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Appendix 1

Canary spectrogram settings used for optimal digital sampling and temporal and acoustic frequency analyses.

Digital Sampling Parameters	**Values**
Sampling rate	22 050 Hz
Sample size	16 bit

Short-Time Fourier Transform Parameters	**Temporal Analysis**	**Frequency Analysis**
Analysis resolution:		
Filter-bandwidth	690.24 Hz	345.12 Hz
Framelength	5.752 ms	11.5 ms
Grid resolution:		
Time	0.719 ms	2.876 ms
Frequency	21.73 Hz	5.433 Hz
Overlap	87.5%	75%
Window function	hanning	hanning
Amplitude	logarithmic	logarithmic
Clipping level	-80 dB	-80 dB
Display style	smooth	smooth

Appendix 2

Sequence of syllables sung by male 1 (1990) in 6 min. of song.

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Appendix 3

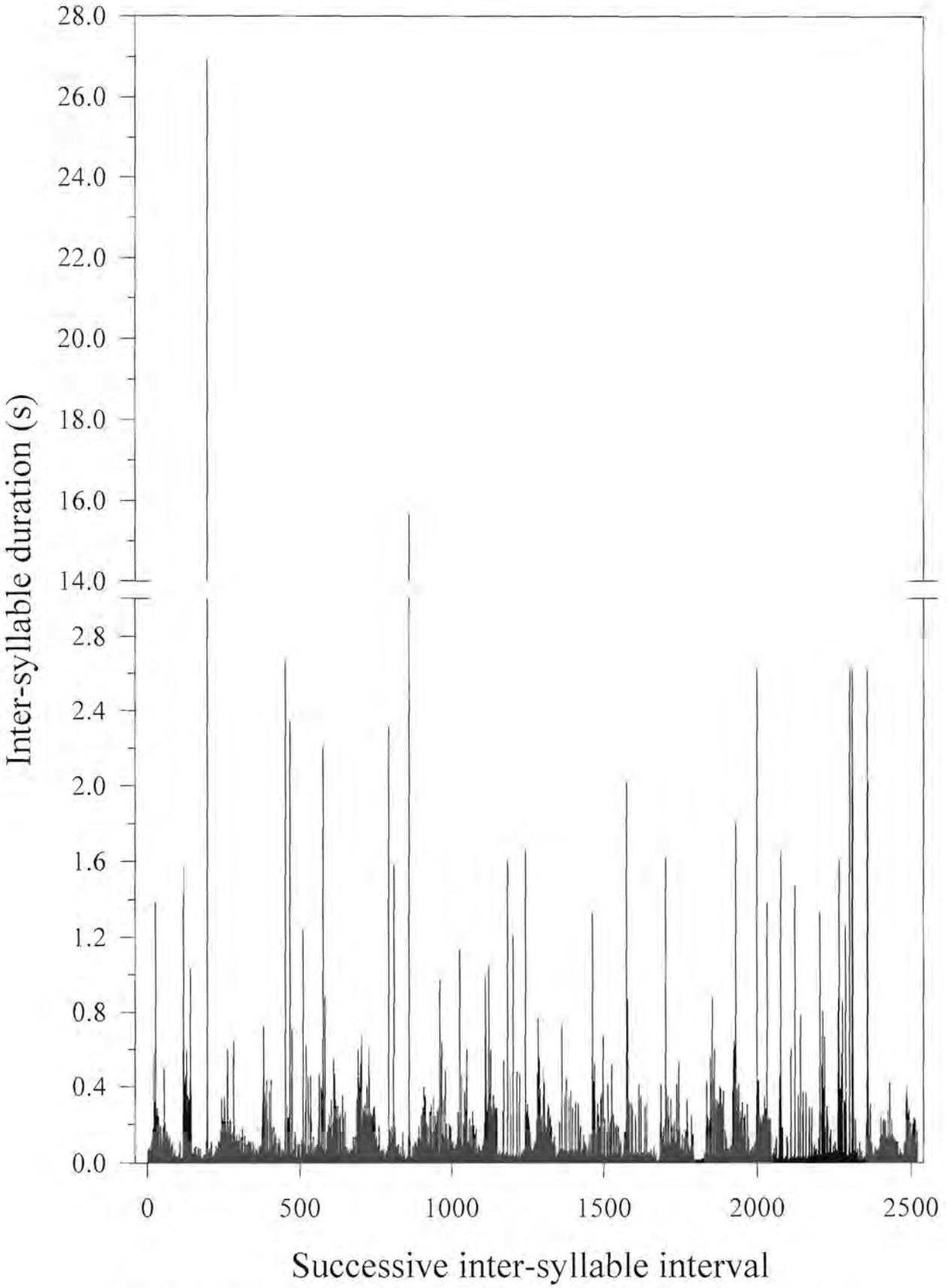

Figure 1. Durations of 2521 successive inter-syllable intervals of male 1 in 10 minutes of continuous, natural singing.

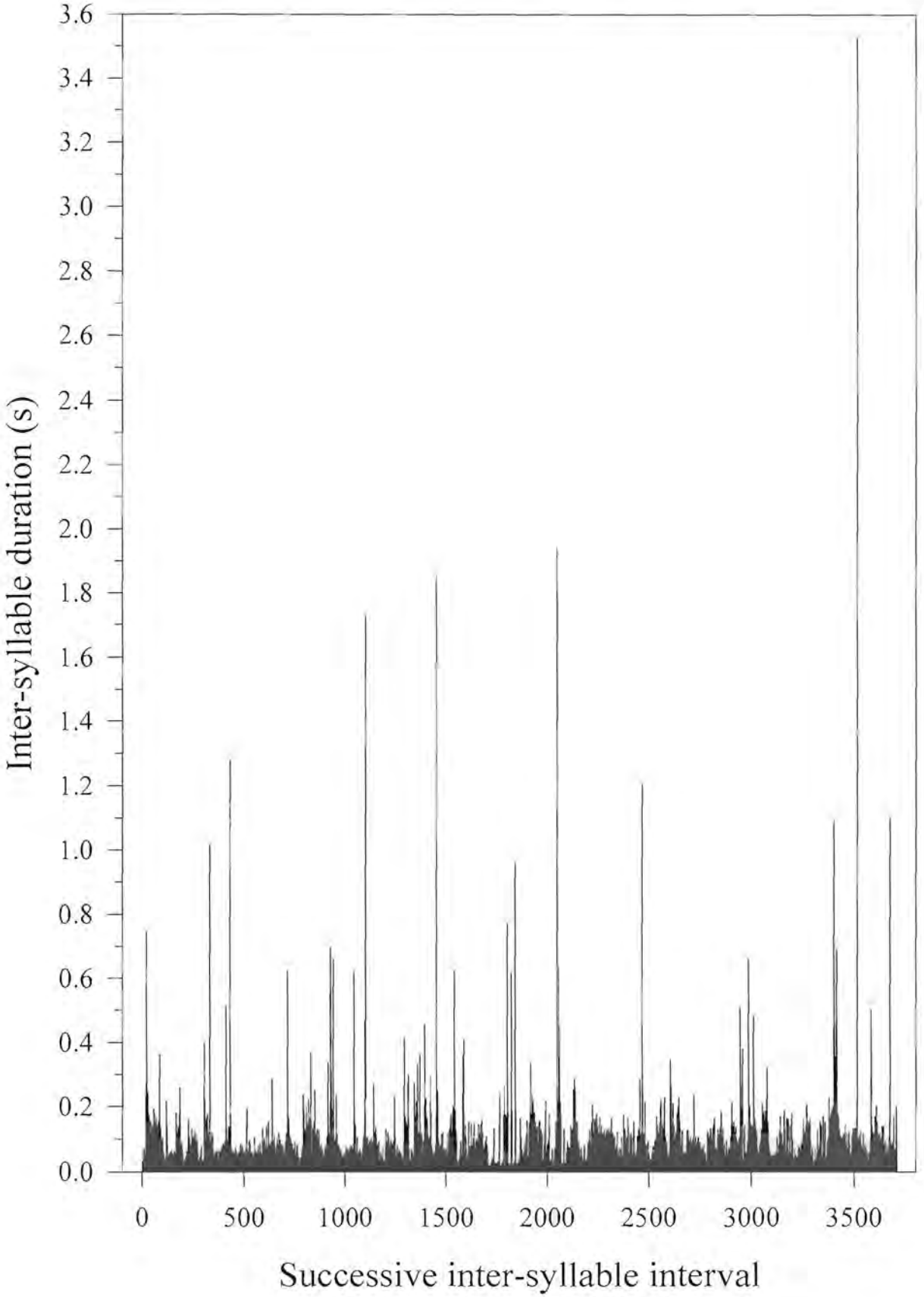

Figure 2. Durations of 3709 successive inter-syllable intervals of male 4 in 10 minutes of continuous, natural singing.

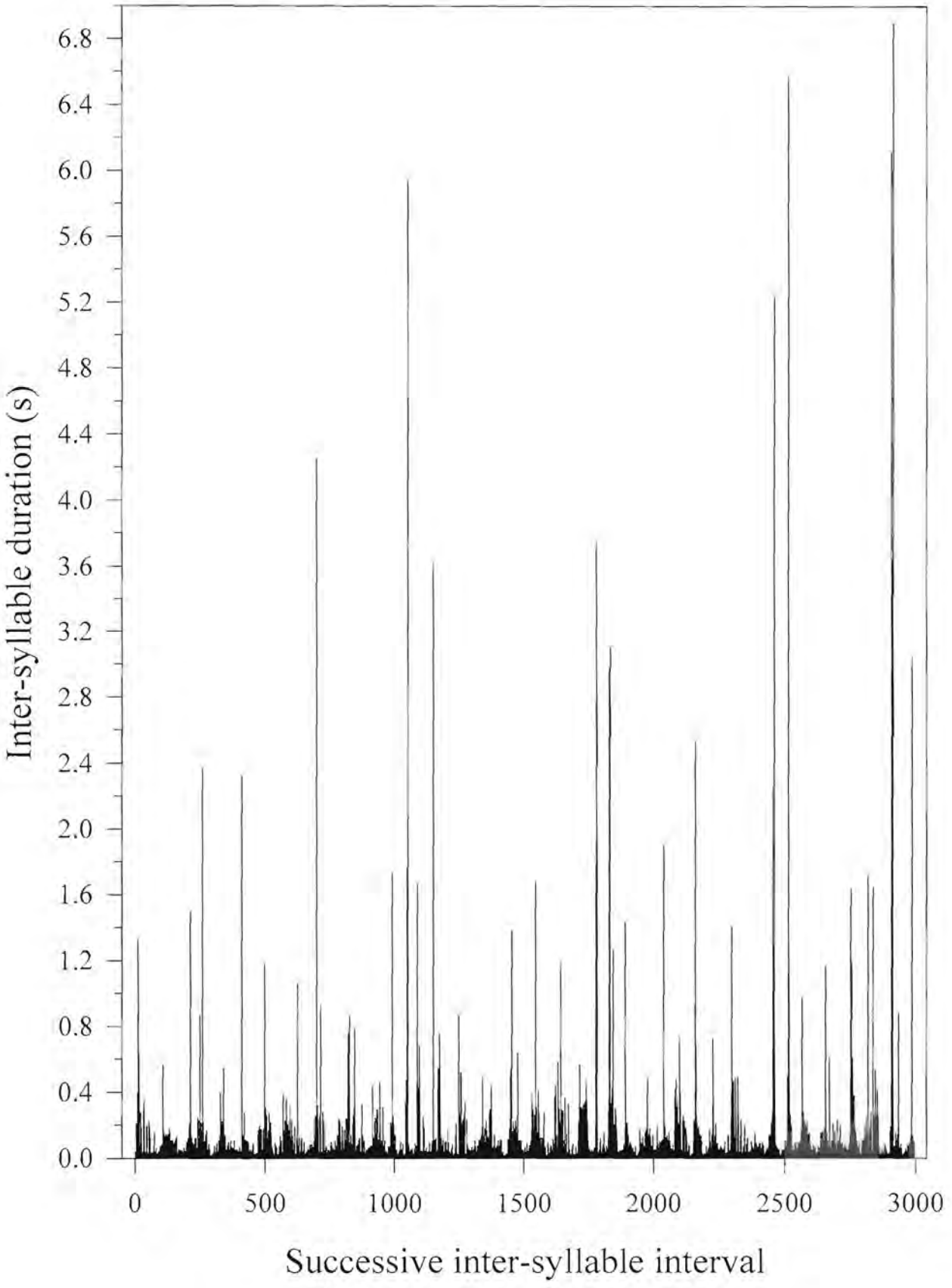

Figure 3. Durations of 2995 successive inter-syllable intervals of male 5 in 10 minutes of continuous, natural singing.

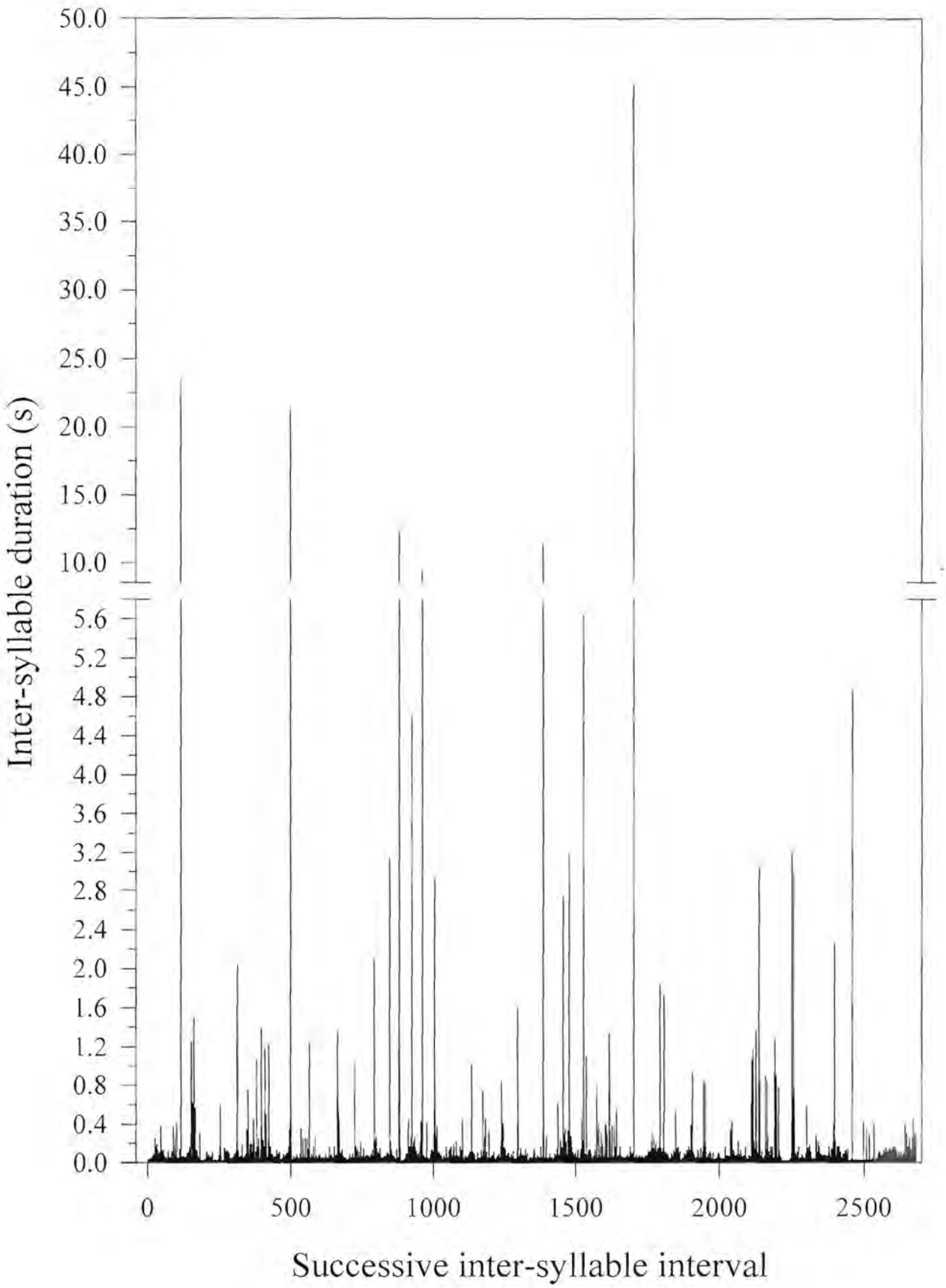

Figure 4. Durations of 2680 successive inter-syllable intervals of male 9 in 10 minutes of continuous, natural singing.

Appendix 4

Canary spectrogram settings used for optimal digital sampling and temporal and acoustic frequency analyses.

Digital Sampling Parameters	Values
Sampling rate	22 050 Hz
Sample size	16 bit

Short-Time Fourier Transform Parameters	Temporal Analysis	Frequency Analysis
Analysis resolution:		
Filter-bandwidth	5521.90 Hz	21.57 Hz
Framelength	0.719 ms	184.1 ms
Grid resolution:		
Time	0.1797 ms	0.1797 ms
Frequency	5.433 Hz	5.433 Hz
Overlap	75%	75%
Window function	hanning	hanning
Amplitude	logarithmic	logarithmic
Clipping level	-80 dB	-80 dB
Display style	smooth	smooth

Appendix 5

Putative syllable types (PSTs) and total numbers of these types identified in male 1's and 4's repertoires by qualitative analysis. Asterisks indicate PSTs that were excluded from uni- and multivariate analyses (U&MVAs) because sample sizes were too low (N<5). Numbers of PSTs excluded from (no. excl.) and included in (no. incl.) U&MVAs are reported. PSTs 87, 89 and 91 that were merged after quantitative analysis are shown.

	Male 1: Syllable Type Analysis				Male 4: Syllable Type Analysis			
	Qualitative		U&MVA		Qualitative		U&MVA	
Syllable type group	PST	Total no.	No. excl.	No. incl.	PST	Total no.	No. excl.	No. incl.
1	1, 2, 3*, 4, 5, 6, 7, 8, 9*	9	2	7	1, 2, 3, 5, 7, 8, 9*, 10, 11*	9	2	7
2	12, 13, 14, 16, 17*, 18, 19	7	1	6	12, 14, 15, 16, 17*, 20*, 33	7	2	5
3	21, 22, 24, 25, 26, 27, 28, 29*, 30, 32	10	1	9	21, 22, 23*, 24, 25, 26, 27, 28, 30, 31, 32, 34	12	1	11
4	35, 37, 38, 39, 40, 43, 45, 46, 47, 49*, 50, 52	12	1	11	35*, 36, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 51, 53*, 54	16	2	14
5	55*, 63, 64, 65*, 66, 67, 69*, 70, 73, 75*, 78, 79, 82, 83*, 85*, **87[1]**, 88, **89[1]**, **91[1]**, 94*, 95*, 96*, 101, 102, 103, 105, 106, 107, 108, 109, 110, 111*, 112, 114*, 117, 118, 119, 120, 121, 122*, 123, 124*, 125*, 128*, 130, 131, 132, 133*, 134*, 135, 136*, 137*, 138*, 139*, 140, 141*, 142*, 143*, 144, 145*, 146*, 151*, 152, 153*, 154*	65	29	36	55, 56*, 57*, 58*, 59*, 60*, 61*, 62*, 63, 64, 67, 68, 71, 72, 73, 74, 76*, 77, 78*, 80, 81, 82, 84*, 86*, 87*, 90*, 92, 93*, 96, 97*, 98*, 99*, 100*, 101, 103, 104, 107, 108, 112, 113, 115*, 116*, 118, 119, 120, 123, 124*, 126*, 127*, 129*, 130*, 131*, 135, 137*, 141*, 142*, 144*, 147*, 148*, 149*, 150*, 152*, 155*, 156*, 157*, 158*, 159*	67	40	27
6	160, 161, 162*, 163*, 164, 165*, 166, 167*	8	4	4	162*, 163*, 164*	3	3	0
Overall totals of PSTs		111	38	73		114	50	64

Appendix 6

Library of spectrograms of putative syllable types (PSTs) determined in male 1's and 4's complete repertoires by qualitative analysis. PSTs are numbered uniquely and referred to by these numbers in my thesis. PSTs 87, 89 and 91 were merged as syllable type 87 in male 1 after quantitative analysis, which indicated that no other changes be made among the PSTs analysed for males 1 and 4 (Refer to Appendix 5).