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

B. Quality

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

C. Resonance Balance

_____ hyponasal
_____ hypernasal
_____ assimilative nasality
_____ normal resonance

D. Voice characteristics under varying conditions

CONDITION	CHARACTERISTIC: Same as Habitual	CHARACTERISTIC: 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

_____ excessive postural changes
_____ quiet and shy
_____ poor eye contact
_____ tense
_____ hostile
_____ pleasant
_____ embarrassed
_____ interested
_____ overly concerned
_____ apathetic
_____ shortness of breath

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[a]	–	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.
[a]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 f_{0SPL} 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 Sue

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/a/ /i/ /u/

TABLE 4
Averaged Maximum Phonation Time in Sec for /a/, /i/, and /u/ *

Age	Females			Males		
	Time	S.D.	N	Time	S.D.	N
	sec			sec		
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.

/a/ /i/ /u/

TABLE 5
Averaged Maximum Phonation Time in Sec for /a/, /i/, and /u/ *

Age	Females			Males		
	Time	S.D.	N	Time	S.D.	N
	sec			sec		
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 /a/ 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		
	n	M	SD	*n*	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

Ninety-five percent confidence data at each age level. An inspec large differences in individual M a given age group in both sexes. limits of the confidence interval tance.

The influence of repeated trial minimum number of trials necess phonation. The criterion variabl first trial that was equal to or gr phonations. See Table 3 for the each sex and age level. Males the length of phonation for m 7.6). Variability of the effect of A cumulative frequency distrib examination of the frequency 16.2% of the males and 23% of th phonation by the third trial. T MPT until the ninth trial. A χ^2 tribution data. Sex and the nu not significantly related (χ^2 (13

MPT data were averaged ov group, and these data were co

Table 2. Ninety-Five Percent Co

	Males		
Age	Lower	M	U li
3	4.38	7.92	1
4	5.08	9.99	1
5	4.15	10.12	1
6	8.06	13.90	1
7	9.11	14.63	2
8	7.98	16.81	2
9	4.94	16.83	2
10	12.91	22.20	3
11	12.43	19.85	3
12	9.02	20.23	3
13	6.29	22.34	3
14	8.84	22.34	3
15	10.32	20.74	3
16	12.43	21.04	3
17	14.83	28.70	4