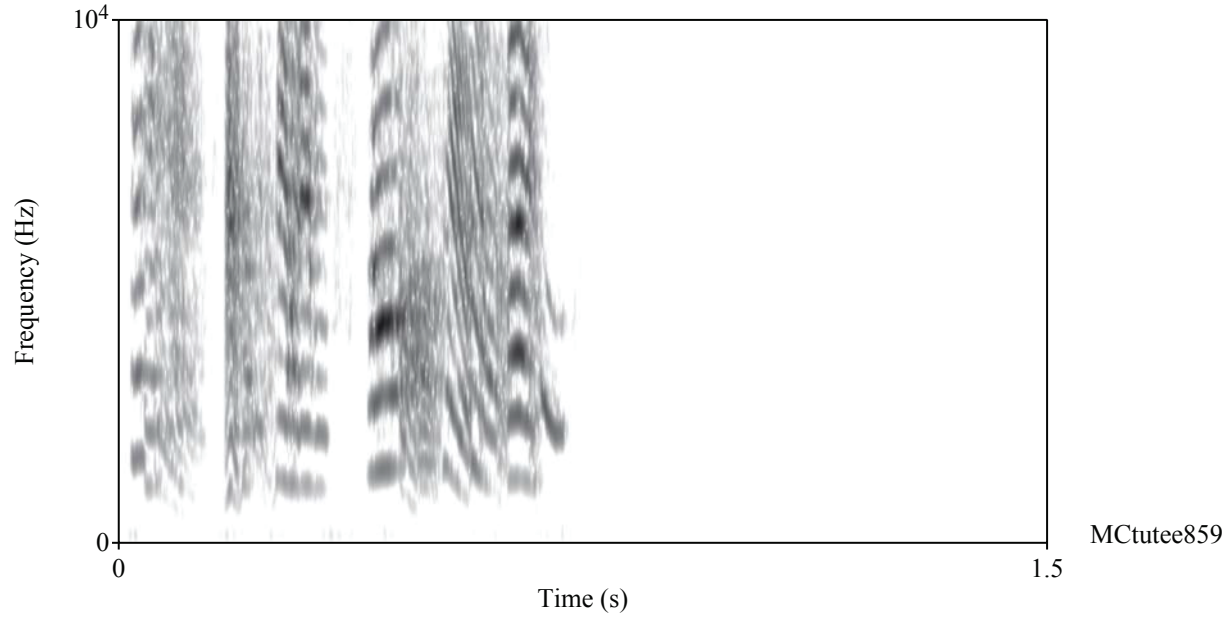
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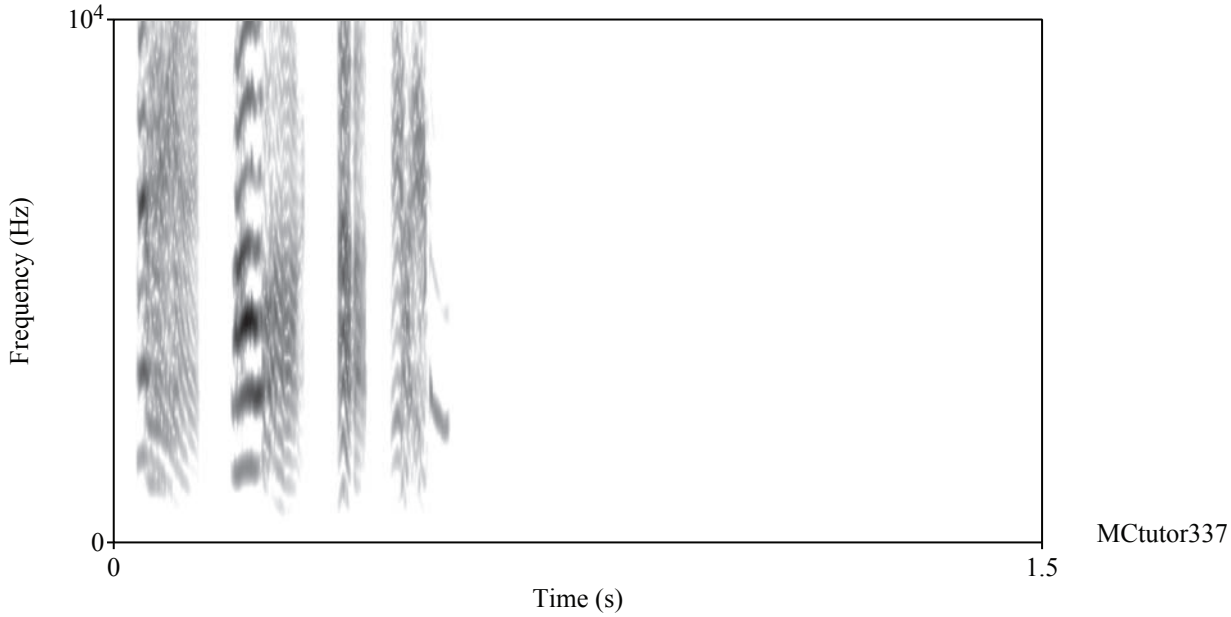
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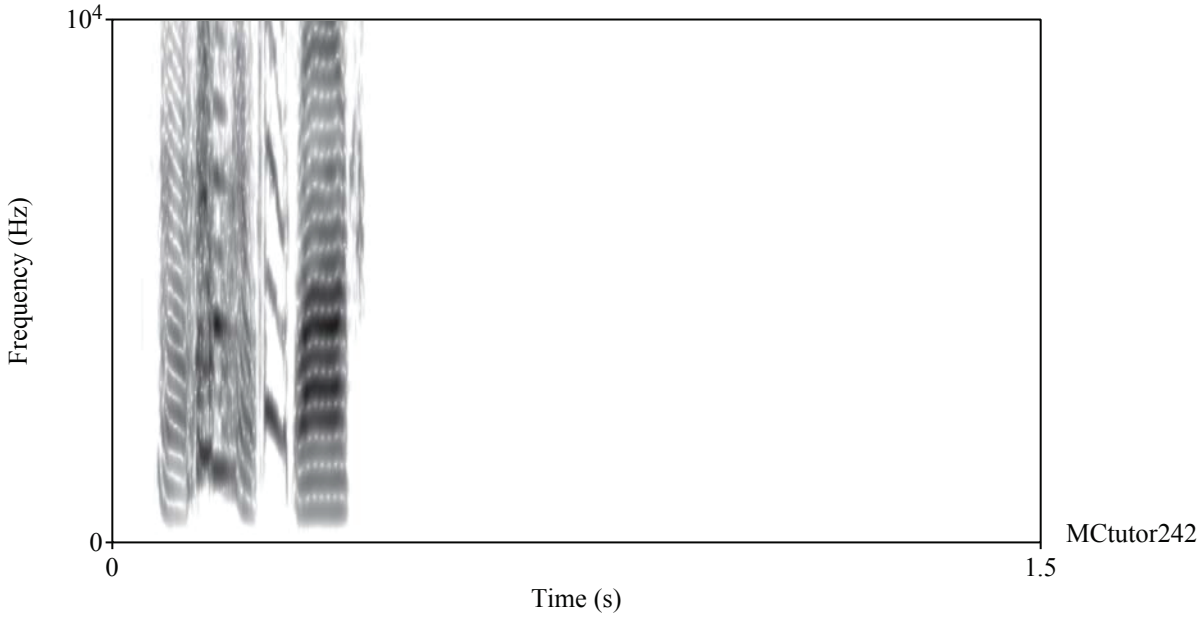
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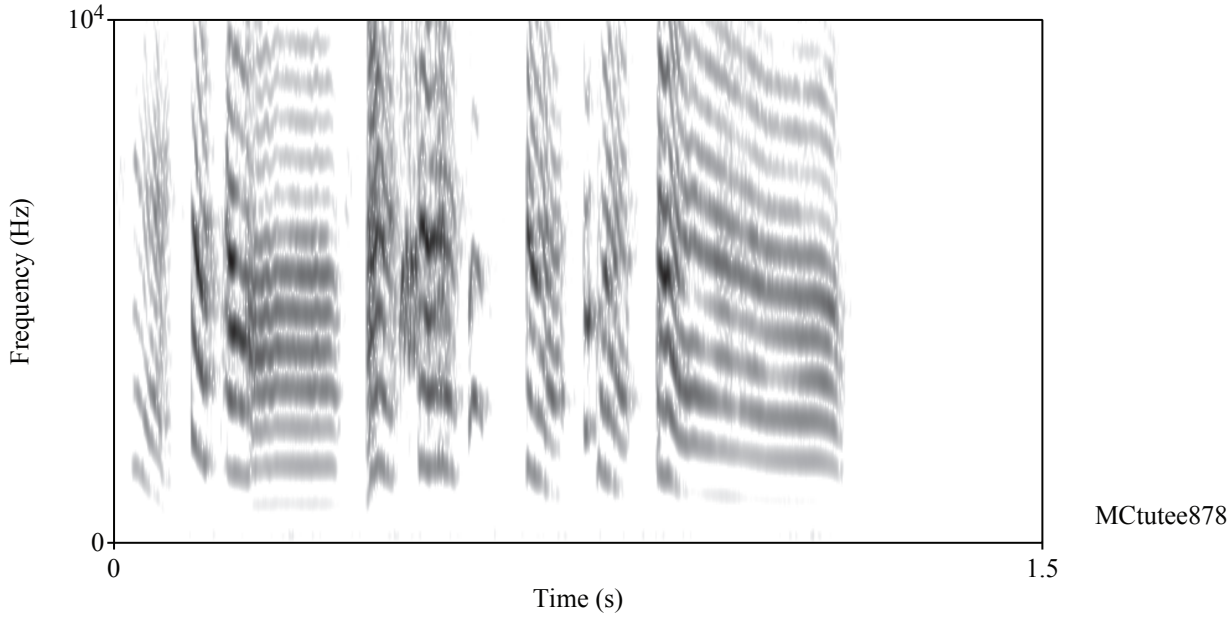
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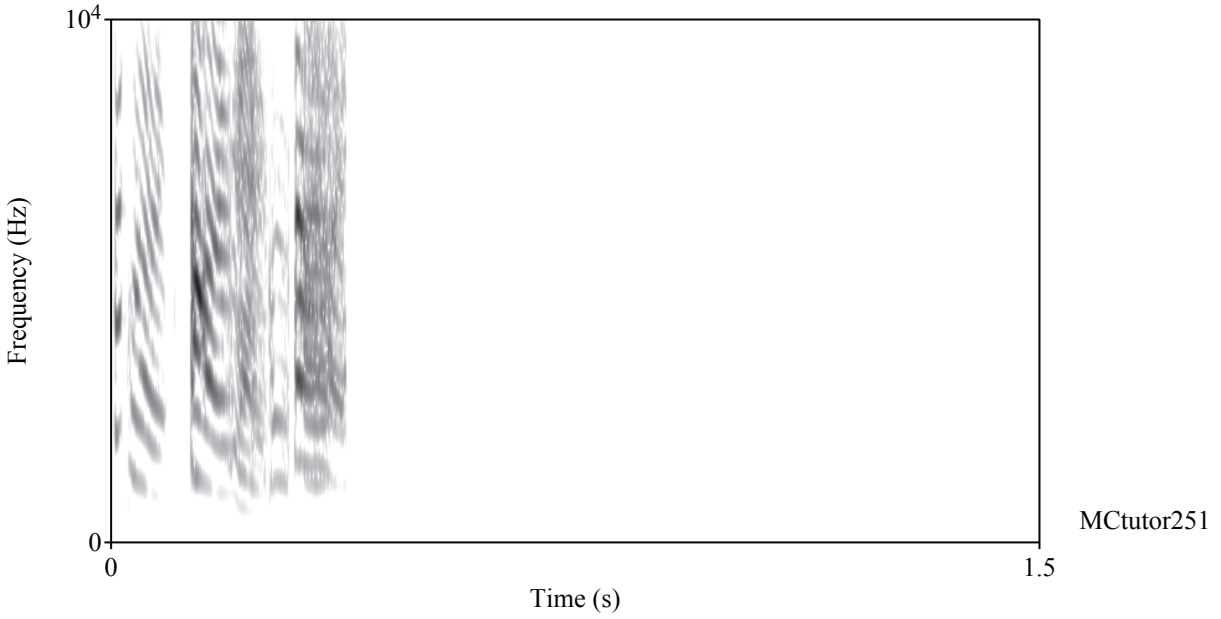
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