

VOICE EVALUATION

Client's Name: \_\_\_\_\_ Referral Source: \_\_\_\_\_  
Address: \_\_\_\_\_ Examiner: \_\_\_\_\_  
Phone: \_\_\_\_\_ Type of Disorder \_\_\_\_\_  
Age: \_\_\_\_\_ Birthdate: \_\_\_\_\_ Date of Exam: \_\_\_\_\_

I. PHYSICAL MECHANISM

A. Breathing

\_\_\_\_\_ clavicular  
\_\_\_\_\_ abdominal  
\_\_\_\_\_ thoracic  
\_\_\_\_\_ shortness of breath  
\_\_\_\_\_ audible breathing  
\_\_\_\_\_ shoulder movement during breathing  
\_\_\_\_\_ speaks on residual air

B. Breath control

\_\_\_\_\_ seconds can count on one breath  
\_\_\_\_\_ no. can count on one breath

Sustains

s-s-s: \_\_\_\_\_ seconds  
z-z-z: \_\_\_\_\_ seconds  
ah (on normal inhalation) : \_\_\_\_\_ seconds  
ah (on deep inhalation): \_\_\_\_\_ seconds  
ee: \_\_\_\_\_ seconds

C. Tension Sites

\_\_\_\_\_ abdominal  
\_\_\_\_\_ chest  
\_\_\_\_\_ upper chest  
\_\_\_\_\_ neck  
\_\_\_\_\_ mandible  
\_\_\_\_\_ face  
\_\_\_\_\_ lips

D. Hearing Acuity

\_\_\_\_\_ has aid  
\_\_\_\_\_ has aid but is not wearing  
\_\_\_\_\_ is wearing aid  
\_\_\_\_\_ hearing normal  
\_\_\_\_\_ has loss but needs no aid  
\_\_\_\_\_ school health record shows history of screening test results

Date of most recent hearing test \_\_\_\_\_

Results:

	LEFT	RIGHT	COMMENTS
AIR			
BONE			

## II. PHONATION

### A. Intensity

_____ normal	_____ able to imitate loud volume
_____ too loud	_____ able to imitate soft volume
_____ too soft	_____ able to imitate a shout
_____ varies in intensity	

### B. Quality

_____ normal	_____ production of /m/ is abnormal
_____ breathy	_____ production of /n/ is abnormal
_____ harsh/rough	_____ production of /ng/ is abnormal
_____ monotone	

### C. Resonance Balance

_____ hyponasal	_____ assimilative nasality
_____ hypernasal	_____ normal resonance

### D. Voice characteristics under varying conditions

CONDITION	CHARACTERISTIC	
	Same as Habitual	Difference from Habitual
----- a. louder than habitual		
----- b. softer than habitual		
----- c. lower pitch than habitual		
----- d. higher pitch than habitual		
----- e. more jaw activity than habitual		
----- f. less jaw activity than habitual		
----- g. faster rate than habitual		
----- h. slower rate than habitual		
-----		

E. Related Observations

- \_\_\_\_\_ clearing of throat
- \_\_\_\_\_ infrequent pitch breaks
- \_\_\_\_\_ frequent pitch breaks
- \_\_\_\_\_ phonation interspersed with whispering
- \_\_\_\_\_ hard glottal attack
- \_\_\_\_\_ pinched throat
- \_\_\_\_\_ muscular contractions exhibited during phonation are similar to those during swallowing
- \_\_\_\_\_ complains of tired throat
- \_\_\_\_\_ diplophonia
- \_\_\_\_\_ complains of chronic tickling
- \_\_\_\_\_ glottal fry
- \_\_\_\_\_ articulation disorder
- \_\_\_\_\_ score on Templin-Darley Diagnostic Test: \_\_\_\_\_
- \_\_\_\_\_ Norm for test: \_\_\_\_\_
- \_\_\_\_\_ spastic dysphonia
- \_\_\_\_\_ aphonia
- \_\_\_\_\_ less than average precision of articulation

F. Rate

Subjective judgment of rate

- \_\_\_\_\_ normal
- \_\_\_\_\_ too fast
- \_\_\_\_\_ too slow

"The Amplifier Passage" rate: \_\_\_\_\_

G. Pitch

- a. Pitch range: \_\_\_\_\_ lowest note                  \_\_\_\_\_ highest note
- \_\_\_\_\_ normal                                  \_\_\_\_\_ restricted
- b. Optimal Pitch: \_\_\_\_\_
- c. Habitual pitch: \_\_\_\_\_
- d. \_\_\_\_\_ speaks in a monotone
- \_\_\_\_\_ is able to imitate inflectional patterns
- \_\_\_\_\_ is able to imitate sequential pitch patterns
- \_\_\_\_\_ has done formal singing
- part client sings: \_\_\_\_\_

III. CLINICAL IMPRESSIONS OF THE CLIENT

<input type="checkbox"/> excessive postural changes	<input type="checkbox"/> embarrassed
<input type="checkbox"/> quiet and shy	<input type="checkbox"/> interested
<input type="checkbox"/> poor eye contact	<input type="checkbox"/> overly concerned
<input type="checkbox"/> tense	<input type="checkbox"/> apathetic
<input type="checkbox"/> hostile	<input type="checkbox"/> shortness of breath
<input type="checkbox"/> pleasant	

Behavioral Description:

IV. MEDICAL DIAGNOSIS

V. SUMMARY OF HOME OBSERVATIONS BY PARENT

VI. SUMMARY OF OBSERVATIONS BY CLINICIAN

VII. SUMMARY OF OBSERVATION BY CLASSROOM TEACHER

VIII. FINAL SUMMARY AND RECOMMENDATIONS

TABLE 2. Normative data on maximum phonation duration (in seconds except for the coefficient of variation, C, which is dimensionless) for vowel /a/. M = male; F = female.

Source	Subjects	Sex	M	SD	Range	C
Harden & Looney (1984)	6-year-olds	M	10.4	5.1	3.8-16.8	.49
		F	10.6	6.3	6.2-30.6	.59
Beckett et al. (1971)	7-year-olds	M	14.2	3.3	12.0-22.0	.23
		F	15.4	2.7	9.0-19.0	.175
Finnegan (1984)	3-year-olds	M	7.9	1.81	4.38-11.46	.23
	3-year-olds	F	6.3	1.76	2.84-9.72	.28
	4-year-olds	M	10.0	2.51	5.08-14.90	.25
	4-year-olds	F	8.7	1.84	5.26-12.46	.21
	5-year-olds	M	10.1	3.05	4.15-16.09	.30
	5-year-olds	F	10.5	2.57	5.44-15.50	.24
	6-year-olds	M	13.9	2.98	8.06-19.74	.21
	6-year-olds	F	13.8	3.65	6.66-20.96	.26
	7-year-olds	M	14.6	2.82	9.11-20.15	.19
	7-year-olds	F	13.7	2.45	8.88-18.48	.18
	8-year-olds	M	16.8	4.51	7.98-25.64	.27
	8-year-olds	F	17.1	4.62	8.07-26.17	.27
	9-year-olds	M	16.8	6.07	4.94-28.72	.36
	9-year-olds	F	14.5	3.78	7.07-21.87	.26
	10-year-olds	M	22.2	4.74	12.91-31.49	.21
	10-year-olds	F	15.9	5.99	4.14-27.62	.38
	11-year-olds	M	19.8	3.79	12.43-27.27	.19
	11-year-olds	F	14.8	2.06	10.73-18.79	.14
	12-year-olds	M	20.2	5.72	9.02-31.44	.28
	12-year-olds	F	15.2	3.87	7.58-22.74	.25
	13-year-olds	M	22.3	8.19	6.29-38.29	.37
	13-year-olds	F	19.2	4.58	10.27-28.21	.24
	14-year-olds	M	22.3	6.89	8.84-35.84	.31
	14-year-olds	F	18.8	5.15	8.76-28.94	.27
	15-year-olds	M	20.7	5.32	10.32-31.16	.26
	15-year-olds	F	19.5	4.66	10.40-29.93	.24
	16-year-olds	M	21.0	4.40	12.43-29.66	.21
	16-year-olds	F	21.8	4.47	13.09-30.61	.20
	17-year-olds	M	28.7	7.08	14.83-42.57	.25
	17-year-olds	F	22.0	6.30	9.65-34.33	.29
Lewis et al. (1982)	8-year-olds	M	20.0	-	11.5-24.5	
	8-year-olds	F	19.1	-	11.9-23.0	
	10-year-olds	M	24.9	-	15.9-39.0	
	10-year-olds	F	16.5	-	12.9-21.8	

phonatory function. It is beyond the scope and purpose of this paper to consider them in detail, but several possible analyses are described in the literature. If a spectrograph is available, then spectrograms can be used to describe or measure various features of the acoustic pattern (Rontal, Rontal, & Rolnick, 1975; Yanagihara, 1967). Vocal tremor, noise, voice breaks, and other irregularities are features to be noted. Using a graphic level recorder, the noise level

in the spectrum can be estimated to derive the spectral noise level (SNL), defined as the lowest peak marking of the graphic level recorder stylus in each 100-Hz section of the spectrum (Arnold & Emanuel, 1979; Emanuel, Lively, & McCoy, 1973; Emanuel & Sansone, 1969; Emanuel & Whitehead, 1979; Hanson & Emanuel, 1979). Perturbations in fundamental frequency (jitter) and amplitude (shimmer) also can be derived from the sustained

TABLE 2. continued

Source	Subjects	Sex	M	SD	Range	C
Williams (1977)	8-year-olds	M	13.3	2.5	-	.19
	8-year-olds	F	13.6	5.2	-	.38
	11-year-olds	M	17.8	4.7	-	.26
	11-year-olds	F	15.8	4.1	-	.26
Child (1979)	10-year-olds	M	20.2	4.7	-	.23
	10-year-olds	F	15.1	4.3	-	.28
Reich et al. (1986)	8.5-10.4 years	F	14.3	4.69	-	.33
Ptacek & Sander (1963)	Young adults	M	22.6	8.1	9.3-43.3	.36
		F	15.2	5.0	6.2-28.4	.33
Ptacek et al. (1966)	Young adults	M	24.6	6.7	12.5-36.0	.27
		F	20.9	5.7	11.8-32.0	.27
Kreul (1972)	Young adults		18.2	4.3	-	.24
Hirano et al. (1968)	Adults	M	34.6	-	15.0-62.3 (CR)	
		F	25.7	-	14.3-40.4 (CR)	
Inglis (1977)	Young adults	M	24.8	8.4	-	.34
		F	22.8	4.1	-	.18
Taylor (1980)	Young adults	M	28.0	8.9	-	.32
		F	22.9	5.8	-	.25
Neiman & Edeson (1981)	Young adults	M	29.0	5.5	-	.19
		F	19.6	4.7	-	.24
Yanagihara & Koike (1967)	Young adults	M	30.2	9.7	20.4-50.7	.32
		F	22.5	6.1	16.4-32.90	.27
Bless & Hirano (1982b)	Young adults	M	33.6	11.4	16.7-58.4	.34
		F	26.5	11.3	11.6-60.5	.43
Canter (1965)	Men (35-75 years)		20.6*	-	14.8-42.4	-
Kreul (1972)	Aged M (65-75 years)		14.6	5.9	-	.40
	F (66-93 years)		14.6	5.8	-	.40
Ptacek et al. (1966)	Aged M (68-89 years)		18.1	6.6	10.0-37.2	.36
	F (66-93 years)		14.2	5.6	7.0-24.8	.39
Mueller (1971)	Aged M (51-65 years)		13.0	-	-	-
	F (49-72 years)		15.4	-	-	-
Mueller (1982)	Aged M (85-92 years)		13.0	-	7.0-12.0	-
	F (85-96 years)		10.0	-	6.0-18.0	-

Note. CR = critical region.

\*Median.

phonation. Normative data are available in several papers (e.g., Hollien, Michel, & Doherty, 1973; Horii, 1979, 1985; Klingholz & Martin, 1985; Koike, 1973; Ramig & Ringel, 1983; Sorenson & Horii, 1984). For sustained vowel phonation in the modal register, jitter averages about 1% and shimmer averages about 0.5 dB. Kojima, Gould, Lambiase, and Isshiki (1980) used Fourier analysis to derive a signal-to-noise (S/N) ratio; and Yumoto, Gould, and Baer (1982) described a harmonics-to-noise (H/N) ratio for voice analysis. Finally, digital processing techniques can be used to derive several measures of

voice function (Davis, 1976). See Johnson (1984) for a helpful review of voice analyses.

Another voice analysis tool is the phonetogram, which describes the fundamental frequency and intensity ranges of a voice and is therefore a portrayal of vocal maximum performance. This analysis—which also has been named a voice profile, voice field, voice area, and  $L_{50}$  profile—is discussed further in conjunction with maximum vocal intensity (to follow). Sonninen, Hurme, Toivonen, and Vilkman (1985) described a *voice field* description of vowel phonation. The voice field is a plot

*Sustained Vowels for Voice*

DEPT. OF COMMUNICATION DISORDERS  
Course 4-516, Voice Problems

*1 a/ t/ l/ / u/*

TABLE 4  
Averaged Maximum Phonation Time in Sec for  
*/u/, /l/, and /u/ \**

Age	Females			Males		
	Time	S.D.	N	Time	S.D.	N
	<i>sec</i>			<i>sec</i>		
9	8.8	3.6	8	11.4	5.9	5
10	9.4	2.8	7	10.4	4.2	7
11	11.5	2.7	8	12.8	7.2	8
12	12.2	3.7	9	12.2	5.3	13
13	11.0	3.5	11	12.3	4.4	15
14	13.3	6.2	12	17.6	7.2	11
15	12.4	5.2	20	18.9	6.0	10
16	12.9	2.9	10	17.8	4.5	6
17	13.5	2.9	10	16.9	8.0	9

\* Adapted from Launer, P. G. Unpublished master's thesis, State University of New York at Buffalo, 1971.

*1 a/ t/ l/ / u/*

TABLE 5  
Averaged Maximum Phonation Time in Sec for  
*/u/, /l/, and /u/ \**

Age	Females			Males		
	Time	S.D.	N	Time	S.D.	N
	<i>sec</i>			<i>sec</i>		
6	11.17	2.82	11	11.74	3.27	10
7	10.57	2.50	12	11.77	3.55	11
8	15.27	2.89	12	12.97	3.03	13

\* Adapted from Cunningham-Grant, J. D. S. Unpublished master's thesis, State University of New York at Buffalo, 1972.

*Sustained 1st for  
voice*

**RESULTS**

Intrajudge reliability of measuring MPT using the stop watch was completed 12 wk following data collection for a random sample of 25 children. The correlation between the two stopwatch measurements was statistically significant ( $r = +0.96$ ;  $t(23) = 3.06$ ;  $p < 0.01$ ). All live stop watch measurements were compared with their countermeasurements derived from the graphic-level recorder. The two measurements were highly related ( $r = +0.89$ ;  $z(285) = 15.06$ ;  $p < 0.01$ ).

The mean and standard deviation of the three longest sustained phonations, measured in seconds and categorized according to sex and age level, are presented in Table 1. The group mean of the three longest sustained phonations for the male children was 18.23 sec; the total sample standard deviation was 7.20 sec, and 15.79 and 5.72 sec, respectively, for the female children. The group mean MPT for the males was significantly longer than for the females [ $t(284) = 3.26$ ;  $p < 0.01$ ]. Males phonated longer than females in 12 of 15 age groups. The only age levels where females sustained phonation longer than males were: 5-0 to 5-11, 8-0 to 8-11, and 16-0 to 16-11.

The mean of the three longest phonations for males increased from 7.92 sec for the 3.5-yr-olds to 28.70 sec for the 17.5-yr-olds, and those for the females increased from 6.28 sec for the 3.5-yr-olds to 21.99 sec for the 17.5-yr-olds. A definite monotonic increase in length of sustained phonation was not apparent across all age levels for either sex.

Table 1. Mean and SD of the Three Longest Sustained Phonations Measured in Seconds ( $n = 286$ )

Age	Female subjects			Male subjects		
	<i>n</i>	M	SD	<i>n</i>	M	SD
3-6 to 3-11	5	6.28	1.76	5	7.92	1.81
4-0 to 4-11	10	8.86	1.84	10	9.99	2.51
5-0 to 5-11	10	10.47	2.57	10	10.12	3.05
6-0 to 6-11	9	13.81	3.65	9	13.90	2.98
7-0 to 7-11	10	13.68	2.45	9	14.63	2.82
8-0 to 8-11	10	17.12	4.62	10	16.81	4.51
9-0 to 9-11	10	14.47	3.78	10	16.83	6.07
10-0 to 10-11	10	15.88	5.99	10	22.20	4.74
11-0 to 11-11	10	14.76	2.06	10	19.85	3.79
12-0 to 12-11	10	15.16	3.87	9	20.23	5.72
13-0 to 13-11	10	19.24	4.58	10	22.34	8.19
14-0 to 14-11	10	18.85	5.15	10	22.34	6.89
15-0 to 15-11	10	19.53	4.66	10	20.74	5.32
16-0 to 16-11	10	21.85	4.47	10	21.04	4.40
17-0 to 17-11	10	21.99	6.30	10	28.70	7.08
Group totals	144	15.79	5.72	142	18.23	7.20

**MAXIMUM PHONATION TIME**

Ninety-five percent confidence data at each age level. An inspection of large differences in individual MPT at a given age group in both sexes. The limits of the confidence intervals are shown in Table 2.

The influence of repeated trials on the minimum number of trials necessary for a first trial that was equal to or greater than the length of phonation by the first trial. See Table 3 for the results of this examination. Males had a mean length of phonation for males (7.6). Variability of the effect of repeated trials on the length of phonation. A cumulative frequency distribution of the effect of repeated trials on the length of phonation by the third trial. The examination of the frequency distribution of the length of phonation by the third trial. The MPT until the ninth trial. A  $\chi^2$  test of the distribution data. Sex and the number of trials were not significantly related ( $\chi^2(13) = 1.0$ ).

MPT data were averaged over age groups, and these data were compared with the data for the first trial.

Table 2. Ninety-Five Percent Confidence Limits of Maximum Phonation Time

Age	Males	
	Lower	M
3	4.38	7.92
4	5.08	9.99
5	4.15	10.12
6	8.06	13.90
7	9.11	14.63
8	7.98	16.81
9	4.94	16.83
10	12.91	22.20
11	12.43	19.85
12	9.02	20.23
13	6.29	22.34
14	8.84	22.34
15	10.32	20.74
16	12.43	21.04
17	14.83	28.70