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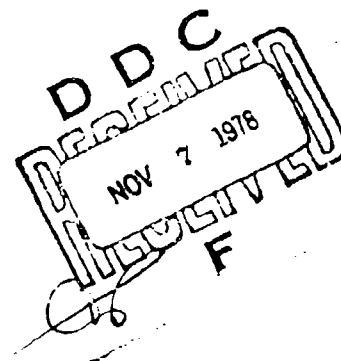
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The Diagnostic Rhyme Test (DRT): An Air Force Implementation

STEVEN MEISTER, Capt, USAF



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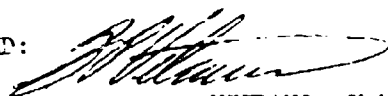
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The Diagnostic Rhyme Test (DRT): An Air Force Implementation

1. INTRODUCTION

The Diagnostic Rhyme Test (DRT)¹ for intelligibility was initially developed under Contract No. F19628-70-C-0182 for the Air Force Electronic Systems Division, Voice Processing Laboratory (formally part of the Air Force Cambridge Research Laboratories, Data Sciences Laboratory). In recent years the DRT has emerged as a DoD Standard for testing the intelligibility of voice communications terminals. This is evidenced by its extensive use by the DoD Narrowband Secure Voice Consortium during its FY75 and FY76 Test and Evaluation of candidate narrowband digital voice algorithms for use in the 1980's. The DRT's used by the Consortium were evaluated under contract by Dynastat, Inc., Austin, Texas, the developers of the test. This report documents the development of an in-house capability to administer and score the DRT.

(Received for publication 16 June 1978)

1. Volers, W. D., Sharpley, A. D., and Hehmsoth, C. J. (1973) Research on Diagnostic Evaluation of Speech Intelligibility, AFRL-72-0894.

2. THE DIAGNOSTIC RHYME TEST

2.1 Introduction

The DRT is a test for intelligibility rather than user acceptance, or quality, of voice systems. Although related, it is important to note the distinction between intelligibility and quality. It is possible for a voice system to be perfectly intelligible yet have a very unnatural sound or not permit speaker recognition. In such a case the system is likely not to be acceptable to the user. On the other hand, a system having poor intelligibility will certainly be unacceptable to the user. Thus, a prerequisite for user acceptance is high intelligibility. The DRT is a measure of that characteristic of a voice system. The test is structured in such a way as to allow a detailed analysis of the ability of a system to reproduce certain classes of phonemes. These classes are categorized by the binary attributes VOICING, NASALITY, SUSTENTION, SIBILATION, GRAVENESS, and COMPACTNESS. The test provides a means of measuring the performance of the voice system for each state, present or absent, of these six attributes as well as total intelligibility. Using these results, specific weaknesses in the voice system can be pinpointed and corrected. This method of diagnostic analysis has been successfully used.^{2,3}

2.2 Usage

A series of master tape recordings have been prepared by Dynastat, Inc. under various Government contracts to be used as input speech material for testing the intelligibility of the voice system under consideration. Each tape recording consists of one or more speakers uttering a known randomized sequence of words. Each word has been selected from a pair of rhyming words differing only in the leading consonant. Figure 1 presents the sequence of events for DRT usage. In order to conduct a DRT one or more master tape recordings are used as input speech material to the voice system under test. The processed output speech is tape recorded for later presentation to a crew of listeners for evaluation. The listeners' task is to determine which of the rhyming words had been uttered by the speaker. After all tape recordings processed by the system under test have been heard by the listening crew, computer analysis of the listeners' responses takes place and a comprehensive printout of the results is provided. Further analysis by the user can then take place.

2. Smith, C. P. (1976) Comparative Evaluations of Speech Intelligibility Performance of Three Narrowband Voice Communications Methods: Trivoc, Linear Prediction Coding (LPC) and Piecewise Linear Prediction Coding (PLPC) ESD-TR-77-131.
3. Smith, C. P. (1977) Intelligibility Performance of Narrowband Linear Predictive Vocoder in the Presence of Bit Errors, ESD-TR-77-328.

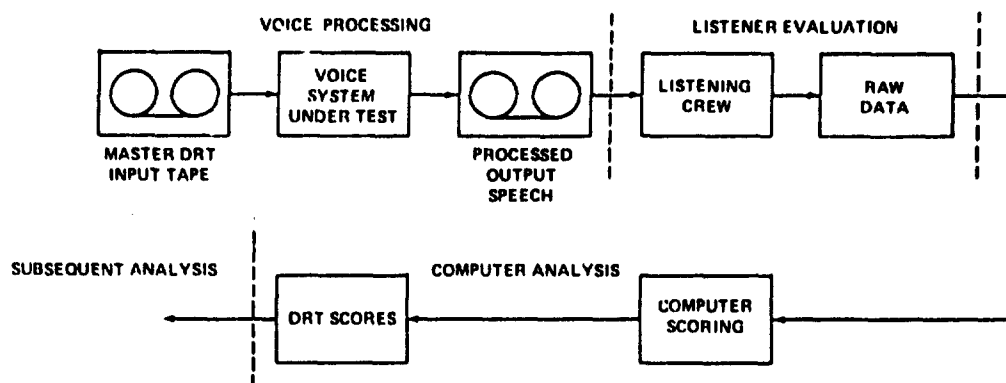


Figure 1. DRT Usage. The sequence of events

2.3 Structure of the DRT

A complete DRT consists of one speaker uttering 464 words of which 384 words are actually scored. The remainder are filler and experimental words. DRT's are normally administered in half tests (192 words) using multiple speakers. The complete list of words used in the DRT appear in Figures 2a through 2d. The DoD Narrowband Secure Voice Consortium has prepared a set of DRT master input tapes using various microphones and ambient acoustic noise backgrounds. These tapes are in the possession of this office and are available for DRT testing. Table 1 is a summary of these tapes. In addition, master DRT tapes as indicated in Tables 3, 4, and 5 are also available.

2.3.1 THE TEST BOOKLET

Each listener who is tasked to evaluate a processed tape recording has before him a four page test booklet for each speaker he will hear. The booklet is sufficient to score one half test. The booklet is shown in Figures 2a through 2d. The speech material the listener hears consists of 232 words uttered by each speaker. The words are one word from each of the word pairs in the test booklet. The listener is instructed to strike out the word he thinks he hears. The booklet is structured so that the word pairs on Figures 2a and 2c are the same but presented in the reverse order. Similarly, the word pairs on Figures 2b and 2d are the same but appear in reverse order. In addition, the present state of each of the six attributes are represented by the left word in each column on Figures 2a and 2b while the absent state is represented by the right word in each column on those pages. The reverse is true for Figures 2c and 2d.

Table 1. Available Master DRT Tapes

Tape ID	DRT TAPES Speaker / List	*Environ- ment	**Microphone					
			1	2	3	4	5	6
E-1-A	LL 302A, CH 308B, RH 310A	Quiet	X	X	X	X		
E-1-B	JE 306A, BV 303A, PK 309A	"	X	X	X	X		
E-2-A	LL 302B, CH 307A, RH 310B	"	X	X	X	X		
E-2-B	JE 306B, BV 303B, PK 312B	"	X	X	X	X		
E-3-A	LL 301A, CH 308A, RH 311A	"	X	X	X	X		
E-3-B	JE 305A, BV 304A, PK 312A	"	X	X	X	X		
E-4-A	LL 301B, CH 307B, RH 311B	"	X	X	X	X		
E-4-B	JE 305B, BV 304B, PK 309B	"	X	X	X	X		
E-5-A	JS 317A, LS 315A, MP 314A	"	X	X	X	X		
E-5-B	JS 317B, LS 315B, MP 314B	"	X	X	X	X		
E-6-A	JS 318A, LS 316A, MP 313A	"	X	X	X	X		
E-6-B	JS 318B, LS 316B, MP 313B	"	X	X	X	X		
G-1-A	RH 318A, JE 310A, CH 314A	ABCP	X		X		X	
G-1-B	RH 318B, JE 310B, CH 314B	"	X		X		X	
G-2-A	RH 317A, JE 309A, CH 313B	HEL	X		X			X
G-2-B	RH 317B, JE 309B, CH 313A	"	X		X			X
G-3-A	RH 303A, JE 311A, CH 315A	SHIP	X		X		X	
G-3-B	RH 303B, JE 311B, CH 315B	"	X		X		X	
G-4-A	RH 304A, JE 312A, CH 316A, JS 305A	Office	X		X		X	
G-4-B	RH 304B, JE 312B, CH 316B, JS 305B	"	X		X		X	

*Environment: Ambient Acoustic Noise Simulated in a Sound Room.
 ABCP - Airborne Command Post
 HEL - Helicopter
 SHIP - Shipboard

** See Table 2 for microphone identification.

Table 2 Microphone Identification Used in Table 1.

1 - Altec 659A Dynamic Microphone
2 - Western Electric T1 Carbon Microphone
3 - Grason-Stadler E7300M Throat Microphone
4 - General Radio 1560-P5 Ceramic Studio Microphone
5 - Roanwell Dynamic Noise Cancelling Microphone
6 - Electrovoice M-78/AIC Dynamic Helicopter Microphone

Table 3 Available Word Lists and Speakers (100 Series)

Word List	Speaker	Word List	Speaker
102A	BV	108A	CH
102B	BV	108B	CH
103A	BV	111A	JE
103B	BV	111B	JE
104A	RD	112A	SN
104B	RD	112B	SN
105A	RD	113A	JE
105B	RD	113B	JE
106A	BL	115A	SN
106B	BL	115B	SN
107A	CH	116A	BL
107B	CH	116B	BL

Table 4. E-4a Advanced Airborne Command Post Master DRT Tapes

Tape ID	DRT Tapes Speaker/List	Environment	*Microphone				
			1	2	3	4	5
S-1-A	SM 301A, SK 307A, BD 311A	Quiet	X	X	X	X	
S-1-B	HH 303A, MM 305A, IP 309A	Quiet	X	X	X	X	
S-2-A	SM 301B, SK 307B, BD 311B	Quiet	X	X	X	X	
S-2-B	HH 303B, MM 305B, IP 309B	Quiet	X	X	X	X	
T-1-A	SM 302A, SK 308A, BD 312A	E-4A Noise	X	X	X		X
T-1-B	HH 304A, MM 306A, IP 310A	E-4A Noise	X	X	X		X
T-2-A	SM 302B, SK 308B, BD 312B	E-4A Noise	X	X	X		X
T-2-B	HH 304B, MM 306B, IP 310B	E-4A Noise	X	X	X		X

*Microphones:

- 1 - ALTEC 659A Dynamic Microphone
- 2 - Roanwell Confidencer Microphone P/N 240100001
- 3 - Grason-Stadler E7300M Throat Microphone
- 4 - General Radio 1560-P5 Ceramic Studio Microphone
- 5 - Noise only - General Radio 1560-P5

Table 5. E-3A AWACS Master DRT Tapes

Tape ID	DRT Tapes Speaker/List	Environment	*Microphone				
			1	2	3	4	5
S-3-A	CH 301A, JE 305A, SM 309A	Quiet	X	X	X	X	
S-3-B	IP 303B, MC 307A, GM 311A	Quiet	X	X	X	X	
S-4-A	CH 301B, JE 305B, SM 309B	Quiet	X	X	X	X	
S-4-B	IP 303A, MC 307B, GM 311B	Quiet	X	X	X	X	
T-3-A	CH 302A, JE 306A, SM 310A	E-3A Noise	X	X	X		X
T-3-B	IP 304A, MC 308A, GM 312B	E-3A Noise	X	X	X		X
T-4-A	CH 302B, JE 306B, SM 310B	E-3A Noise	X	X	X		X
T-4-B	IP 304B, MC 308B, GM 312A	E-3A Noise	X	X	X		X

*Microphones:

- 1 - ALTEC 659A Dynamic Microphone
- 2 - H-335/A1C Headset Microphone
- 3 - Grason-Stadler E7300M Throat Microphone
- 4 - General Radio 1560-P5 Ceramic Studio Microphone
- 5 - Noise only - General Radio 1560-P5

DRT Test Nr.

(A)

ROW

1	GOB - BOB	COOT - TOOT
2	DAUNT - TAUNT	BOND - POND
3	MOOT - BOOT	MOAN - BONE
4	SHEET - CHEAT	VILL - BILL
5	JAB - GAB	JEST - GUEST
6	POT - TOT	FOUGHT - THOUGHT
7	GHOST - BOAST	COOP - POOP
8	LIP - RIP	LEAP - REAP
9	ZED - SAID	VAST - FAST
10	GNAW - DAW	KNOCK - DOCK
11	SHOES - CHOOSE	THOSE - DOZE
12	CHEEP - KEEP	SING - THING
13	BANK - DANK	MET - NET
14	GOT - DOT	CAUGHT - TAUGHT
15	LOAD - ROAD	LEWD - RUDE
16	DINT - TINT	BEAN - PEEN
17	NECK - DECK	MAD - BAD
18	THONG - TONG	VOX - BOX
19	CHOO - COO	JOE - GO
20	WEED - REED	BID - DID
21	SHAG - SAG	YEN - WEN
22	LOT - ROT	LAW - RAW
23	VOLE - FOAL	ZOO - SUE
24	NIP - DIP	NEED - DEED
25	FENCE - PENCE	THAN - DAN
26	SAW - THAW	CHOP - COP
27	POOL - TOOL	FORE - THOR
28	YIELD - WIELD	HIT - FIT
29	LAP - RAP	LEST - REST

Name _____

Date / Time _____

Figure 2a. DRT Test Booklet

DRT IV Nr.

(8)

ROW

1	PEST - TEST	FAN - PAN
2	VAULT - FAULT	JOCK - CHOCK
3	NEWS - DUES	NOTE - DOTE
4	VEE - BEE	THICK - TICK
5	SANK - THANK	CHAIR - CARE
6	WAD - ROD	BONG - DONG
7	SHOW - SO	YOU - RUE
8	LID - RID	LEEK - REEK
9	DENSE - TENSE	GAFF - CALF
10	MOSS - BOSS	MOM - BOMB
11	FOO - POOH	THOUGH - DOUGH
12	ZEE - THEE	JILT - GILT
13	FAD - THAD	PENT - TENT
14	HOP - FOP	YAWL - WALL
15 +	LOW - ROW	LOOT - ROOT
16	GIN - CHIN	VEAL - FEEL
17	MEND - BEND	NAB - DAB
18	SHAW - CHAW	VON - BON
19	JUICE - GOOSE	SOLE - THOLE
20	PEEK - TEAK	FIN - THIN
21	GAT - BAT	KEG - PEG
22	LOCK - ROCK	LONG - WRONG
23	GOAT - COAT	DUNE - TUNE
24	MIT - BIT	MEET - BEET
25	THEN - DEN	SHAD - CHAD
26	JAWS - GAUZE	JOT - GOT
27	MOON - NOON	BOWL - DOLE
28	KEY - TEA	GILL - DILL
29	LAMP - RAMP	LEND - REND

Name _____

Date / Time _____

Figure 2b. DRT Test Booklet

ERT IV Nr.

(C)

ROW

1	BOB - GOB	TOOT - COOT
2	TAUNT - DAUNT	POND - BOND
3	BOOT - MOOT	BONE - MOAN
4	CHEAT - SHEET	BILL - VILL
5	GAB - JAB	GUEST - JEST
6	TOT - POT	THOUGHT - FOUGHT
7	BOAST - GHOST	POOP - COOP
8	RIP - LIP	REAP - LEAP
9	SAIO - ZEO	FAST - VAST
10	DAW - GNAW	DOCK - KNOCK
11	CHOOSE - SHOES	DOZE - THOSE
12	KEEP - CHEEP	THING - SING
13	DANK - BANK	NET - MET
14	DOT - GOT	TAUGHT - CAUGHT
15+	ROAD - LOAD	RUDE - LEWD
16	TINT - DINT	PEEN - BEAN
17	DECK - NECK	BAD - MAD
18	TONG - THONG	BOX - VOX
19	COO - CHOO	GO - JOE
20	REED - WEED	DID - BID
21	SAG - SHAG	WREN - YEN
22	ROT - LOT	RAW - LAW
23	FOAL - VOLE	SUE - ZOO
24	DIP - NIP	DEED - NEED
25	PENCE - FENCE	DAN - THAN
26	THAW - SAW	COP - CHOP
27	TOOL - POOL	THOR - FORE
28	WIELD - YIELD	FIT - HIT
29	RAP - LAP	REST - LEST

Name

Date/Time

Figure 2c. DRT Test Booklet

60 11 02 001

DRT IV Nr.

(D)

ROW

1	TEST - PEST	PAN - FAN
2	FAULT - VAULT	CHOCK - JOCK
3	DUES - NEWS	NOTE - NOTE
4	BEE - VEE	TICK - THICK
5	THANK - SANK	CARE - CHAIR
6	ROD - WAD	DONG - BONG
7	SO - SHOW	RUE - YOU
8	RID - LID	REEK - LEEK
9	TENSE - DENSE	CALF - GAFF
10	BOSS - MOSS	BOMB - MOM
11	POOH - FOO	COUGH - THOUGH
12	THEE - ZEE	GILT - JILT
13	THAD - FAD	TENT - PENT
14	FOP - HOP	WALL - YAWL
15	ROW - LOW	ROOT - LOOT
16	CHIN - GIN	FEEL - VEAL
17	BEND - MEND	DAB - NAB
18	CHAW - SHAW	BON - VON
19	GOOSE - JUICE	THOLE - SOLE
20	TEAK - PEEK	THIN - FIN
21	BAT - GAT	PEG - KEG
22	ROCK - LOCK	WRONG - LONG
23	COAT - GOAT	TUNE - DUNE
24	BIT - MIT	BEET - MEET
25	DEN - THEN	CHAD - SHAD
26	GAUZE - JAWS	GOT - JOT
27	NOON - MOON	DOLE - BOWL
28	TEA - KEY	DILL - GILL
29	RAMP - LAMP	REND - LEND

Name _____

Date/Time _____

Figure 2d. DRT Test Booklet

2.3.2 THE MAJOR ATTRIBUTES

The six attributes tested by the DRT are VOICING, NASALITY, SUSTENTION, SIBILATION, GRAVENESS, and COMPACTNESS. Each of the 192 word pairs in a half-test has been selected so that the leading consonant differs only in the present or absent state of a single attribute. The particular attribute tested by each word pair is shown in Figure 3. The 1st, 8th, 15th, 22nd and last words in each column are not scored. These words are included to allow time for turning pages, moving to the top of the next column, and for inclusion of experimental words. A couple of examples will serve to clarify this.

Example 1. In Figure 2a, the 11th word pair in the left hand column is SHOES-CHOOSE. In Figure 3, the attribute corresponding to the 11th word pair is SUSTENTION. Thus, the word pair SHOES-CHOOSE tests the attribute SUSTENTION. Further, since this word pair is shown on the first page of the booklet, the leading consonant in SHOES exhibits the present state of the attribute while the leading consonant of the word CHOOSE exhibits the absent state of the attribute, thus, SHOES represents a SUSTAINED consonant while CHOOSE represents an ABRUPT consonant.

Example 2. In Figure 2d, the third word pair in the right column is DOTE-NOTE. From Figure 3, it can be seen that this word pair tests the attribute NASALITY. Since this word pair is shown on the fourth page of the booklet, we observe that DOTE represents the absent state of NASALITY (Non-Nasal) while NOTE represents the present state of NASALITY (Nasal).

2.3.3 THE SUB-FEATURES

The following constraints were observed in constructing the set of test words:

- (a) Half of the items designed to test VOICING are fricatives; the other half are stop consonants,
- (b) Half of the NASALITY phoneme pairs are grave; the rest acute,
- (c) Half of the SUSTENTION items are voiced; half unvoiced,
- (d) Half of the phoneme pairs that test SIBILATION are voiced, the remainder unvoiced,
- (e) Half of the GRAVENESS test items are voiced; the other half unvoiced,
- (f) Half of the COMPACTNESS items are voiced; the remainder unvoiced.

Row	Filler	Filler
1		
2	Voicing	Voicing
3	Nasality	Nasality
4	Sustention	Sustention
5	Sibilant	Sibilant
6	Graveness	Graveness
7	Compactness	Compactness
8	Experimental	Experimental
9	Voicing	Voicing
10	Nasality	Nasality
11	Sustention	Sustention
12	Sibilant	Sibilant
13	Graveness	Graveness
14	Compactness	Compactness
15	Experimental	Experimental
16	Voicing	Voicing
17	Nasality	Nasality
18	Sustention	Sustention
19	Sibilant	Sibilant
20	Graveness	Graveness
21	Compactness	Compactness
22	Experimental	Experimental
23	Voicing	Voicing
24	Nasality	Nasality
25	Sustention	Sustention
26	Sibilant	Sibilant
27	Graveness	Graveness
28	Compactness	Compactness
29	Experimental	Experimental

Figure 3. Attribute Tested-Word Pair Position

Figure 4 can be used in conjunction with Figures 2a-d and 3 to determine exactly which word pairs are presented with the sub-features indicated above. A plus (+) in Figure 4, indicates that the two words exhibit the present state of the sub-feature; a minus (-) the absent state. The sub-feature assignments are the same for pages 1 and 3 of the DRT test booklet as well as for pages 2 and 4. The columns of pluses and minuses in Figure 4, correspond to the columns of word pairs in the DRT test booklet. Notice that in Figure 3 each major attribute is tested four times in each column. Thus, there are four pluses and minuses in each column for each major attribute in Figure 4. The following examples will serve to illustrate the use of Figures 2a-d, 3, and 4 to determine the major attribute and sub-feature of each word pair.

Page No.	VOICING	NASALITY	SUSTENTION	SIBILATION	GRAVENESS	COMPACTNESS
1&3	- -	+ +	- +	+ +	- -	+ -
	+ +	- -	- +	- -	+ +	+ -
	- -	- +	- +	- +	+ +	- +
	+ +	- -	- +	- -	- -	+ -
2&4	+ +	- -	+ -	- -	+ +	- +
	- -	+ +	- +	+ +	- -	- +
	+ +	+ -	- +	+ -	- -	+ -
	- -	+ +	+ -	+ +	+ +	- +
		<u>Main Attribute</u>		<u>Sub-Feature (+/-)</u>		
		Voicing		Frictional/Non-Frictional		
		Nasality		Grave/Acute		
		Sustention		Voiced/Unvoiced		
		Sibilation		Voiced/Unvoiced		
		Graveness		Voiced/Unvoiced		
		Compactness		Voiced/Unvoiced		

Figure 4. Sub-Feature State Location in Test Booklet

Example 1. The second word pair shown on page 1 of the DRT test booklet (Figure 2a) in the left column is DAUNT-TAUNT. Figure 3 indicates that this word pair tests the attribute VOICING. Since this word pair is shown on page 1, (Figure 2a) we conclude that DAUNT represents the voiced case and TAUNT represents the unvoiced case. Referring to Figure 4, we observe that the first pair of words in the left hand column of page 1 of the DRT test booklet that tests the attribute VOICING exhibit the absent (-) state of the sub-feature. That is, the words DAUNT and TAUNT are non-frictional. The word pair ZED-SAID shown on page 1 (Figure 2a) also tests the VOICING attribute. However, these words are frictional.

This can be observed by noting that they are the second word pair in the left column shown on page 1 (Figure 2a) that tests the attribute VOICING. Figure 4 indicates that these two words are frictional (+).

Example 2. The 17th word pair shown on page 4 of the DRT test booklet (Figure 2d) in the right column is DAB-NAB. From Figure 3, we ascertain that this word pair tests the attribute NASALITY. Further, since this word pair is shown in page 4 (Figure 2d), we conclude that DAB is non-nasal and NAB is nasal. The sub-feature for NASALITY is graveness. Referring to Figure 4 we see that the third word pair in the right column shown on page 4 (Figure 2d) that tests the attribute NASALITY exhibits the absent (-) state of the sub-feature graveness. Thus the leading consonant of the word DAB is non-nasal and acute while the leading consonant of the word NAB is nasal and acute. In contrast, the 17th word pair in the left column shown on page 4 (Figure 2d) is BEND-MEND. This pair also tests NASALITY. Figure 4 indicates that these words are grave (+).

2.3.4 THE WORD LISTS

The words in Figures 2a-d have been spoken by each speaker in a predetermined sequence called a word list. Each word list is identified by a three digit number followed by the letter A or B. The letter A is used to identify the first half of the DRT and B to identify the second half. Tables 1, 3, 4, and 5 contain summaries of word lists available and the associated speaker's initials. Appendix A contains the actual word lists.

3. EARLY IN-HOUSE DEVELOPMENT

3.1 Rationale

The DRT has proven itself to be a useful diagnostic tool for finding weaknesses in narrowband digital voice processing algorithms. However, the cost of a DRT using contractor resources was considered too high (approximately \$550.00 for a six speaker DRT in FY 78) to make it practical for testing the many algorithm changes required on a week to week basis. In addition, the cost was too high to repeat the test for each configuration in order to obtain estimates of measurement errors needed for a complete statistical analysis (that is, Analysis of Variance⁴). It was determined that DRTs could be conducted at the Air Force Voice Processing Facility, Hanscom Air Force Base using existing hardware for approximately one-tenth the contractor cost, excluding the scoring software development costs. In-house resources were to be used to develop the software.

4. Guenther, W.C. (1964) Analysis of Variance, Prentice-Hall, Inc., Englewood Cliffs, N.J.

The DRT scoring software was written in FORTRAN IV and implemented on the CSP-30 High Speed Signal Processor. Figure 5 shows flow charts of the scoring programs as implemented on the CSP-30. The program listing and a sample printout of the test results for a two-speaker, two-listener DRT are contained in Appendix B.

The scoring software as implemented on the CSP-30 requires manual data entry via the ADDS Video Terminal. The program is used as follows:

- INSERT 150 FT CARTRIDGE IN UPPER DECK
I/O RESET - CONTINUE.

f. After carrying out the above instructions the ADDS terminal will display:
SYSTEM UNDER TEST?

g. ADDS will display:
HOW MANY LISTENERS?
LL

h. ADDS will display:
HOW MANY SPEAKERS?
SS

```

1.  For I = 1 to the number of listeners the ADDS will display:
    LISTENER I NAME
    NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN

```

J. ADDS will display:
FOR LISTENER I SPEAKER J
ENTER KEY NUMBER AND LETTER
NNNL

21

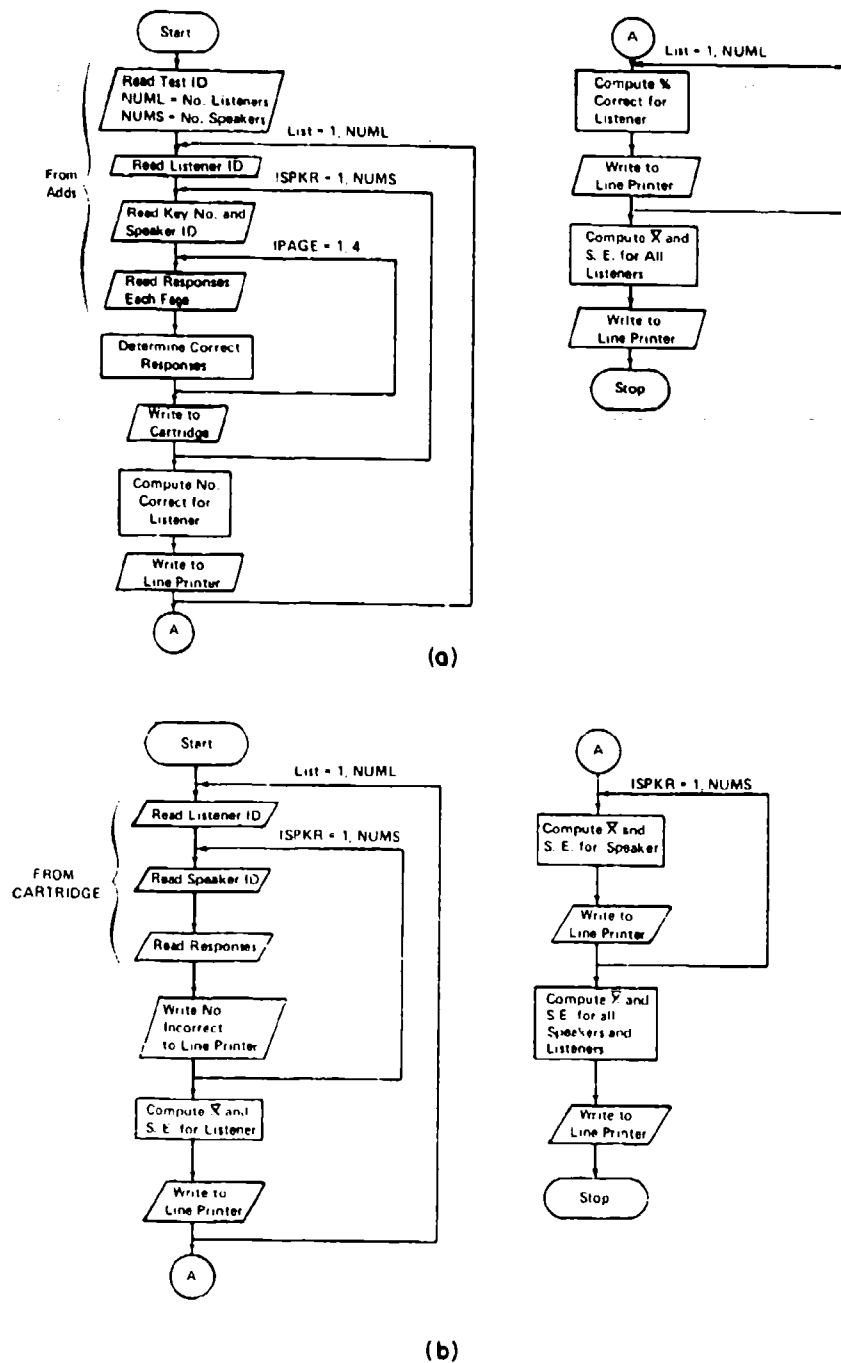


Figure 5. DRT Scoring

*****NO KEY XXXA*****

KEY = XXXA SPEAKER

IF OK ENTER 0

SPEAKER?

SS

KEY = XXXA SPEAKER

IF OK ENTER 0

1. ADDS will display:

FOR KEY XXXA LISTENER I PAGE K ENTER RESPONSE BY COLUMNS

1 = FIRST WORD 2 = SECOND WORD

RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

For the first column of each word pair on page K of listener I's answer book enter a 1 if the first word of the pair was selected or a 2 if the second word was selected. After the first column has been entered hit new line. Enter the second column in the same way.

m. ADDS will display a graphic representation of the first 15 rows of the page just entered. An example is:

```

1  XXXXXX                      XXXXXX
2  XXXXXX                      XXXXXX
3                      XXXXXX      XXXXXX
4                      XXXXXX      XXXXXX
5                      XXXXXX      XXXXXX
6  XXXXXXXXXXXXXXXXXXXX      XXXXXX
7  XXXXXX                      XXXXXX
8  XXXXXX                      XXXXXX
9                      XXXXXX      XXXXXX
10                     XXXXXX      XXXXXX
11                     XXXXXX      XXXXXX
12  XXXXXXXXXXXXXXXXXXXX      XXXXXX
13  XXXXXX                      XXXXXX
14  XXXXXX                      XXXXXX
15  XXXXXX                      XXXXXX
IF OK ENTER 0

```

IF OK ENTER 0

This allows you to check for errors in key punching the entries of the first 15 rows. Notice that rows 6 and 12 in column 1 contain X's in both first and second word

positions. This indicates that something other than 1 or 2 was entered in those positions and corrections should be made.

n. If no corrections are needed enter 0 followed by new line. Anything other than 0 implies a correction is to be made. ADIS will display:

ROW AND COLUMN TO CHANGE? ENTER 999 TO CHANGE ENTIRE PAGE
RRC

Enter the row number in 12 format followed by the column number in 11.

o. If 999 was entered program will go to step 1 above. If a row outside the range 1 to 29, other than 99, or a column other than 1 or 2 is entered, program goes to step n above. If row and column are within the specified range, ADIS displays:

NEW ENTRY?

R

Enter a 1 or 2. Program goes to step m above.

p. After corrections to rows 1 through 15 are made, rows 16 through 29 are displayed and corrected in a similar manner. (NOTE: Corrections to any row can be made regardless of the rows being displayed.)

q. After all pages for listener I, key XXXA have been scored, the next speaker is scored in the same way. After all speakers for listener I have been scored the data is output to the cartridge and a printout of listener I's correct responses is made.

r. The next listener is scored in the same way.

s. After all listeners have been scored, a percent correct printout is made for each listener using the transformation

$$\text{SCORE} = \frac{R-W}{T} \times 100$$

Where R = Number correct

W = Number incorrect

T = Total number of items

t. A summary of all scores and standard errors across listeners is then printed (see Appendix B). Program stops.

u. Load the DRT Scoring Program (Cartridge Input).

v. Run at starting address = 0.

w. ADIS will display:

INSERT CARTRIDGE IN UPPER DECK

I/O RESET-CONTINUE

Insert the cartridge containing the DRT data into the upper Tri-Data deck. After hitting I/O Reset and Continue, the program will execute as in Figure 5b. A comprehensive printout of DRT results will be made as shown in Appendix B. No further interaction with the ADIS terminal is required.

3.3 Listeners

It was considered crucial to the success of the in-house DRT program that sufficient numbers of listeners be recruited and that their performance on the DRT be consistent. The reliability of the DRT as a useful tool in measuring intelligibility so that meaningful comparisons between voice systems can be made is dependent on the repeatability of the scores. That is, if a particular DRT is administered to a crew of listeners at different points in time, are the results different? If they are, the credibility of the test is in question. It has been shown that the DRT is highly reliable in this regard if a properly selected and trained listening crew is used.⁵

In addition, for the in-house DRT program to be of maximum utility, the results obtained should be comparable to those obtained by others who administer the same test to their listeners. In particular, we felt it essential that in-house DRT results be comparable to those obtained by Dynastat, Inc.

During the period February-October 1976, 21 volunteer listeners participated in DRT tests to determine the feasibility of implementing an in-house DRT program. The volunteers were recruited from the Hanscom AFB community. They consisted of U.S. Air Force military, civilian employees, military dependents and in-house contractor personnel. Each listener was subjected to a pure tone audiometric test for hearing loss and passed the requirements for an H-1 profile as specified in AFM 160-1 (C9) Attachment 3, 2 May 1975. During the period February-March 1976 four listening sessions were conducted. Each session was approximately two hours in duration. From four to seven listeners participated in each session. The purpose of this initial trial period was to gain some insight into the feasibility of conducting in-house DRTs and to determine if comparability with contractor results can be obtained. A second trial period consisting of three sessions was conducted in October 1976. The purpose of this trial period was to measure the repeatability of scores for in-house DRTs and to detect any significant learning trends when a listener is repeatedly exposed to the same test. Seven listeners were used during this second trial period. All but two had been used in the previous tests.

3.3.1 COMPARABILITY

Tables 6a to 6c contain summaries of the results of in house listening Sessions 2, 3, and 4 conducted during February and March 1976 as well as Dynastat scores for the same DRT tapes. The systems used in the tests were all vocoders at various narrowband data rates. Only those scores for listeners who participated in two or more sessions are reported. Session 1 is not included because it served as an orientation for the listeners. The tables also include 95 percent confidence intervals

5. Voters, W. D. (1965) Performance Evaluation of Speech Processing Devices II. The Role of Individual Differences, AFCTR-66-24.

based on the Dynastat means and standard errors. In addition, the differences between in-house and Dynastat means are included. Those in-house mean scores that lie outside the confidence interval are marked with an asterisk (*). Some observations follow:

- a. No attempt was made to screen and eliminate listeners for the purpose of improving in-house means.
- b. Of the listeners used in this trial period only two participated in three sessions. All others participated in two or fewer sessions.
- c. The general tendency for in-house scores was to approach Dynastat scores as listeners gained experience. In the second listening session seven in-house means fell below their confidence intervals while six fell below their confidence intervals for Sessions 3 and 4. The median difference between in-house and Dynastat means improved from -3.2 to -2.05 from Session 2 to Session 3. For Session 4 the median difference was -2.3.

Table 6a. In-House and Dynastat DRT Scores.
Listening Session 2 - 25 Feb 1976

System	Speaker	IN-HOUSE						DYNASTAT				DIFF
		LISTENER					MEAN	MEAN	S.E.	95% C.I.		
		1 ^a	2 ^b	3 ^a	5 ^a	6 ^a						
1102	BL	87.5	87.5	86.5	76.0	89.6	84.4*	89.6	1.35	(86.4, 92.8)	-5.2	
	CH	86.5	89.6	88.5	84.4	87.5	87.3	89.8	1.19	(87.0, 92.6)	-2.5	
	SN	82.3	72.9	82.3	76.0	78.1	78.3*	83.5	1.27	(80.5, 86.5)	-5.2	
1103	BL	89.6	82.3	88.5	85.4	87.5	86.7	86.6	1.74	(82.5, 90.7)	+0.1	
	CH	91.7	85.4	85.4	87.5	90.6	88.1*	91.7	0.88	(89.6, 93.8)	-3.6	
	SN	75.0	74.0	78.1	80.2	75.0	76.5*	79.7	1.04	(77.2, 82.2)	-3.2	
1104	BL	85.4	82.3	86.5	85.4	85.4	85.0*	88.3	1.19	(85.5, 91.1)	-3.3	
	CH	83.8	85.4	88.5	85.4	87.5	88.1	90.8	1.16	(88.1, 93.5)	-2.7	
	SN	83.3	82.3	81.3	80.2	81.3	81.7	82.8	1.55	(79.1, 86.5)	-1.1	
1105	BL	81.3	79.2	83.3	79.2	82.3	81.1*	84.8	1.23	(81.9, 87.7)	-3.7	
	CH	87.5	83.3	83.3	84.4	88.5	85.4	88.5	1.67	(84.6, 92.4)	-3.1	
	SN	82.3	76.0	82.3	80.2	74.0	79.0*	82.2	0.80	(80.3, 84.1)	-3.2	

- a - First session for this listener.
b - Second session for this listener.
* - Below 95% confidence interval.

Table 6b. In-House and Dynastat DRT Scores.
Listening Session 3 - 4 Mar 1976

System	Speaker	IN-HOUSE				DYNASTAT				DIFF
		LISTENER				MEAN	MEAN	S.E.	95% C.I.	
		1 ^a	4 ^a	6 ^a	7 ^a					
1106	BL	82.3	86.5	93.8	80.2	85.7	87.8	1.70	(83.3, 91.8)	-2.1
	CH	88.5	90.6	90.6	83.3	88.1*	91.7	0.86	(89.7, 93.7)	-3.4
	SN	74.0	83.3	91.7	77.1	81.5	82.2	1.09	(77.7, 86.7)	-0.7
1108	BL	86.5	86.5	92.7	84.4	88.0	88.2	1.69	(84.2, 92.2)	-0.2
	CH	88.5	95.8	90.6	88.5	90.1*	91.9	0.73	(90.2, 93.6)	-1.8
	SN	76.0	89.6	87.5	82.3	83.9	85.9	1.73	(81.8, 90.0)	-2.0
1110	BL	86.5	89.6	87.5	86.5	87.5*	92.6	1.05	(90.1, 95.1)	-5.1
	CH	85.4	87.5	93.8	83.3	87.5*	93.0	0.70	(91.3, 94.7)	-5.5
	SN	76.0	86.5	82.3	82.3	81.8	83.2	1.57	(79.5, 86.9)	-2.0
1112	BL	86.5	93.8	91.7	80.5	90.1*	92.4	0.67	(90.8, 94.0)	-2.3
	CH	90.6	87.5	92.7	95.8	91.7*	94.8	1.08	(92.2, 97.4)	-3.1
	SN	85.4	88.5	87.5	84.4	86.5	87.0	1.59	(83.2, 90.8)	-0.5

a - Second session for this listener.
* - Below 95% confidence interval.

Table 6c. In-House and Dynastat DRT Scores.
Listening Session 4 - 22 Mar 1976

System	Speaker	IN-HOUSE				DYNASTAT				DIFF
		LISTENER				MEAN	MEAN	S.E.	95% C.I.	
		1 ^a	2 ^b	3 ^b	5 ^a					
1113	BL	90.6	86.5	89.6	85.4	88.0	90.1	0.90	(88.0, 92.2)	-2.1
	CH	92.7	89.6	89.6	91.7	90.9	92.2	0.65	(90.7, 93.7)	-1.3
	SN	80.2	86.5	89.6	83.3	84.9*	88.0	1.15	(85.3, 90.7)	-3.1
1146	BL	90.6	87.5	88.5	86.5	88.3*	90.8	0.80	(88.9, 92.7)	-2.5
	CH	92.7	92.7	92.7	92.7	92.7	94.8	0.88	(92.7, 96.9)	-2.1
	SN	81.3	84.4	87.5	86.5	84.9*	91.3	1.16	(88.6, 94.0)	-6.4
1150	BL	87.5	85.4	96.9	85.4	88.8	88.4	0.89	(86.3, 90.5)	+0.4
	CH	92.7	90.6	90.6	92.7	91.7*	94.4	0.71	(92.7, 96.1)	-2.7
	SN	84.4	81.3	85.4	86.5	84.4*	88.8	1.14	(86.1, 91.5)	-4.4
1152	BL	88.5	91.7	94.8	89.6	91.2	92.2	0.81	(90.3, 94.1)	-1.0
	CH	92.7	88.5	89.6	88.5	89.8*	92.8	0.80	(90.9, 94.7)	-3.0
	SN	85.4	83.3	85.4	88.5	85.7	87.4	1.05	(84.9, 89.9)	-1.7

a - Second session for this listener.
b - Third session for this listener.
* - Below 95% confidence interval.

3.3.2 REPEATABILITY

During the three listening sessions in October 1976 seven listeners were exposed repeatedly to the same DRT tape. Speaker CH was used for all repetitions. Table 7 contains a summary of the number of repetitions each listener participated in for each of the three sessions. Table 8 contains the mean and standard deviation across repetitions for each listener for each session. For those listeners that participated in two sessions the tendency was for the mean score to rise slightly and the standard deviation to decrease. This is what might be expected from listeners who are relatively inexperienced and are still rising on the "learning curve." A simple linear regression model was fitted to the data for each listener for each session. The independent variable was the repetition number; the dependent variable the DRT score. The intent was to examine the slope of the regression line to determine if a significant linear trend in the listeners' scores existed. Table 9 contains the intercept and slope for each listener as well as a 95 percent confidence interval for the slope of each line. The confidence interval did not contain zero in only two of the twelve cases. This means that the slopes of the remaining ten lines are not significantly different from zero indicating no significant learning trend. Further analysis consisted of computing the DRT mean and standard error across listeners for each repetition during the first and last listening sessions. Table 10 contains these results. Figure 6 is a scatter diagram of this data and contains a linear regression line for each session. The slope of each of these lines is significantly different from zero, however, it can be observed that the rate of increase is smaller for the third session than for the first session. Additionally, the standard errors in Table 10 are reducing and becoming more consistent as the listeners gain experience. Also included in Figure 6 is a 95 percent confidence interval for the mean score for speaker CH based on the mean obtained by Dynastat for the same tape used in our in-house sessions. A reliable estimate for the standard error for this score is not available. However, typical standard errors obtained by Dynastat for speaker CH when the mean is near 93.0 are less than 1.00. The confidence interval shown in Figure 6 was constructed using an estimated standard error of 0.75. All in-house scores for the 20 October 1976 session lie within the confidence interval as well as four of the last five scores on 6 October 1976.

The foregoing results led to the conclusion that a properly selected and trained listening crew used in an in-house program could produce results that are not only repeatable but also comparable to those obtained by Dynastat.

Table 7. Number of DRT Repetitions
Listeners Were Exposed to for Speaker
CH

Listener	6 Oct 76	12 Oct 76	20 Oct 76
4	9	0	9
8	9	0	9
9	9	9	0
10	9	0	9
11	9	8	0
13	0	0	12
14	0	0	12

Table 8. DRT Means and Standard Deviations Across
Repetitions for Each Listener at Each Session

Listener	6 Oct 76		12 Oct 76		20 Oct 76	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
4	93.3	2.28	-	-	95.0	1.25
8	95.6	1.86	-	-	96.8	0.63
9	92.0	1.80	92.6	2.05	-	-
10	91.6	3.10	-	-	92.9	1.79
11	87.0*	4.00	92.1	1.66	-	-
13	-	-	-	-	91.7	1.89
14	-	-	-	-	95.3	2.79

*First exposure to the DRT for this listener.

Table 9. Simple Linear Regression Models for Repetition (X) and DRT Score (Y) for Each Listener

Listener	6 OCT 76			12 OCT 76			20 OCT 76		
	Intercept	Slope	95% C.I. for Slope	Intercept	Slope	95% C.I. for Slope	Intercept	Slope	95% C.I. for Slope
4	92.9	0.07	(-0.67, 0.81)	-	-	-	94.6	0.09	(-0.31, 0.49)
8	94.1	0.30	(-0.25, 0.84)	-	-	-	96.1	0.14	(-0.02, 0.30)
9	90.4	0.33	(-0.18, 0.84)	90.2	0.49	(-0.02, 0.99)	-	-	-
10	86.9	0.94*	(0.37, 1.50)	-	-	-	90.9	0.40	(-0.06, 0.86)
11	82.5	0.90	(-0.21, 2.01)	92.8	-0.16	(-0.82, 0.50)	-	-	-
13	-	-	-	-	-	-	91.2	0.07	(-0.29, 0.44)
14	-	-	-	-	-	-	90.7	0.71*	(0.50, 0.93)

*Slope significantly different from zero.

Table 10. DRT Mean and Standard Error Across Listeners for Each Repetition for First and Last Sessions

Repetition	6 Oct 76		20 Oct 76	
	Mean	Std Error	Mean	Std Error
1	88.3	2.01	93.8	0.81
2	90.4	2.47	92.9	1.29
3	91.3	2.12	93.3	1.07
4	94.2	0.78	94.0	1.06
5	92.1	1.50	94.2	1.38
6	90.8	2.04	94.0	0.83
7	92.9	0.77	94.2	1.49
8	93.3	1.38	95.0	1.01
9	93.7	1.47	94.8	1.19

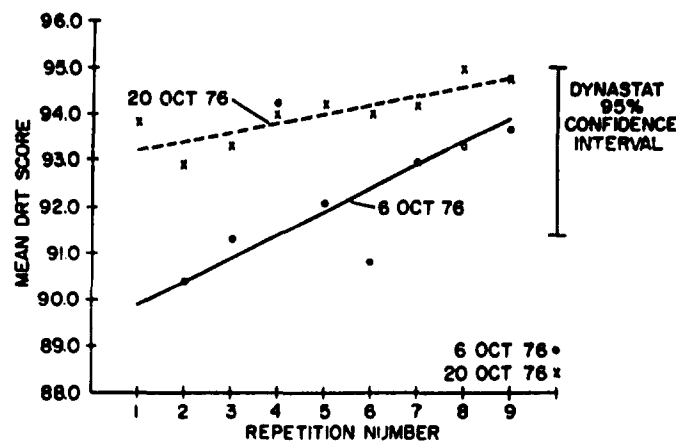


Figure 6. Scatter Diagram and Linear Regression for Mean DRT Score as a Function of Repetition Number

3.4 Conclusions and Recommendations

It was concluded that the DRT scoring software as implemented on the CSP-30 functioned properly, however, the manual entry of the raw data was unsatisfactory. A six speaker, ten listener DRT required approximately two hours to enter the data. The CSP-30 is a single user system, the primary function of which is research and development of voice algorithms. To dedicate the CSP-30 to the time required to enter DRT data is a waste of a valuable resource. In addition, this method of data entry proved to be susceptible to key punch errors. It was recommended that the DRT scoring software be implemented on an existing in-house PDP-11 mini-computer. It was further recommended that an optical mark reader be procured and interfaced to the PDP-11 and that special DRT test forms be designed so that automated data entry could be used in the scoring procedure.

It was further concluded that a listening crew could be trained in-house to perform in a consistent manner and obtain results comparable to those obtained by Dynastat. However, it was considered unsatisfactory to depend on volunteer listeners. Our experience was that it was difficult to obtain volunteers who were willing or able to participate in DRT listening the number of hours and frequency required for them to become consistent, reliable listeners. It was recommended that listeners be hired and that they participate in listening tests a minimum of one-half day each week.

It was further recommended that procedures be developed to recruit, train, and control the listeners and to monitor their performance. In addition, the

development of a method for screening and eliminating those listeners who are unsatisfactory was required.

4. FOLLOW-ON DEVELOPMENT

The decision was made to fully develop the in-house DRT program. The recommendations of Section 3.4 were adopted and implemented. The following Sections describe this development.

4.1 Optical Mark Reader

A search through several issues of the Excess ADP Equipment Bulletin published by the Defense Logistics Agency, Cameron Station, Alexandria, VA 22314 revealed that two (2) Decision Optical Mark Readers (OMR), model OMR 6510 were listed as excess. Further investigation revealed that these readers were located within ESD on Hanscom AFB. Contact with the users was immediately established. A review of the OMR documentation and discussions with the users resulted in the determination that the OMR could easily be interfaced with our PDP-11 and that forms could be designed and procured to satisfy our requirements. A no cost transfer of the OMRs to the Voice Processing Facility was accomplished. It was immediately learned that the interface hardware required was already available in our PDP-11. All that was required was to plug an existing connector into the OMR.

4.1.1 OMR TEST BOOKLETS

DRT test booklets were designed and procured for use with the OMR. Two different test booklets were procured; one for the 100 series word lists (ESD Form 36) and one for the 300 series word lists (ESD Form 37). Each booklet consists of four (4) pages joined together at the left edge by a perforated binding. This is referred to as a four part snapak. This allows the pages to be separated so that they may be fed into the OMR. Figure 7 is a copy of a page from one of the booklets. The only differences between this page and other pages are the words themselves and the position of the black rectangle in the upper right hand corner. This rectangle is used to indicate the booklet page number by its location. The listeners are required to fill in certain header information on the first page of each booklet before the test begins as indicated in Figure 7. The information is entered by first writing it in the large boxes to the left of each information block. The listeners then blacken in the appropriate rectangles using a No. 2 pencil. During the test listeners strike through the word of their choice as before. After much experimentation it was determined that wide, dark marks are required over the words for reliable OMR reading. A certain amount of practice was required before the listeners

mastered the technique of properly marking the words. The time required for this practice was minimal when compared to the total listener training period. It was determined that the best marker to use is a black tube-type, felt-tip marker, Federal Stock Number 7520-00-973-1059. These markers are available in adequate supply and if stored tip down between listening sessions have a reasonable usable life. Rectangles in the extreme left and right hand margins of each test booklet page are provided to give the listener an opportunity to change his answer by simply marking through the rectangle closest to the word pair to be changed. The test form pages measure 8-1/2 in. X 11 in. after separation. They were designed on a 5446 Decision format sheet (54 columns by 46 rows). The forms were printed using Pantone Purple 185 ink (12 parts warm red, 4 parts rubine red). Complete specifications for the forms are available in the Hanscom Air Force Base, Central Base Administration (DA) office.

4.1.2 SOFTWARE

The software functions required to interface the OMR to the PDP-11 and provide data that can be used by the DRT scoring software consisted of:

a. An OMR driver. This function is required to do the necessary handshaking between the OMR and the PDP-11 interface card (DC-11) and to send and receive necessary status, control, and data words.

b. A page reader. This software module is required to store an image of the test booklet page being read. It consists of filling in a 46 x 54 matrix of zeroes and ones. Each element of the matrix corresponds to a position on the test form page. A zero indicates no mark in that position, a one indicates a mark.

c. A page interpreter. This module interprets the matrix of zeroes and ones constructed by the page reader and extracts the following information:

1. System ID.
2. Listener ID.
3. Word List ID.
4. Speaker ID.
5. Page number.
6. The responses. These are stored in a similar manner as the CSP-30 version.

These functions are drawn together into a program called XXX on the PDP-11 disk file. The output of this program is a disk file containing the data described above. In addition, a program called XFDR is used before actual scoring takes place. This program accesses the data file created by XXX and creates a new file after performing the following:

d. Translates the XXX file into a new file in the format required for the scoring program.

DIAGNOSTIC RHYME TEST

LAST NAME

DAY

MONIH

YEAR

SYSTEM

0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9
0	1	2	3	4	5	6	7	8	9

WORD LIST

	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9
	0	1	2	3	4	5	6	7	8	9

LISTENER

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523
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SPEAKER

1 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
2 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

BOB -- GOB
TAUNT -- DAUNT
BOOT -- MOOT
CHEAT -- SHEET
GAB -- JAB
TOT -- POT
BOAST -- GHOST
NILL -- RILL
SAID -- ZED
DAW -- GNAW
CHOOSE -- SHOES
KEEP -- CHEEP
DANK -- BANK
DOT -- GOT
NOSE -- NOSE
TINT -- DINT
DECK -- NECK
TONG -- THONG
COO -- CHOO
REED -- WEED
SAG -- SHAG
ROB -- KNOB
FOAL -- VOLE
DIP -- NIP
PENCE -- FENCE
THAW -- SAW
TOOL -- POOL
WIELD -- YIELD
RAT -- GNAT

TOOT — COOT
POND — BOND
BONE — MOAN
BILL — VILL
GUEST — JEST
THOUGHT — FOUGHT
POOP — COOP
REAP — NEAP
FAST — VAST
DOCK — KNOCK
DOZE — THOSE
THING — SING
NET — MET
TAUGHT — CAUGHT
RUDE — NUDE
PEEN — BEAN
BAD — MAD
BOX — VOX
GO — JOE
DID — BID
WREN — YEN
NOUGHT — WROUGHT
SUE — ZOO
DEED — NEED
DAN — THAN
COP — CHOP
THOR — FORE
FIT — MIT
REST — NEST

Figure 7. DRT Test Booklet for Use With the Optical Mark Reader

e. Offers the opportunity to correct word list identification that may have been entered incorrectly.

f. Permits the elimination of selected listeners from the scoring run.

g. Permits the elimination of selected speakers from the scoring run.

The final step in the process is the execution of the scoring program itself. This program is called SCORE and is substantially the same as implemented on the CSP-30. The fundamental differences are:

h. It has been modified to accept data from the disk file rather than the ADDS terminal.

i. The printout of results has been expanded to include a page which consists of a matrix of listener/speaker scores.

Appendix C contains the listings for the above described software and an example DRT printout.

4.2 Program Usage

A step-by-step procedure for using the DRT scoring software follows. It is assumed that the operating system is the RSX-11M and the user is familiar with it. The scoring programs have been written to prompt the use by asking specific questions and waiting for a reply. Also, various error messages are written on the Decwriter when OMR read errors occur. Figure 8 is a copy of the Decwriter output for a DRT scoring run. The example in Figure 8 is for a single listener and a single speaker. Items marked with an asterisk (*) are entered by the user. Figure 9 is the resulting printout of the scoring process for this example. Before starting the procedure the test booklets should be prepared by first arranging them so that the speakers are in the same order for each listener. It is convenient, but not necessary, to arrange the speakers alphabetically and the listeners numerically. Listeners are identified by the last four digits of their social security account number. After arranging the booklets in the desired order the bindings should be removed so that the pages separate:

a. Turn the OMR on and press the feeder clear and reset buttons.

b. Run program XXX and follow instructions printed on the Decwriter. (See Figure 8.)

c. Enter date of test.

d. Enter up to 50 ASCII characters describing the system tested.

e. A disk write option is then selected. If a 1 is entered a disk file will be created. If 0 is entered no file is created. This option is useful for checking the OMR or forms alignment. See paragraph f below. Normal operation is to enter a 1.

f. A line printer output option is then selected. A 0 will cause no line printer output. A 1 will cause a printout to be made of the matrix of zeroes and ones for

each test booklet page. This option is selected when checking forms alignment and OMR operation. Normal procedure is to enter a 0.

g. Follow instructions for entering the number of listeners and speakers and the system identification number.

h. Follow instructions for entering the word list key and speaker identification. This has been added to eliminate the need for the listeners to blacken in the rectangles on their test booklets corresponding to this information. They should continue to write this information in the large boxes to the left of the rectangles.

i. After entering all word list keys and speakers they will be typed out on the Decwriter for verification. Carefully check their accuracy. If there is an error start over by aborting XXX. This is accomplished by typing in C while holding the CTRL key down followed by ABORTXXX after the MCR prompt. If the word list keys and speakers are correct type in RESUME followed by a carriage return.

j. At this time the pages are manually fed into the OMR. Each page should be placed face down on the glass platen with the header end of the page against the paper gate. After the page is read it is removed from the platen and the next page placed in position. This process is repeated until all pages are read. After the last page is read a blank page (could use reverse side of last page) is placed on the platen and read. This will cause the program to pause.

k. After the pause, if more pages are to be read in enter a 0. If the scoring run is complete enter a 1. A printout of "bad marks" is made on the Decwriter. These numbers are the number of listener responses not read by the OMR for each listener. This information is used when training new listeners to master the technique of using the markers and to detect OMR read problems. After this printout, XXX stops.

l. Various error conditions can occur while reading pages in. These may be due to the pages being read in the wrong order, a page not properly aligned over the glass platen, or a page read in twice. Error messages are printed on the Decwriter for each of these conditions. Simply correct the problem and type in RESUME.

m. The next step in the process is to execute XFER. Run XFER in the usual way (see Figure 8) and follow instructions.

n. The final step is the actual scoring. Run SCORE and follow instructions. Be sure the line printer is on-line. The result will be a disk file called FOR006.DAT containing the scored DRT results. Output this file to the line printer using PIP to obtain hardcopies.

* RUN DF:XXX

ENTER DATE OF TEST DD-MMM-YY (15-NOV-77) :21 MAR 78
THIS IS WHAT YOU SAID... 21 MAR 78

* ENTER HEADER INFO...A50
* DRT SCORING EXAMPLE

* ***COPY TO DISK?..TYPE 0 FOR NO; 1 FOR YES
* 1

* ***COPY TO PRINTER?..TYPE 0 FOR NO; 1 FOR YES
* 0

* ENTER #LISTENERS,#SPEAKERS,#SYSTEM..I2I2I4
* FOR EXAMPLE:08061104 FOLLOWED BY CARRIAGE RETURN
* 01011000
* ENTER KEY AND SPEAKER (E.G.:102BBV) FOR SPEAKER 1
* 304BBV

CHECK THE KEYS...

304BBV
TTO -- PAUSE ***** READY TO GO *****

* >RES
* >
* EOF. ENTER 0 TO GO OR 1 TO STOP
* 1

BAD MARKS,MARKS X ... 1. 232. 0.4
****SYSTEM # 1000
LISTENER 1277 0 ERRORS X 0.0
00000 00000 00000 00000 00000 00000 00000 00000 00300 00000 0000
TTO -- STOP *** FINISHED ***
>

* RUN DF:XFER

* ENTER SYSTEM ID ...I4
* 1000

21 MAR 78 DRT SCORING EXAMPLE

* HOW MANY LISTENERS TO DELETE?..I2
* 0

* HOW MANY SPEAKERS TO DELETE?..I2
* 0

* ENTER ANY INCORRECT-CORRECTED KEY PAIR (0 IF OK)
* 0
* TTO -- STOP
* >

Figure 8. Sample Decwriter Output During DRT Scoring on PDP-11

SYSTEM TESTED: 1000 21 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS = 1
NUMBER SPEAKERS = 1

FOR LISTENER: 1277 *

SPKR SCORE

BV 90.62

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	75.00	0.00	87.50	0.00
FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NON-FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	100.00	0.00	87.50	0.00	93.75	0.00
VOICED	100.00	0.00	75.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
SIBILATION	87.50	0.00	100.00	0.00	93.75	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	87.50	0.00	75.00	0.00	81.25	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
COMPACTNESS	100.00	0.00	75.00	0.00	87.50	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
TOTALS	95.83	0.00	85.42	0.00	90.62	0.00

* MEAN = 90.62 *
* S.E. = 0.00 *

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11

SYSTEM TESTED: 1988 21 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS = 1
NUMBER SPEAKERS = 1

FOR SPEAKER: BV *

LISTENER SCORE
1277 98.62

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	75.00	0.00	87.50	0.00
FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NON-FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	100.00	0.00	87.50	0.00	93.75	0.00
VOICED	100.00	0.00	75.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
SIBILATION	87.50	0.00	100.00	0.00	93.75	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	87.50	0.00	75.00	0.00	81.25	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
COMPACTNESS	100.00	0.00	75.00	0.00	87.50	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
TOTALS	95.83	0.00	88.42	0.00	98.62	0.00

TOTAL DRT SCORE: *
* MEAN = 98.62 *
* S.E. = 0.00 *

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11 (Cont)

SYSTEM TESTED: 1000 21 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS = 1
NUMBER SPEAKERS = 1

COMBINED RESULTS - STANDARD ERRORS ACROSS SPEAKERS AND LISTENERS *****

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	75.00	0.00	87.50	0.00
FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NON-FRICTIONAL	100.00	0.00	75.00	0.00	87.50	0.00
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	100.00	0.00	87.50	0.00	93.75	0.00
VOICED	100.00	0.00	75.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
SIBILATION	87.50	0.00	100.00	0.00	93.75	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	87.50	0.00	75.00	0.00	81.25	0.00
VOICED	75.00	0.00	100.00	0.00	87.50	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
COMPACTNESS	100.00	0.00	75.00	0.00	87.50	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	50.00	0.00	75.00	0.00
TOTALS	88.83	0.00	85.42	0.00	90.62	0.00

TOTAL DRT SCORE: * MEAN = 90.62 *
* S.E. = 0.00 *

SV
MEAN 90.62
S.E. 0.00

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11 (Cont)

SYSTEM 1000 01 MAR 78 DRT SCORING EXAMPLE

NUMBER LISTENERS = 1
NUMBER SPEAKERS = 1

SPEAKERS

BV

LIST.

1277 90.62 90.62 0.00

MEAN 90.62

S.E. 0.00

TOTAL DRT SCORE:

* MEAN = 90.62 *
* S.E. = 0.00 *

Figure 9. Sample Printout Resulting From DRT Scoring on PDP-11 (Cont)

4.3 Listeners

4.3.1 LISTENER BEHAVIORAL CONTROLS

A study was made to determine those controls required to minimize the effects of listener behavior on the DRTs conducted in-house. The study included a search of the applicable literature and a personal interview with Dr. W. D. Volers, one of the creators of the DRT. A report of this study is included as Appendix D. In addition, a committee was formed to make a determination as to the applicability of AFR 80-33, Use of Volunteers in Aerospace Research to the in-house DRT program. The committee found that the provisions of AFR 80-33 do not apply. A report of these findings is on file at the COMSEC Engineering Office.

4.3.2 RECRUITING

Listeners were recruited by advertising in local newspapers during November 1976. Over one hundred responses were received. Initial screening was accomplished by administering a pure tone audiometric test as was done during the trial period earlier in the year. Those who did not pass the test were not considered for the job. The nature of the work was explained to each application. They were offered \$2.50 per hour for one-half day (4-1/2 hours) per week with the understanding that they must successfully complete a training period and that they were subject to removal from the program at any time if their performance was not consistent and reliable. The first eighteen that qualified and were willing entered a training program. Approximately 50 names were retained on a backup list. Since then the 50 names have been exhausted to replace listeners (many did not want the job when called back several weeks later). On one other occasion an advertisement in the newspaper was used again to recruit listeners. Other than that one time, word of mouth through the listening crew has been adequate to recruit replacement listeners.

4.3.3 TRAINING

A training program consisting of four sessions, each four and one-half hours in length, was conducted during December 1976. Of the eighteen listeners who started the program, three quit after the first session, two after the second session, and four were not accepted for the job after the fourth session. The remaining nine stayed on as part of the listening crew. A second training period consisting of three sessions, each four and one-half hours in length, was conducted in January 1977. Five candidates from the backup list participated. Two quit after the second session, the remaining three became part of the listening crew. Of the twelve who were selected four are still part of the listening crew after one year. The remaining eight quit at various times. The first left after 22 weeks. The mean length of time these eight listeners stayed on the crew was 30 weeks. Replacements were recruited and trained as required.

4.3.3.1 Training Material

Training material consisted of repeated applications of two three-speaker DRTs that had been processed by two different narrowband vocoders. The two DRTs were administered 13 times during the December training program. Fifteen single speaker tests were administered the first session and 21 on each of the remaining sessions. After three sessions it was clear which listeners would not be selected, therefore, the January training program consisted of only three sessions. The same training material was used. Fifteen single speaker tests were administered during the first session and 21 the second and third sessions. The speakers were heard repeatedly in the order: BV JE RD BL SN CH. The first three speakers had been processed by a tenth order Linear Predictive Vocoder (LPC)⁶ at a 3.6 kbps data rate, the last three by TRIVOC (4-14)⁷ at 2.4 kbps. These DRTs had been previously evaluated by Dynastat. Table 11 contains the mean DRT scores and standard deviations obtained by Dynastat for each of the systems used during the training.

Table 11. DRT Scores Obtained by Dynastat for the Test Material Used During In-House Training Program in December 1976 and January 1977

System	Speaker	Mean	Standard Deviation*
1104 (LPC)	BV	86.1	2.80
	JE	84.6	1.53
	RD	89.7	1.32
2003 (TRIVOC)	BL	87.2	1.61
	SN	86.8	2.88
	CH	95.2	1.64

*Standard deviations were computed from furnished standard errors using the formula

$$\text{Standard Error} = \frac{\text{Standard Deviation}}{\sqrt{N-1}}$$

where

N = number of listeners.

6. Wiggins, R. H. (1976) Narrowband Digital Voice Processing (CSP-30 LPC Software Documentation), Volume I, ESD-TR-76-282.

7. Roberts, J. E., Smith, C. P., and Wiggins, R. H. (1975) Triple-function voice coder (TRIVOC), J. Acous. Soc. Am. 57 Suppl. 1:535.

4.3.3.2 Training Results

Time and space does not permit complete exposure of the results for every listener who entered the training program in this report. Three listeners were randomly selected to illustrate the kinds of results obtained during the training. Listener 3299 participated in the December 1976 training period and was not selected to continue in the program. Table 12a contains a summary of all DRT scores achieved by this listener. Listener 5699 also participated in the December training. This listener's scores are contained in Table 12b. Listener 5699 was selected to continue in the program and remained with the listening crew for 25 weeks. Listener 9557 was a member of the January training group. Scores for this listener are contained in Table 12c. Listener 9557 was selected and continues to be a member of the crew after 14 months. Tables 12a, b, and c also contain entries for the last two training sessions which are the number of standard deviations the listeners' DRT scores are from the Dynastat scores. These entries are based on the data in Table 11. Table 13a is a summary of the number of times each listeners' score was two or more standard deviations below Dynastat. Table 13b is a summary of the number of times each listeners' score was three or more standard deviations below Dynastat. Over half the time listener 3299 scored more than three standard deviations below Dynastat. In addition, this listener did not perform consistently as can be observed in Table 12a. For these reasons listener 3299 was not retained. Listener 5699 was above three standard deviations below Dynastat over 80 percent of the time. Listener 9557, after only three training sessions, scored above three standard deviations below Dynastat over 70 percent of the time. Both of these listeners scored above Dynastat on several occasions. In addition, except for an occasional "outlier", both of these listeners were consistent. These two listeners were selected to continue. These results are representative of all who participated in both the December and January training periods. Those who were eliminated from the program performed as did listener 3299. Those who were selected performed in a similar manner as listeners 5699 and 9557.

Table 12a. Training History for Listener 3299. Top number is DRT score.
Bottom number (for last two sessions only) is number of standard deviations
listener score is from Dynastat score

Speaker	REPITION NUMBER												
	1	2	3	4	5	6	7	8	9	10	11	12	13
BV	61.5	71.9	74.0	74.0	71.9	70.8	78.1 -2.36	76.0 -3.61	78.1 -2.86	68.8 -6.18	77.1 -3.21	77.1 -3.21	80.2 -2.11
JE	68.8	74.0	79.2	70.8	76.0	78.1	78.1 -4.25	82.3 -1.50	79.2 -3.53	85.4 +0.52	83.3 -0.85	76.0 -5.62	81.3 -2.16
RD	80.2	78.1	78.1	77.1	82.3	79.2	83.3 -4.85	86.5 -2.42	84.4 -4.02	85.4 -3.26	83.3 -4.85	87.5 -1.67	88.5 -0.91
BL	69.8	69.8	71.9	80.2	83.3	78.1	74.0 -8.20	75.0 -7.58	83.3 -2.42	77.1 -6.27	85.4 -1.12	79.2 -4.97	83.3 -2.42
SN	68.8	76.0	69.8	81.3	76.0	74.0	81.3 -1.91	78.1 -3.02	80.2 -2.29	82.3 -1.56	82.3 -1.56	77.1 -3.36	79.2 -2.64
CH	90.6	85.4	83.3	89.6	87.5	84.4	88.5 -4.09	87.5 -4.70	89.6 -3.41	93.8 -0.85	86.5 -5.30	88.5 -4.09	86.5 -5.30
	2 December			9 December			16 December			20 December			

Table 12b. Training History for Listener 5698. Top number is DRT score.
Bottom number (for last two sessions only) is number of standard deviations
listener score is from Dynastat score

Speaker	REPITION NUMBER												
	1	2	3	4	5	6	7	8	9	10	11	12	13
BV	71.9	83.3	81.3	82.3	82.3	82.3	81.3 -1.71	82.3 -1.36	85.4 -0.25	82.3 -1.36	80.2 -2.11	87.5 +0.50	85.4 -0.25
JE	76.0	78.1	79.2	78.1	81.3	78.1	80.2 -2.88	83.3 -0.85	74.0 -6.93	81.3 -2.16	77.1 -4.90	79.2 -3.53	79.2 -3.53
RD	89.6	86.5	90.6	91.7	88.5	87.5	87.5 -1.67	90.6 +0.68	92.7 +2.27	88.5 -0.91	90.6 +0.68	92.7 +2.27	90.6 +0.68
BL	84.4	86.5	86.5	86.5	85.4	82.3	84.4 -1.74	85.4 -1.12	83.3 -2.42	87.5 +0.19	84.4 -1.74	86.5 -0.43	84.4 -1.74
SN	74.0	77.1	75.0	81.3	81.3	76.0	81.3 -1.91	83.3 -1.22	81.3 -1.91	79.2 -2.64	81.3 -1.91	77.1 -3.37	84.4 -0.83
CH	88.5	95.8	91.7	90.6	94.8	87.5	93.8 -0.85	88.5 -4.09	88.5 -4.09	90.6 -2.80	90.6 -2.80	92.7 -1.52	94.8 -0.24
	2 December			9 December			16 December			20 December			

Table 12c. Training History for Listener 9557. Top number is DRT score. Bottom number (for last two sessions only) is number of standard deviations listener score is from Dynastat score

Speaker	REPETITION NUMBER									
	1	2	3	4	5	6	7	8	9	10
BV	67.7	83.3	78.1	83.3 -1.00	88.5 +0.86	87.5 +0.50	84.4 -0.61	83.3 -1.00	80.2 -2.11	82.3 -1.36
JE	71.9	83.3	83.3	77.1 -4.90	82.3 -1.50	81.3 -2.16	83.3 -0.85	82.3 -1.50	79.2 -3.53	82.3 -1.50
RD	78.1	90.6	86.5	91.7 +1.52	89.6 -0.08	94.8 +3.86	92.7 +2.27	91.7 +1.52	88.5 -0.91	93.8 +3.11
BL	72.9	82.3	77.1 -6.27	81.3 -3.66	85.4 -1.12	81.3 -3.66	82.3 -3.04	79.2 -4.97	83.3 -2.12	
SN	61.3	83.3	71.9 -5.18	79.2 -2.64	81.3 -1.91	83.3 -1.22	61.3 -1.91	78.1 -3.02	83.3 -1.22	
CH	87.5	93.8	89.6 -3.41	91.7 -2.13	91.7 -2.13	91.7 -2.13	81.3 -8.48	89.6 -3.41	91.7 -2.13	
	6 January			13 January			20 January			

Table 13a. Number of Times Listeners' Score Was Two or More Standard Deviations Below Dynastat Score (last two sessions only)

Speaker	Listener		
	3299	5699	9557
BV	7	1	1
JE	4	6	3
RD	5	0	0
BL	6	1	6
SN	4	2	3
CH	6	4	7
Total	32 (76%)	14 (33%)	20 (48%)

Table 13b. Number of Times Listeners' Score Was Three or More Standard Deviations Below Dynastat Score (last two sessions only)

Speaker	Listener		
	3299	5699	9557
BV	4	0	0
JE	3	4	2
RD	4	0	0
BL	4	0	5
SN	2	1	2
CH	6	2	3
Total	23 (55%)	7 (17%)	12 (29%)

5. PERFORMANCE OF IN-HOUSE DRTs

As discussed earlier in this report, it is essential that DRT scores be repeatable for a successful in-house program. In addition, it is desirable that in-house DRT scores be comparable to Dynastat scores. Results obtained over the first 12 months of the in-house program indicate that both repeatability and comparability have been achieved.

5.1 Listener Elimination

Normally a DRT is administered to 10 or 12 listeners. However, it is likely that one or two of them are trainees and one or two may not be performing up to their normal standard. Therefore a screening process is used to eliminate listeners from a given scoring run. The number of listeners is reduced to eight for each scoring run. This is the number that Dynastat uses. The elimination procedure used has been developed to improve the consistency of the listeners as a group by eliminating outliers. Let L = number of listeners and s = number of speakers for a particular DRT. Suppose X_{ij} is the i th listener's DRT score for speaker j where $i = 1, \dots, L$ and $j = 1, \dots, S$. We compute the mean DRT score for each speaker j .

$$\bar{X}_j = \frac{1}{L} \sum_{i=1}^L X_{ij}, \quad j = 1, \dots, s.$$

We then form a matrix whose elements D_{ij} are the differences between the i th listener's score for speaker j and the mean for speaker j . Thus,

$$D_{ij} = X_{ij} - \bar{X}_j, \quad i = 1, \dots, L; \quad j = 1, \dots, s.$$

Those listeners who are performing at or near the mean for all speakers will have differences that are near zero. Those that perform exceptionally low or high for one or more speakers might be considered outliers. A measure based on the magnitude of these differences is used to eliminate the listener who is an outlier. The measure is

$$VAR_i = \frac{1}{s} \sum_{j=1}^s D_{ij}^2, \quad i = 1, \dots, L.$$

The listener having the largest VAR_i is eliminated from the scoring run. L is then reduced by one and the process is repeated by computing new speaker means and differences. Again VAR_i is computed for each listener and the next listener is eliminated. This procedure is repeated until only eight listeners remain. This

process allows for the possibility of very high scoring listeners to be eliminated. However, it has been our experience that only rarely is a high scoring listener eliminated.

5.2 Repeatability and Comparability

Every listening session is started by administering the same three-speaker DRT. We refer to this DRT as the probe. The probe was also used during the training periods in December 1976 and January 1977. It consists of the first three speakers from Table 11. The scores obtained by each listener for the probe is closely tracked in order to monitor the listeners' consistency. The mean score for the probe each week provides us a measure of repeatability as well as a comparison with Dynastat scores. Additionally, from time to time a particular DRT is administered to the listening crew a second or third time in order to measure repeatability. Figure 10 is a scatter diagram of mean DRT scores for the probe for 40 repetitions. Each point represents one administration of the test. The first test was given on 14 January 1977 and the last on 22 December 1977. Each mean is based on only eight listener scores. Elimination of listeners was accomplished as described in Section 5.1. Also included in the figure is a confidence interval for the mean based on a Dynastat score of 86.8 and standard error of 0.75 for these speakers. A rapid learning trend during the first four sessions is apparent in the figure. After that time the scores are rather consistent except for a drop after the 22nd repetition. This was a time when several new listeners were added to replace departing members of the crew. The low scores for repetition numbers 23, 29, and 35 can be explained by noting that a full listening crew was not available on those dates and trainees' scores are included in the mean. 95 percent confidence intervals for the mean DRT score in the range 88 to 90 are typically two to three points wide. Most of the scores reflected in Figure 10 are well within a three-point band. This indicates that the in-house listening crew performs consistently over time. In-house DRT scores are shown to be comparable with scores obtained by Dynastat in Table 14. Table 14 contains mean DRT scores and standard errors for those systems that have been tested at least three times using either in-house or Dynastat resources. A one-way classification analysis of variance⁴ was performed on the scores for each system. No significant differences were found. This indicates that in-house and Dynastat DRT scores for the same system are essentially the same. Thus, direct statistical comparisons can be made using a mix of in-house and Dynastat DRT results.

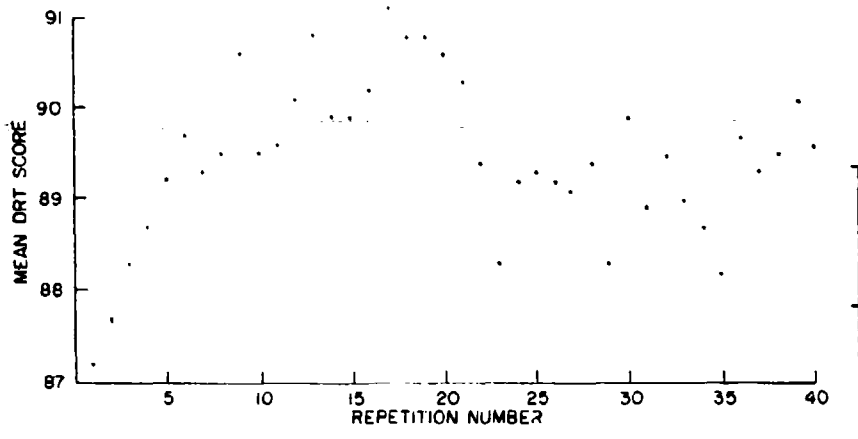


Figure 10. Mean DRT Scores for Probe After Eliminating Outlier Listeners

Table 14. In-House and Dynastat DRT Scores

SYSTEM ID	IN-HOUSE (MEAN/STANDARD ERROR) REPETITION			DYNASTAT (MEAN/STANDARD ERROR) REPETITION	
	1	2	3	1	2
2001	91.9/0.46			90.6/0.62	90.4/0.65
2017	87.5/0.46			85.0/0.93	85.9/0.51
2023	91.3/0.44	91.0/0.43		89.6/0.74	
2043	92.2/0.48	92.6/0.41		90.9/0.28	
2047	87.7/0.63	88.4/0.58		87.1/0.56	
2048	79.8/0.59	81.4/0.56	78.9/0.74	81.5/0.85	
2049	70.5/0.90	71.9/0.85		72.3/0.95	
2050	90.6/0.40	91.3/0.35		91.7/0.37	
2051	85.2/0.63	86.7/0.54		86.0/0.38	
2052	76.7/0.76	77.5/0.71	75.9/0.90	77.2/0.70	
2054	68.8/0.86	68.3/0.80		69.1/1.29	
2058	81.2/1.41	81.5/1.43		83.5/0.80	
2060	81.0/1.17	79.3/1.49		82.6/0.65	
2069	88.6/0.52	89.7/0.55	89.7/0.42	88.7/0.30	
2070	84.7/0.72	86.2/0.73		87.6/0.57	
2071	69.2/1.12	69.3/1.21		71.4/0.96	
2072	66.5/1.81	70.2/1.74		72.8/0.59	
2073	84.7/0.60	85.3/0.63		84.5/0.73	

6. COST

The weekly costs to conduct in-house DRTs are summarized below:

Listener salaries	\$162.00
12 listeners, 4-1/2 hours at \$3.00 per hour	
Test booklets	27.72
252 booklets at \$.11 each	
Test Administrator Salary	40.00
5 hours at approximately \$8.00 per hour	
Scoring Cost:	
Scorer salary (6 hours at \$3.00 per hour)	\$18.00
Computer	No Charge
	18.00
Total cost for three six-speaker DRTs:	\$247.72
Cost for one six-speaker DRT:	
In-house	\$82.85

The above in-house cost does not include development and implementation of the in-house capability. These additional costs, if apportioned over a 3-year period, would add less than \$50.00 to the cost of a single six-speaker DRT. Overhead costs have not been included in the above figures. Allowing for as much as 100 percent for overhead results in a final in-house cost for a six-speaker DRT that is significantly lower than that charged by a contractor. Sufficient demand exists to utilize the entire in-house capability of 150 six-speaker DRTs each year, thus realizing a large cost savings.

7. CONCLUSIONS AND RECOMMENDATIONS

It is concluded that the in-house DRT capability is a cost-effective means of providing a needed measure of voice communications intelligibility. It provides reliable data that is based on a widely accepted measure of intelligibility that is fast becoming a DoD Standard. It has been shown that the in-house testing provides results that are equivalent to those provided by contractor resources at a large cost savings. The in-house capability provides the additional advantage of rapid turnaround time, thus allowing decisions to be made in a timely fashion. The reduced unit cost of in-house DRTs allows us to perform the large number of DRTs required for our on-going algorithm development. Contractor costs for the number of DRTs required would be prohibitive. In addition to substantial cost savings and speedy turn-around, it is essential for the Government to have an in-house mechanism for validating results that might otherwise only be available from one, or very few other sources. This is particularly important in view of the decisions based on these results. It is recommended that the in-house capability be maintained.

It is a valuable resource that has widespread application throughout the Department of Defense. This capability could be expanded to serve the needs of other agencies requiring intelligibility testing and thus realize its maximum potential benefit. It is further recommended that continued use of contractor resources be made for conducting DRTs so that independent, unbiased results can be obtained at key points in our investigations. This will further serve to verify in-house results and provide a periodic comparison between in-house and contractor DRT scores.

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Appendix A

Diagnostic Rhyme Test
Word Lists

PRECEDING PAGE BLANK-NOT FILMED

DIAGNOSTIC RHYME TEST

WORD LIST 192A

PAGE 1	PAGE 2	PAGE 3	PAGE 4
BOB	COOT	BOB	PEST
DAUNT	BOND	TAUNT	VAULT
ROOT	MOAN	MOOT	DUES
CHEAT	BILL	SHEET	SEE
JAB	GUEST	GAB	SANK
TOY	FOUGHT	POT	ROO
BOAST	POOP	GHOST	SO
LIP	LEAP	RIP	LIO
SAID	VAST	ZED	FAST
GNAW	KNOCK	DAW	DOCK
CHOOSE	DOZE	SHOES	THOSE
CHEEP	SING	KEEP	THING
DANK	NET	BANK	NET
OOT	TAUGHT	GOT	CAUGHT
LOAD	RUDE	ROAD	LEND
TINT	BEAN	DINT	PEEN
NECK	HAD	DECK	SAD
THONG	VOX	TONG	BOX
CHOO	JOE	COO	GO
WED	BID	NEED	DID
SAG	YEN	SHAG	WREN
ROT	RAW	LOT	LAW
VOLE	SUE	FOAL	ZOO
NIP	NEED	NIP	DEED
FENCE	DAN	PENCE	THAN
SAW	CHOP	THAW	COP
POOL	THOR	TOOL	FORE
YIELD	FIT	WIELD	HIT
LAP	LEST	RAP	REST
TEST	PAN	BOB	FAN
FAULT	CHOCK	TAUNT	JOCK
NEWS	DATE	MOOT	NOTE
VEE	THICK	SHEET	TICK
THANK	CHAIR	GAB	CARE
HAD	DONG	POT	BONG
SHOW	YOU	GHOST	RUE
RID	REEK	RIP	LEEK
DENSE	CALF	ZED	GAPP
BOSS	BOMB	DAW	MOB
FOO	THOUGH	SHOES	DOUGH
THEE	GILT	KEEP	JILT
PAD	PENT	BANK	TENT
HOP	YAWL	GOT	HALL
ROW	LOOT	ROAD	ROOT
GIN	FEEL	DINT	VEAL
BEND	DAB	DECK	NAB
CHAN	BON	TONG	VON
GOOSE	THOLE	COO	SOLE
TEAK	THIN	NEED	FIN
GAT	PEG	SHAG	KEG
LOCK	LONG	LOT	WRONG
COAT	DUNE	FOAL	TUNE
BIT	BEET	NIP	MEET
OEN	SHAD	PENCE	CHAD
GAUZE	GOT	THAW	JOT
NOON	BOWL	TOOL	SOLE
TEA	GILL	WIELD	DILL
RAMP	RENO	RAP	LEND

DIAGNOSTIC RHYME TEST

WORD LIST 1928

PAGE 1

BOB COOT
DAUNT POND
BOOT MOAN
CHEAT VILL
JAB GUEST
TOT THOUGHT
GHOST COOP
LIP LEAP
SAID FAST
DAN KNOCK
CHOOSE DOZE
KEEP THING
BANK MET
OOT CAUGHT
LOAD LEWD
DINT PEEN
DECK MAD
THONG VOX
CHOO JOE
WEED DID
SAG WREN
ROT LAW
FOAL ZOO
DIP NFED
PENCE DAN
THAN COP
POOL THOR
WIELD FIT
RAP LEST

PAGE 2

PEST PAN
FAULT JOCK
NEWS DOTE
VEE TICK
THANK CHAIR
HAD BONG
BO RUE
RID REEK
DENSE GAPP
MOSS BOMB
FOO THOUGH
ZEE JILT
THAD TPNT
HOP WALL
ROW ROOT
CHIN VEAL
MEND DAB
CHAW BON
GOOSE THOLE
TEAK PIN
GAT KEG
LOCK WRONG
GOAT TUNF
MIT BEET
DEN SHAD
JAWS JOY
NOON BOWL
KEY GILL
LAMP REND

PAGE 3

BOB TOOT
TAUNT BOND
MOOT BONE
SHEET BILL
GAR JEST
ROT FUGHT
ROAST POOP
RIP RFAP
ZED VAST
GNAW ONCK
SHOES THOSE
CHEEP SING
DANK NET
GOT TAUGHT
ROAD RUDE
TINT BFAN
NECK BAO
TONG BOX
COO GO
REED AJO
SHAG YEN
LOT RAW
VOLE SHE
NIP DEED
PENCE THAN
RAW CHOP
TOOL FORE
YIELD HIT
LAP REST

PAGE 4

TEST PAN
VAULT CHOCK
OURS NOTE
PCE THICK
SANK CARE
ROD DONG
SHOW YOU
LID LECK
TENSE CALF
BOSS MOM
POOH DOUGH
THEE GILT
PAD PENT
POP YAWL
LOW LOOT
GIN FEEL
BEND NAB
SHAW VON
JUICE SOLE
PEEK THIN
BAT PEG
ROCK LONG
COAT DUNF
RIT MEET
THEN CHAO
GAUZE GOT
MOON DOLE
TEA DILL
RAMP LEND

DIAGNOSTIC RHYME TEST

WORD LIST 103A

PAGE 1		PAGE 2		PAGE 3		PAGE 4	
ROB	TOOT	PEST	PAN	GOB	COOT	TEST	PAN
TAUNT	POND	VAULT	JOCK	DAUNT	BOND	FAULT	CHOCK
ROOT	MOAN	NEWS	DOTF	MOOT	BONE	DUES	NOTE
CHEAT	VILL	VEE	TICK	SNEET	BILL	BEE	THICK
GAB	GUEST	SANK	CHAIR	JAB	JEST	THANK	CARE
TOT	THOUGHT	WAD	BONG	POT	FOUGHT	ROD	DONG
BOAST	CHOP	SHOW	RUE	GHOST	POOP	SO	YOU
LIP	REAP	RID	LEEK	RIP	LEAP	LID	REEK
ZED	FAST	TENSE	GAFF	SAID	VAST	DENSE	CALF
GNAW	KNOCK	ROSS	BOMR	DAW	DOCK	MOSS	MON
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POON	THOUGH
KEEP	SING	ZEE	GILT	CHEEP	THING	THEE	JILT
DANK	MET	FAD	TENT	RANK	NET	THAC	PENT
OGT	CAUGHT	HOP	WALL	GOT	TAUGHT	POP	YAWL
LOAD	RUDE	ROW	LOOT	ROAD	LEND	LOW	ROOT
TINT	PEEN	GIN	VEAL	DINT	BEAN	CHIN	FEEL
NECK	MAD	MEND	DAB	NECK	BAD	REND	NAB
THONG	BOX	CHAW	VON	TONG	VOX	SHAW	BON
COO	JOE	JUICE	THOLF	CHOO	GO	GOOSE	SOLE
WEED	BIO	TEAK	THIN	WEED	DIO	PEEK	FIN
SAG	WREN	GAT	KEG	SHAG	YEN	BAT	PEG
LOT	RAW	ROCK	LONG	POT	LAW	LOCK	WRONG
VOLF	SUE	COAT	DUNE	FOAL	ZOO	GOAT	TUNE
DIP	NEED	HIT	BEEF	NIP	DEED	BIT	MEET
FENCE	DAN	THEN	SHAD	FENCE	THAN	DEN	CHAD
THAN	CHOP	JAWS	GOT	RAW	COP	GAUZE	JOT
TOOL	FORE	MOON	DOLE	POOL	THOR	NOON	HOWL
YIELD	HIT	TFA	OTLL	WIELD	FIT	KEY	GILL
LAP	REST	RAMP	LEND	RAP	LEST	LAMP	REND

DIAGNOSTIC RHYME TEST

WORD LIST 1938

PAGE 1	PAGE 2	PAGE 3	PAGE 4
BOR	COOT	BOB	TOOT
TAUNT	POND	NAUNT	BOND
ROOT	BONE	MOOT	MOAN
CHEAT	VILL	SHEET	BILL
GAR	GUEST	JAB	JEST
POT	THOUGHT	TOY	FOUGHT
ROAST	COOP	OMOST	POOP
RIP	LEAP	LIP	REAP
ZED	FAST	SAID	VAST
RAW	KNOCK	GNAW	DOCK
SHOES	THOSE	CHOSE	DOZE
KEEP	THING	CHEEP	SING
HANK	MET	HANK	NET
GOT	CAUGHT	DOT	TAUGHT
ROAD	LEND	LOAD	RUDE
TINT	BEAN	DINT	PEEN
DECK	HAD	NECK	BAO
TONG	BOX	THONG	VOX
COO	JOE	CHOO	GO
WEED	DID	REED	BID
SAG	YEN	SHAG	WREN
LOT	RAW	ROT	LAW
FOAL	ZOO	VOLE	SUE
DIP	NEED	NIP	DEED
PENCE	DAN	FENCE	THAN
THAW	COP	SAW	CHOP
POOL	THOR	TOOL	FORE
YIELD	HIT	WIELD	FIT
LAP	LEST	RAP	REST
PEST	PAN	GOB	TOOT
VAULT	JOCK	NAUNT	BOND
NEWS	NOTE	MOOT	MOAN
VEF	TICK	SHEET	BILL
SANK	CHAIR	JAB	JEST
ROD	BONG	TOY	FOUGHT
SHOW	RUE	OMOST	POOP
LID	RECK	LIP	REAP
TENSE	GAPP	SAID	VAST
MOSS	ROMA	GNAW	DOCK
POOH	DOUGH	CHOSE	DOZE
ZEE	JILY	CHEEP	SING
PAD	TENT	HANK	NET
FOP	WALL	DOT	TAUGHT
LOW	ROOT	LOAD	RUDE
GIN	FEEL	DINT	PEEN
MEND	DAB	NECK	BAO
SHAW	VON	THONG	VOX
JUICE	THOLE	CHOO	GO
TEAK	FIN	REED	BID
GAT	PEG	SHAG	WREN
ROCK	LONG	ROT	LAW
GOAT	THINE	VOLE	SUE
HIT	HFET	NIP	DEED
THEN	SHAD	FENCE	THAN
JANS	JOT	SAW	CHOP
NOON	BOWI	TOOL	FORE
TEA	DILL	WIELD	FIT
RAMP	REND	RAP	REST
TEST	PAN	GOB	TOOT
PAULT	CHOCK	NAUNT	BOND
DUES	DOYE	MOOT	MOAN
SEE	THICK	SHEET	BILL
THANK	CARE	JAB	JEST
HAD	DONG	TOY	FOUGHT
SO	YOU	OMOST	POOP
RID	LEEK	LIP	REAP
DENSE	CALF	SAID	VAST
BOSS	MON	GNAW	DOCK
FOO	THOUGH	CHOSE	DOZE
THEE	GILT	CHEEP	SING
THAO	PENT	HANK	NET
HOP	YAWL	DOT	TAUGHT
ROW	LOOT	LOAD	RUDE
CHIN	VEAL	DINT	PEEN
BEND	NAB	NECK	BAO
CHAW	BON	THONG	VOX
GOOSE	SOLE	CHOO	GO
PEEK	THIN	REED	BID
BAT	LEG	SHAG	WREN
LOCK	WRONG	ROT	LAW
COAT	DUNE	VOLE	SUE
BIT	MEET	NIP	DEED
DEN	CHAD	FENCE	THAN
GAUZE	GOT	SAW	CHOP
MOON	DOLE	TOOL	FORE
KEY	GILL	WIELD	FIT
LAMP	LEND	RAP	REST

DIAGNOSTIC RHYME TEST

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 DAUNT POND
 MOOT BONE
 SHEET VILL
 GAB JEST
 POT FOUGHT
 BOAST POOP
 LIP REAP
 SAID VAST
 DAN DOCK
 SHOES THOSE
 KEEP SING
 BANK MET
 BOT TAUGHT
 LOAD RUDE
 TINT PEEN
 DECK MAD
 THONG VOX
 COO GO
 REED BIO
 SHAG WREN
 LOT RAW
 POAL SUE
 NIP DEED
 PENCE DAN
 THAW CHOP
 POOL FORT
 YIELD HIT
 RAP REST

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TEST PAW
 FAULT JOCK
 DIES NOTE
 BEE TICK
 BARK CARE
 ROD DONG
 SHOW YOU
 RIO LECK
 DENSE CALP
 MOSS MOM
 PHOM DOUGH
 ZEE GILT
 THAD TENT
 POP YAWL
 ROM LOOT
 GIN VEAL
 MEND DAB
 CHAW BON
 JUICE SOLP
 PEEK THIN
 BAT KEG
 OCK LONG
 LOAT DUNE
 BIT MEET
 DEN SHAD
 JAWB GOT
 NOON DOLE
 TEA DILL
 LAMP LEND

PAGE 3

ROB TOOT
 TAUNT BOND
 BONT MOAN
 CHEAT BILL
 JAB GUEST
 TOT THOUGHT
 GHOST COOP
 RIP LEAP
 ZED FAST
 GNAM KNOCK
 CHOOSE DOZE
 CHEEP THING
 OANK NET
 DOT CAUGHT
 ROAD LEWD
 DINT BEAN
 NECK BAD
 TONG BOX
 CHOO JOE
 NEED OIO
 RAG YEN
 ROT LAH
 VOLE ZOO
 DIP NEED
 PENCE THAW
 SAW COP
 TOOL THOR
 WIELD FIT
 LAP LEST

PAGE 4

PEET PAN
 VAULT CHOCK
 NEWS DOTE
 VEE THICK
 THANK CHAIR
 MAD BONG
 SO RUE
 LID REEK
 TENSE GAPP
 BOSS BOMB
 POO THOUGH
 THEE JILT
 PAD PENT
 HOP WALL
 LOW ROOT
 CHIN FEEL
 SEND NAB
 SHAW VON
 BOOSE THOLE
 TEAK PIN
 GAY PEG
 LOCK WRONG
 COAT TUNE
 HIT BEET
 THEN CHAD
 GAUZE JOY
 MOON BOWL
 KEY GILL
 RAMP REND

DIAGNOSTIC RHYME TEST

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PAGE 1		PAGE 2		PAGE 3		PAGE 4	
ROB	TOOT	PEST	FAN	ROB	COOT	TEST	PAN
TAUNT	POND	VAULT	JOCK	DAUNT	SONO	PAULT	CHOCK
BOOT	BONE	NEWS	NOTE	MOOT	MOAN	OUES	DOYE
CHEAT	VILL	VEE	TICK	SHEET	BILL	SEE	THICK
GAB	GUEST	SANK	CHAIR	JAB	JEST	THANK	CARE
POT	FOUGHT	ROD	DONG	TOT	THOUGHT	HAD	BONG
GHOST	PHOP	SO	YOU	ROAST	COOP	SHOW	RUE
LIP	REAP	RIO	LEEK	RIP	LEAP	LID	REEK
ZED	FAST	TENSE	GAPP	SAID	VAST	DENSE	CALF
DAN	DOCK	MOSS	MON	GNAW	KNOCK	BOSS	BOMB
CHOOSE	THOSE	FOO	DOUGH	SHOES	OOZE	POOH	THOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	THEE	GILT
BANK	NET	THAD	PENT	DANK	MEY	PAD	TENT
GOT	CAUGHT	POP	WALL	DOT	TAUGHT	HOP	YAWL
ROAD	RUDE	LOW	LOOT	LOAD	LEWD	ROW	ROOT
TINY	BEAN	GIN	FEEL	DINT	PEEN	CHIN	VEAL
NECK	BAD	BEND	NAB	DECK	HAD	MEND	OAB
TONG	VOX	SHAW	BON	THONG	BOX	CHAW	VON
CHOD	JOE	GOOSE	THOLE	CON	GO	JUICE	SOLE
REED	DIO	PEEK	FIN	WEED	BID	TEAK	THIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAT	KEG
ROT	LAW	LOCK	WRONG	LOT	RAW	ROCK	LONG
FOAL	ZOO	GOAT	TUNE	VOLE	SUE	COAT	DUNE
NIP	NEED	BIT	BEET	DIP	DEED	HIT	MEET
PENCE	THAN	DEN	CHAD	PENCE	DAN	THEN	SHAD
THAW	COP	JAWB	JOT	SAW	CHOP	GAUZE	GOT
TOOL	PORE	MOON	DOLE	POOL	THOR	NOON	BOWL
YIELD	PIT	TEA	GILL	WIELD	HIT	KEY	DILL
LAP	LEST	RAMP	REND	RAP	REST	LAMP	LEND

DIAGNOSTIC RHYME TEST

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GOB	COOT	TEST	PAN
TAUNT	BOND	VAULT	CHOCK
BOOT	BONE	NEWS	NOTE
CHEAT	BILL	VEE	THICK
JAB	JEST	THANK	CARE
POT	FOUGHT	ROD	DOING
BOAST	POOP	SHOW	YOU
RIP	REAP	LID	LEEK
SAID	VAST	DENSE	CALF
GNAW	DOCK	BOSS	MON
CHOOSE	DOZE	FOO	THOUGH
KEEP	THING	ZEE	JILT
BANK	NET	THAD	PENT
GOT	TAUGHT	POP	YAWL
ROAD	RUDE	LOW	LOOT
TINT	PEEN	GIN	VEAL
NECK	BAD	BEND	NAB
THONG	BOX	CHAW	VON
COO	GO	JUICE	SOLE
WEED	BIO	TEAK	THIN
SAG	YEN	GAT	PEG
LOT	LAW	ROCK	WRONG
POAL	ZOO	GOAT	TUNF
NIP	NEED	BIT	BEET
PENCE	DAN	THEN	SHAD
THAW	COP	JAWS	JNT
POOL	THOR	NOON	BOWL
YIELD	FIT	TEA	GILL
RAP	REST	LAMP	LEND
		ROB	TOOT
		HAUNT	POND
		MOOT	MOAN
		SHEET	VILL
		GAR	GUEST
		TOY	THOUGHT
		GHOST	COOP
		LIP	LEAP
		ZED	PAST
		DAW	KNOCK
		SHOES	THOSE
		CHEEP	SING
		DANK	NET
		DOT	CAUGHT
		LOAD	LEWD
		DINT	BEAN
		DECK	MAD
		TONG	VOX
		CHOO	JOE
		REED	DIO
		SHAG	WREN
		ROT	RAM
		VOLE	SUE
		DIP	DEED
		FENCE	THAN
		SAW	CHOP
		TOOL	FORE
		WIELD	HIT
		LAP	LEST
		PEST	FAN
		FAULT	JOCK
		DUES	DOYE
		BEE	TICK
		BANK	CHAIR
		WAD	BONG
		SO	RUE
		RIO	REEK
		TENSE	GAPP
		MOSS	BOMB
		POOH	DOUGH
		THEE	GILT
		PAD	TENT
		MOP	WALL
		ROW	ROOT
		CHIN	FEEL
		MEND	DAB
		SHAW	BON
		GOOSE	THOLE
		PEEK	PIN
		BAT	KEO
		LOCK	LONG
		COAT	DUNE
		HIT	MEET
		DEN	CHAD
		GAUZE	GOT
		MOON	DOLE
		KEY	DILL
		RAMP	RENO

DIAGNOSTIC RHYME TEST

WORD LIST 1998

PAGE 1	PAGE 2	PAGE 3	PAGE 4
BOB	TOOT	TEST	PAN
TAUNT	POND	VAULT	JOCK
MOOT	MOAN	DUES	NOTE
CHEAT	BILL	VEE	TICK
GAB	GUEST	BANK	CHAIR
TOT	FOUGHT	MAD	DOGS
BOAST	POOP	SHOW	YOU
LIP	LEAP	RID	REEK
SAID	VAST	DENSE	CALF
GNAM	DOCK	BOSS	HOM
SHOES	THOSE	PONH	DOUGH
CHEEP	SING	THEE	GILT
DANK	MET	PAD	TENT
DOT	CAUGHT	HOP	WALL
ROAD	RUDE	LOW	LOOY
DINT	PEEN	CHIN	VEAL
NECK	BAD	BEND	NAB
THONG	VOX	CHAW	BON
COO	GO	JUICE	SOLE
NEED	DID	TEAK	PIN
SAG	YEN	GAT	PEG
ROT	LAW	LOCK	WRONG
VOLE	ZOO	COAT	TUNE
DIP	NEED	HIT	BEET
FENCE	THAN	DEN	CHAD
THAN	CHOP	JANS	GOT
POOL	FORE	NOON	DOLE
WIELD	HIT	KEY	DILL
LAP	LEST	RAMP	REND
BOB	COOT	BOB	COOT
DAUNT	BOND	DAUNT	BOND
BOOT	BONE	BOOT	BONE
SHEET	VILL	SHEET	VILL
JAB	JEST	JAB	JEST
POY	THOUGHT	POY	THOUGHT
GHOST	COOP	GHOST	COOP
RIP	REAP	RIP	REAP
ZED	PAST	ZED	PAST
DAW	KNOCK	DAW	KNOCK
CHOOSE	OOZE	CHOOSE	OOZE
KEEP	THING	KEEP	THING
RANK	NET	RANK	NET
GOT	TAUGHT	GOT	TAUGHT
LOAD	LEWD	LOAD	LEWD
TINT	BEAN	TINT	BEAN
DECK	MAD	DECK	MAD
TONG	BOX	TONG	BOX
CHOO	JOE	CHOO	JOE
REED	BID	REED	BID
SHAG	WREN	SHAG	WREN
LOT	RAW	LOT	RAW
FOAL	SUE	FOAL	SUE
NIP	DEED	NIP	DEED
PENCE	DAN	PENCE	DAN
SAW	COP	SAW	COP
TOOL	THOR	TOOL	THOR
YIELD	PIT	YIELD	PIT
RAP	REST	RAP	REST
PEST	FAULT	PEST	FAULT
NEWS	SEE	NEWS	SEE
THANK	ROD	THANK	ROD
SO	COOP	SO	COOP
LID	LEEK	LID	LEEK
TENSE	GAPP	TENSE	GAPP
MOSS	BOMB	MOSS	BOMB
FOO	THOUGH	FOO	THOUGH
ZEE	JILT	ZEE	JILT
THAD	PENT	THAD	PENT
POP	YAWL	POP	YAWL
ROW	ROOT	ROW	ROOT
GIN	PEEL	GIN	PEEL
MEND	DAB	MEND	DAB
SHAW	VON	SHAW	VON
GOOSE	THOLE	GOOSE	THOLE
PEEK	THIN	PEEK	THIN
BAT	KEG	BAT	KEG
ROCK	LONG	ROCK	LONG
GOAT	DUNE	GOAT	DUNE
BIT	MEET	BIT	MEET
THEN	SHAD	THEN	SHAD
GAUZE	JOT	GAUZE	JOT
MOON	BOWL	MOON	BOWL
TEA	GILL	TEA	GILL
LAMP	LEND	LAMP	LEND

DIAGNOSTIC RHYME TEST

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PAGE 1

GOS	COOT
TAUNT	BOND
BOOT	BONE
CHEAT	BILL
JAB	SUPST
POT	THO(USHY
BOAST	COOP
LIP	COO
SAID	VAST
GNAN	DOCK
SHOES	THOSE
KEEP	THING
BANK	NET
DOT	CAUGHT
LOAD	LEWD
TINT	BEAN
NECK	MAD
THONG	VOK
COO	GO
WEED	DIO
SAG	WREN
LOT	LAW
FOAL	SUE
NIP	NEED
FENCE	THAN
THAW	COP
TOOL	THOR
WIELD	FIT
LAP	LEST

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TEST	PAN
VAULT	CHOCK
NEWS	NOTE
VEE	THICK
THANK	CHAIR
ROD	BONG
SHDW	RUE
RID	LEEK
OENSE	CALF
ROSS	MOH
POOH	MOUGH
ZEE	JILT
THAO	TENT
HOP	WALL
ROW	ROOT
GIN	PEEL
BEND	DAB
CHAW	BON
JUICE	SOLE
TEAK	FIN
GAT	KEG
ROCK	WRONG
GOAT	DUNE
BIT	BEEY
DEN	CHAD
JAWS	JOT
MOON	BOWL
KEY	GILL
RAMP	REND

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ROB	TOOT
NAUNT	POND
MOOT	MOAN
SHEET	VILL
GAB	JEST
TOT	FOUGHT
GHOST	POOP
RIP	LEAP
ZED	FABY
RAW	KNOCK
CHOOSE	DOZE
CHEEP	SING
DANK	NEY
GOY	TAUGHT
ROAD	RUDE
NINT	PEEN
DECK	BAD
TONG	BOX
CHOO	JOE
REED	BID
SHAG	VEN
ROT	RAW
VOLE	ZOO
DIP	DEED
PENCE	DAN
SAW	CHOP
POOL	FORE
WIELD	HIT
RAP	REST

PAGE 4

PEST	FAN
FAULT	JOCK
QUES	DOYE
BER	TICK
SANK	CARE
NAD	DOING
SO	YOU
LTD	REEK
TENSE	GAPP
MOSS	BOMB
FOO	THOUGH
THEE	GILT
FAD	PENT
POP	YAWL
LOW	LOOT
CHIN	VEAL
MEND	NAB
SHAW	VON
GOOSE	THOLE
PEEK	THIN
BAT	PEG
LOCK	LONG
COAT	TUNE
MIT	MEET
THEN	SHAD
GAUZE	GOY
NOON	DOLZ
TEA	DILL
LAMP	

DIAGNOSTIC RHYME TEST

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BOB TOOT
TAUNT BOND
BOOT BONE
SHEET BILL
GAB JEST
POT THOUGHT
GHOST COOP
RIP REAP
BAID VAST
DAN DOCK
CHOOSE THOSE
KEEP THING
DANK NET
DOT CAUGHT
ROAD RUDE
TINT BEAN
DECK MAD
TONG VOX
CHOD GO
WEED BIO
SHAG WREN
LOT RAN
VOLE ZOO
DIP NEED
FENCE THAN
SAM CHOP
POOL THOR
WIELD HIT
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PEST PAN
VAULT CHOCK
NEWS NOTE
BEE THICK
SANK CARE
ROD SONG
SO RUE
LID LEEK
DENSE CALF
MOSS MOM
POD DRUGH
ZEE JILT
PAD PENT
HOP WALL
LOW LROT
GIN PEEL
MEND OAB
SHAW SON
GONSE SOLE
TEAK THIN
BAT KEG
ROCK LONG
COAT TUNE
MIT BEET
DEN CHAD
GAUZE GOT
NOON BOWL
KEY DILL
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GOS COOT
DAUNT POND
MOOT NOAN
CHEAT VILL
JAB GUEST
TOT FOUGHY
BOAST POOP
LIP LEAP
ZED PAST
GNAM KNOCK
SHOES DOZE
CHEEP SING
BANK NET
GOT TAUGHT
LOAD LEND
DINT PEEN
NECK BAD
THONG BOX
COO JOE
REED DID
SAB YEN
ROT LAW
FOAL BUE
NIP DEED
PENCE DAN
THAN COP
TOOL FORE
YIELD FIT
LAP REST

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TEST PAN
FAULT JOCK
DUES OOTE
VEE TICK
THANK CHAIR
MAD DONS
SHOW YOU
RID REEK
TENSE GAPP
BOSS BONS
POOM THOUGH
THEE GILT
THAD TENT
POP YAWL
ROW ROOT
CHIN VEAL
BEND NAB
CHAW VON
JUICE THOLE
PERK PIN
GAT PEG
LOCK WRONG
GOAT DUNE
BIT MEET
THEN SHAD
JAMS JOT
MOON DOLE
TEA GILL
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GOB	COOT
TAUNT	BOND
MOOT	BONE
SHEET	STLL
GAB	QUEST
TOT	FOUGHY
GHOST	COOP
LIP	REAP
ZED	FAST
SNAN	KNOCK
CHOOSE	THOSE
CHEEP	THING
BANK	MEY
DOT	TAUGHT
ROAD	RUDE
DINT	PEEN
NECK	BAD
THONG	VOX
CHOO	GO
REED	DID
SHAG	WREN
ROT	LAW
VOLZ	ZOO
NIP	DEED
PENCE	DAN
SAW	CHOP
TOOL	PORE
WIELD	FIT
RAP	REST

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TEST	PAN
VAULT	CHOCK
DUES	NOTE
BEE	THICK
BANK	CHAIR
HAD	DONG
SO	RUE
RID	LEEK
TENSE	GAFF
BOSS	BOMB
FOO	DOUGH
THEE	JILT
THAD	TENT
HOP	YAWL
LOW	LOOT
CHIN	VEAL
BEND	NAB
CHAM	BON
GOOSE	SOLE
PEEK	PIN
DAY	KEG
LOCK	WRONG
COAT	TUNE
BIT	MEET
THEN	SHAD
GAUZE	GOT
MOON	DOLE
KEY	GILL
LAMP	LEND

PAGE 3

BOR	TOOT
DAUNT	POND
BOOT	MOAN
CHEAT	VILL
JAR	JEST
POT	THOUGHT
ROAST	POOF
RIP	LEAP
SAID	VAST
DAN	DOCK
SHOES	DOZE
KEEP	SING
DANK	NET
GOT	CAUGHT
LOAD	LEND
TINT	BEAN
DECK	HAD
TONG	BOX
COO	JOE
WEED	BID
SAG	YEN
LOT	RAM
FOAL	SUE
DIP	NEED
FENCE	THAN
THAN	COP
POOL	THOR
YIELD	HIT
LAP	LEST

PAGE 4

PEST	FAN
FAULT	JOCK
NEWS	BOYE
VEE	TICK
THANK	CARE
ROO	BONG
SHOW	YOU
LIO	REEK
DENSE	CALF
HOSS	HOM
POOH	THOUGH
ZEE	GILT
FAD	PENT
POP	HALL
ROW	ROOT
GIN	FEEL
MEND	DAB
SHAW	VON
JUICE	THOLE
TEAK	THIN
GAT	PEG
ROCK	LONG
GOAT	DUNE
MIT	BEEY
ON	CHAD
JAWS	JOT
NOON	BOWL
TEA	DILL
RAMP	RENO

DIAGNOSTIC RHYME TEST

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ROB
DAUNT
ROOT
SHEET
GAB
TOT
GHOST
RIP
SAID
GNAW
SHOES
KEEP
BANK
COT
LOAD
TINT
NECK
YONG
COO
NEED
SAG
LOT
FOAL
DIP
FENCE
THAN
TOOL
YIELD
RAP

COOT
BOND
BONE
VILL
GUEST
FOUGHT
POOP
REAP
VAST
DOCK
THOSE
SING
NET
CAUGHT
RUDE
BEAN
HAD
BOX
GO
DID
WREN
RAW
ZOO
DEED
THAN
CHOP
THOR
PIY
REST

PAGE 2

PEST
FAULT
NEWS
BEE
SANK
HAD
SO
LID
DENSE
BOSS
POOH
ZEE
THAD
HOP
ROW
GIN
BEND
SHAW
JUICE
PEEK
GAT
ROCK
GOAT
HIT
DEN
JAWS
MOON
TEA
LAMP

PAN
CHOCK
NOTE
TICK
CHAIN
DONG
YOU
LEEK
CALF
MOM
DOUGH
GILT
PENT
WALL
LOOT
PEEL
DAB
VON
SOLE
PIN
KEG
LONG
TUNE
MEET
CHAD
BOT
BOWL
GILL
LEND

PAGE 3

ROB
TAUNT
MOOT
CHEAT
JAB
POY
BOAST
LIP
ZEO
OAW
CHOOSE
CHEEP
DANK
GOT
ROAD
DINT
DECK
THONG
CHOO
NEED
SHAG
ROY
VOLE
NIP
PENCE
SAW
POOL
WIELD
LAP

TOOT
POND
MOAN
BILL
JEST
THOUGHT
COOP
LEAP
FAST
KNOCK
DOZE
THING
MEY
TAUGHT
LEND
PEEN
BAD
VOX
JOE
BID
YEN
LAW
SUE
NEED
OAN
COP
FORE
HIT
LEST

PAGE 4

TEST
VAULT
DUES
VEE
THANK
ROD
SHOW
RID
TENSE
MOSS
POO
THEE
PAD
POP
LOW
CHIN
MEND
CHAW
GOOSE
TEAK
SAT
LOCK
COAT
BIT
THEN
GAUZE
NOON
KEY
RAMP

PAN
JOCK
OOTE
THICK
CARE
SONG
RUE
REEK
GAPP
BOMB
THOUGH
JILT
TENT
YAWL
ROOT
YEAL
NAB
SON
THOLE
THIN
PEG
WRONG
DUNE
SEET
SHAD
JOY
DOLE
OILL
REND

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PAGE 1

BOB
DAUNT
MOOT
SWEET
GAB
TOT
BOAST
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VAULT	JOCK
DUES	DOYE
BEE	YICK
SANK	CARE
WAD	BONS
SHOW	YOU
RIO	LEEK
TENSE	GAFF
BOSS	NOM
POO	DOUGH
ZEE	JILT
THAD	TENT
POP	WALL
LOW	LOOT
GIN	VEAL
MEND	DAB
CHAM	BON
GOOSE	THOLE
TEAK	PIN
BAY	PEG
ROCK	WRONG
GOAT	TUNE
BIT	MEET
THEN	SHAD
JAWS	GOY
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TEA	GILL
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TAUNT POND
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BOAST POOP
LIP LEAP
ZED FAST
GNAW KNOCK
CHOOSE DOZE
KEEP THING
DANK MET
OOT CAUGHT
LOAD LEND
DINT PEEN
DECK BAD
THONG BOX
COO GO
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SHAG YEN
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VOLE SUE
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FENCE THAN
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ZEE JILT
FAD TENT
POP WALL
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CHIN VEAL
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CHAW VON
JUICE SOLE
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GHOST COOP
RIP REAP
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DAUNT	BOND	FAULTY	CHOCK
MOOT	BONE	DUES	NOTE
CHEAT	BILL	VEE	THICK
GAB	GUEST	BANK	CHAIR
TOT	FOUGHT	WAD	DONG
BOAST	POOP	SHOW	YOU
RIP	LEAP	LID	REEK
SAID	VAST	DENSE	CALF
GNAW	DOCK	BOBS	MOM
SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEE	JILT
CANK	MET	FAD	TENT
GOT	TAUGHT	FOP	YAWL
ROAD	LEWD	LOW	ROOT
TINT	PEEN	GIN	VEAL
DECK	BAD	MEND	NAB
THONG	VOX	CHAN	BON
CHOD	GO	GOOSE	SOLE
REED	DID	PEEK	PIN
SAG	WREN	GAT	KEG
ROT	RAW	LOCK	LONG
VOLE	ZOO	COAT	TUNE
OIP	NEED	HIT	BEET
PENCE	THAN	DEN	CHAD
THAW	COP	JAWS	JOT
POOL	FORE	NOON	DOLE
YIELD	FIT	TEA	GILL
RAP	REST	LAMP	LEND
BOB	COOT	BOB	COOT
TAUNT	POND	TAUNT	POND
BOOT	MOAN	BOOT	MOAN
SHEET	VILL	SHEET	VILL
JAB	JEST	JAB	JEST
POT	THOUGHT	POT	THOUGHT
GHOST	COOP	GHOST	COOP
LIP	REAP	LIP	REAP
ZED	FAST	ZED	FAST
DAW	KNOCK	DAW	KNOCK
CHOOSE	THOSE	CHOOSE	THOSE
CHEEP	SING	CHEEP	SING
BANK	NET	BANK	NET
DOT	CAUGHT	DOT	CAUGHT
LOAD	RUDE	LOAD	RUDE
DINT	BEAN	DINT	BEAN
NECK	MAO	NECK	MAO
TONG	BOX	TONG	BOX
COO	JOB	COO	JOB
WEED	SID	WEED	SID
SHAG	YEN	SHAG	YEN
LOT	LAW	LOT	LAW
FOAL	SUE	FOAL	SUE
NIP	DEED	NIP	DEED
PENCE	DAN	PENCE	DAN
SAW	CHOP	SAW	CHOP
TOOL	THOR	TOOL	THOR
WIELD	HIT	WIELD	HIT
LAP	LEST	LAP	LEST
PEST	PAN	PEST	PAN
VAULT	JOCK	VAULT	JOCK
NEWS	DOZE	NEWS	DOZE
SEE	TICK	SEE	TICK
THANK	CARE	THANK	CARE
ROD	BONG	ROD	BONG
SO	RUE	SO	RUE
RID	LEEK	RID	LEEK
TENSE	GAPP	TENSE	GAPP
MOSS	BOMB	MOSS	BOMB
POO	DOUGH	POO	DOUGH
THRE	GILT	THRE	GILT
THAD	PENT	THAD	PENT
MOP	WALL	MOP	WALL
ROW	LOOT	ROW	LOOT
CHIN	FEEL	CHIN	FEEL
BEND	DAB	BEND	DAB
SHAW	VON	SHAW	VON
JUICE	THOLE	JUICE	THOLE
TEAK	THIN	TEAK	THIN
BAT	PEG	BAT	PEG
ROCK	WRONG	ROCK	WRONG
GOAT	DUNE	GOAT	DUNE
BIT	MEET	BIT	MEET
THEN	SHAD	THEN	SHAD
GAUZE	GOT	GAUZE	GOT
MOON	BOWL	MOON	BOWL
KEY	DILL	KEY	DILL
RAMP	REND	RAMP	REND

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SHOES DOZE
KEEP SING
DANK MET
OOT CAUGHT
ROAD LEWD
DINT BEAN
DECK MAD
TONG BOX
COO JOE
REED DIO
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VOLE ZOO
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ZEE GILT
PAD TENT
POP MALL
LOW ROOT
CHIN PEEL
HEND DAB
SHAW VON
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BAT KED
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BAR JEST
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GHOST COOP
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ZED VAST
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CHOOSE THOSE
CHEEP THING
BANK NET
OOT TAUGHT
LOAD RUDE
TINT PEEN
NECK BAD
THONG VOX
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VAULT CHOCK
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MAD DDON
SO RUE
LID LEEK
TENSE CALF
BOSS MON
FOO DOUGH
THRE JILT
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TEAK THIN
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BOOT	MOAN	MOOT	BONE
CHEAT	BILL	SHEET	VILL
JAB	JEST	SAB	SUEST
TOT	FOUGHT	POT	THOUGHT
BOAST	COOP	GHOST	POOP
RIP	REAP	LIP	LEAP
SAID	PAST	ZED	VAST
DAW	DOCK	GNAW	KNOCK
SHOES	DOZE	CHOOSE	THOSE
CHEEP	SING	KEEP	THING
DANK	NET	BANK	MET
DOT	TAUGHT	GOT	CAUGHT
LOAD	RUDE	ROAD	LEND
OINT	PEEN	TINT	BEAN
DECK	HAD	NECK	BAD
THONG	VOX	TONG	BOX
COO	GO	CHOO	JOE
REED	BID	WEED	DID
SHAG	YEN	SAG	WREN
ROT	RAW	LOT	LAW
VOLE	ZOO	FOAL	SUE
DIP	NEED	NIP	DEED
PENCE	THAN	FENCE	DAN
THAW	COP	SAW	CHOP
POOL	PORE	TOOL	THOR
YIELD	FIT	WIELD	MIT
LAP	REST	RAP	LEST
PEST	PAN		
FAULT	JOCK		
NEWS	DOE		
VEE	THICK		
THANK	CAME		
HAD	DONS		
SHOW	RUE		
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CHIN	VEAL		
MEND	DAB		
CHAW	SON		
JUICE	SOLE		
PEEK	THIN		
BAT	PEG		
LOCK	LONG		
COAT	TUNE		
MIT	BEET		
THEN	CHAD		
JAWS	JOT		
NOON	DOLE		
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RAMP	LEND		
TEST	FAN		
VAULT	CHOCK		
OUES	NOTE		
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SANK	CHAIR		
ROD	SONS		
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BEND	NAB		
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GAUZE	SOT		
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THIN
PES
LONG
TUNE
BERT
CHAD
JOT
GOLE
DILL
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DIAGNOSTIC RHYME TEST

WORD LIST 110A

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BOB
TAUNT
BOOT
CHEAT
GAB
POY
BOAST
LIP
SAID
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SHOES
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TAUGHT
RUDE
PEEN
MAD
VOX
JOE
SID
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DAN
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THOR
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VAULT
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GILL
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BOB
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SONO
MOAN
BILL
GUEST
THOUGHT
COOP
LEAP
VAST
KNOCK
DOZE
SING
MET
CAUGHT
LEWD
BEAN
BAD
BOY
GO
DID
WREN
RAN
ZOO
DEED
THAN
CHOP
FORE
HIT
REST

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PEST
FAULT
DUES
BEE
THANK
MAD
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LIO
TENSE
MOSS
POO
THEE
FAD
HOP
ROW
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BEND
SHAW
JUICE
PEEK
BAT
LOCK
GOAT
BIT
THEN
GAUZE
NOON
KEY
RAMP

PAN
CHOCK
DOTE
THICK
CHAIR
SONG
RUE
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CALF
BOMB
THOUGH
GILT
TENT
WALL
ROOT
FEEL
NAB
VON
SOLE
PIN
KEG
LONG
TUNE
MEET
CHAD
GOT
DOLE
DILL
LEND

DIAGNOSTIC RHYME TEST

WORD LIST 1168

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BOB COOT
TAUNT BOND
BOOT BONE
SHEET BILL
JAB GUEST
TOT FOUGHT
BOAST COOP
RIP REAP
ZED PAST
GNAW DOCK
SHOES THOSE
CHEEP SING
BANK NET
DOY CAUGHT
LOAD LEWD
DINT PEEN
NECK MAD
TONG BOX
CHOO JOE
NEED DIO
SHAG YEN
ROT LAW
VOLE SUE
DIP NEED
PENCE DAN
SAN CHOP
POOL THOR
WIELD PIT
LAP REST

PAGE 2

PEST PAN
VAULT CHOCK
NEWS NOTE
BEE THICK
THANK CHAIR
WAO DONE
SHOW RUE
LID LEEK
TENSE GAPP
BOBS MOM
POOH DOUGH
THEE GILT
THAD PENT
HOP WALL
ROM RODY
CHIN VEAL
BENO DAB
SHAW VON
GOOSE THOLE
PEEK PIN
BAT PEG
LOCK WRONG
COAT DUNE
HIT BEET
THEN SHAD
GAUZE GOY
NOON BOWL
KEY GILL
RAMP LEND

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GOR TOOT
DAUNT POND
MOOT MOAN
CHEAT VILL
GAB JEST
ROT THOUGHT
GHOST POOP
LIP LEAP
SAID VAST
DAM KNOCK
CHOOSE DOZE
KEEP THING
DANK MET
GOT TAUGHT
ROAD RUDE
TINT BEAN
NECK BAD
THONG VOX
COO GO
WEED BID
SAB WREN
LOT RAM
FOAL ZOO
NIP DEED
PENCE THAN
THAM COP
TOOL FORE
YIELD HIT
RAP LEST

PAGE 4

TEST PAN
FAULT JOCK
DUES DOTE
VEE TICK
SANK CARE
ROO BOMB
SO YOU
RIO REEK
DENSE CALF
MOBS BOMB
POD THOUGH
ZEE JILT
PAD TENT
POP YAWL
LOW LOOT
GIN FEEL
MEND NAB
CHAN BON
JUICE SOLE
TEAK THIN
GAT KEB
ROCK LONG
GOAT TUNE
BIT MEET
DEN CHAD
JAMB JOT
MOON DOLE
TEA DILL
LAMP REND

DIAGNOSTIC RHYME TEST

WORD LIST 301A

PAGE 1	PAGE 2	PAGE 3	PAGE 4
BOB	TOOT	TEST	PAN
DAUNT	BOND	FAULT	CHOCK
BOOT	MOAN	NEWS	DOZE
CHEAT	BILL	VEE	THICK
GAB	GUEST	BANK	CHAIR
POT	FOUGHT	ROD	DONS
GHOST	COOP	SO	RUE
RILL	NEAP	NIP	WREATH
SAID	PAST	DENSE	GAPP
GNAM	KNOCK	BOSS	BOMB
SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEE	JILT
BANK	NET	THAD	PENT
GOY	CAUGHT	FOP	WALL
NOSE	NUDE	RODE	ROOSE
TINT	SEAN	GIN	PEEL
DECK	MAO	MEND	DAB
THONG	BOX	CHAW	VON
COO	GO	JUICE	SOLE
NEED	DID	TEAK	PIN
SAG	WREN	GAT	KEG
KNOB	WROUGHT	ROT	GNAM
VOLE	ZOO	COAT	TUNE
DIP	NEED	HIT	BEET
PENCE	DAN	THEN	SHAD
SAW	COP	GAUZE	JOT
TOOL	THOR	MOON	BOWL
YIELD	FIT	TEA	GILL
SNAY	REST	RAP	NEO
BOB	COOT	PEST	PAN
TAUNT	POND	VAULT	JOCK
MOOT	BONE	DUES	NOTE
SHEET	VILL	SEE	TICK
JAB	JEST	THANK	CARE
TOY	THOUGHT	MAO	SONG
BOAST	POOP	SHOW	YOU
NILL	REAP	RIP	NEATH
ZED	VAST	TENSE	CALF
DAM	DOCK	MOSS	MON
CHOOSE	THOSE	POO	DOUGH
CHEEP	SING	THEE	GILT
DANK	NET	PAD	TENT
DOT	TAUGHT	HOP	YAWL
ROSE	RUDE	NODE	NOOSE
NINT	PEEN	CHIN	VEAL
NECK	SAD	BEND	NAB
TONG	VOX	SHAN	BON
CHEW	JOE	GOOSE	THOLE
REED	SID	PEEK	THIN
SHAG	YEN	BAT	PEB
ROB	NOUGHT	NOT	RAW
FOAL	SUR	GOAT	DUNE
NIP	DEED	BIT	MEET
PENCE	THAN	DEN	CHAO
THAW	CHOP	JAWS	GOT
POOL	PORE	NOON	DOLE
WIELD	HIT	KEY	DILL
RAY	NEST	NAP	RED

DIAGNOSTIC RHYME TEST

WORD LIST 3010

PAGE 1

BOB
DAUNT
BOOT
CHREAY
SAB
POY
BOASTY
NILL
ZED
SNOW
SHORE
KEEP
BANK
BOY
ROSE
TINY
DECK
TONG
CHEW
REED
SHAB
KNOB
VOLE
NIP
FENCE
SAX
TOOL
HIELD
RAY

TOOT
POND
BONE
VILL
QUEST
THOUGHT
COOP
NEAP
FAST
KNOCK
DOZE
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CAUGHT
NUDE
PEEN
HAD
BOY
JOE
DIO
VEN
WROUGHT
BUE
NEED
DAN
CHOP
THOR
MIT
REBY

PAGE 2

TEST
PAULY
NEWS
VEE
BANK
ROD
SHOW
RIP
TENSE
BOSS
POOM
ZEE
THAD
MOP
NODE
GIN
MEND
SHAW
GOOSE
PEEK
DAY
ROY
COAT
BIT
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BAUZE
MOON
KEY
NAP

FAN
JOCK
NOTE
TICK
CHASE
BOMB
RUE
WREATH
SAPP
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ROOSE
VEAL
DAB
VON
THOLE
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PES
SHAW
DUNE
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BOY
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BOB
TAUNT
MOOT
SWEET
JAB
TOY
GHOST
RILL
SAID
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CHOOSE
CHEEP
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THIN
KES
RAK
TUNE
HEET
CHAD
JOY
DOLE
GILL
RED

DIAGNOSTIC RHYME TEST

WORD LIST 302A

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SAID
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CHOOSE
KEEP
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ROSE
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DIAGNOSTIC RHYME TEST

WORD LIST 3020

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BOB
DAUNT
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BOB
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DIAGNOSTIC RHYME TEST

WORD LIST 383A

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BOB
DAUNT
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BOB
TAUNT
MOOT
CHEAT
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GHOST
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SATO
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CHOOSE
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PEST
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JOCK
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WREATH
CALF
BONS
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TENT
YAWL
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VEAL
NAB
BON
SOLE
FIN
KEG
GNAN
DUNE
BEET
CHAO
JOT
BOWL
DILL
RED

DIAGNOSTIC RHYME TEST

WORD LIST 3838

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TAUNT	BOND	VAULT	CHOCK
BOOT	BONE	NEWS	NOTE
CHEAT	VILL	VEE	TICK
GAB	GUEST	SANK	CHAIR
POT	FOUGHT	ROD	DONG
BOAST	COOP	SHOW	RUE
MILL	REAP	RIP	NEATH
ZED	VAST	TENSE	CALF
GNAW	KNOCK	BOSS	ROMB
CHOOSE	DOZE	FOO	THOUGH
CREEP	SING	THIR	GILT
BANK	NET	THAD	PENT
DOT	TAUGHT	HOP	YAWL
ROSE	NUDE	NODE	ROOSE
TINT	BEAN	GIN	PEEL
NECK	BAD	BEND	NAB
THONG	VOX	CHAW	BON
CHEN	JOE	GOOSE	THOLE
NEED	BIO	TEAK	THIN
SHAG	YEN	BAT	PEG
ROB	NOUGHT	NOT	RAW
VOLF	ZOO	COAT	TUNE
NIP	NEED	BIT	BEET
FENCE	THAN	DEN	CHAD
THAW	COP	JAWS	JOT
POOL	FORE	NOON	DOLE
WIELD	HIT	KEY	DILL
GNAT	NEST	RAP	RED
ROB	TOOT	ROB	TOOT
DAUNT	POND	DAUNT	POND
MOOT	MOAN	MOOT	MOAN
SHEET	BILL	SHEET	BILL
JAR	JEST	JAR	JEST
TOT	THOUGHT	TOT	THOUGHT
GHOST	POOP	GHOST	POOP
MILL	NEAP	MILL	NEAP
SAID	FAST	SAID	FAST
DAW	DOCK	DAW	DOCK
SHOES	THOSE	SHOES	THOSE
KEEP	THING	KEEP	THING
DANK	MET	DANK	MET
GOT	CAUGHT	GOT	CAUGHT
NOSE	RUDE	NOSE	RUDE
DINT	PEEN	DINT	PEEN
DECK	MAD	DECK	MAD
TONG	BOX	TONG	BOX
COO	GO	COO	GO
REED	DID	REED	DID
SAG	WREN	SAG	WREN
KNOB	WROUGHT	KNOB	WROUGHT
FOAL	BUE	FOAL	BUE
DIP	DEED	DIP	DEED
FENCE	DAN	FENCE	DAN
SAW	CHOP	SAW	CHOP
TOOL	THOR	TOOL	THOR
YIELD	PIT	YIELD	PIT
RAT	REST	RAT	REST
PEST	FAULT	PEST	FAULT
DUES	DUES	DUES	DUES
SEE	THICK	SEE	THICK
THANK	CARE	THANK	CARE
WAD	SONG	WAD	SONG
SO	YOU	SO	YOU
NIP	WREATH	NIP	WREATH
DENSE	GAPP	DENSE	GAPP
MOSS	HOM	MOSS	HOM
POOH	DOUGH	POOH	DOUGH
ZEE	JILT	ZEE	JILT
PAD	TENT	PAD	TENT
FOP	WALL	FOP	WALL
RODE	NOOSE	RODE	NOOSE
CHIN	VEAL	CHIN	VEAL
MEND	DAB	MEND	DAB
SHAW	VON	SHAW	VON
JUICE	SOLE	JUICE	SOLE
PEEK	PIN	PEEK	PIN
GAT	KEG	GAT	KEG
ROT	GNAW	ROT	GNAW
GOAT	DUNE	GOAT	DUNE
HIT	MEET	HIT	MEET
THEN	SHAD	THEN	SHAD
GAUZE	GOT	GAUZE	GOT
MOON	BOWL	MOON	BOWL
TEA	GILL	TEA	GILL
NAP	NEO	NAP	NEO

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WORD LIST 304A

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BOOT	MOAN	NEWS	DOYE
CHEAT	BILL	VEE	THICK
GAB	JEST	SANK	CARE
TOT	THOUGHT	WAD	BONG
BOAST	POOP	SHOW	YOU
HILL	REAP	RIP	NEATH
ZED	PAST	TENSE	SAPP
DAM	DOCK	MOSS	HOM
CHOOSE	DOZE	FOO	THOUGH
CHEEP	THING	THEE	JILT
BANK	NET	THAD	PENT
DOT	TAUGHT	HOP	YAWL
ROSE	NUDE	NODE	ROOSE
TINT	BEAN	GIN	FEEL
DECK	SAD	MEND	NAB
THONG	VOX	CHAW	BON
COO	SO	JUICE	SOLE
REED	BID	PEEK	THIN
SHAB	WREN	BAT	KEG
ROB	NOUGHT	NOT	RAW
FOAL	SUE	GOAT	DUNE
NIP	NEED	BIT	BERT
FENCE	THAN	DEN	CHAD
SAW	CHOP	GAUZE	BOT
POOL	PORE	NOON	SOLE
YIELD	FIT	TEA	GILL
GNAT	NEST	RAP	RED
BOB	TOOT	BOB	TOOT
DAUNT	BOND	DAUNT	BOND
MOOT	BONE	MOOT	BONE
SHEET	VILL	SHEET	VILL
JAB	GUEST	JAB	GUEST
POT	FOUGHT	POT	FOUGHT
SHOOT	COOP	SHOOT	COOP
RILL	NEAP	RILL	NEAP
SAID	VAST	SAID	VAST
GNAM	KNOCK	GNAM	KNOCK
SMOBS	THOSE	SMOBS	THOSE
KEEP	SING	KEEP	SING
DANK	NET	DANK	NET
BOY	CAUGHT	BOY	CAUGHT
NOY	RUDE	NOY	RUDE
DE	PEEN	DE	PEEN
NECK	HAD	NECK	HAD
TONG	BOX	TONG	BOX
CHEN	JOE	CHEN	JOE
WEED	DIO	WEED	DIO
SAG	YEN	SAG	YEN
KNOB	WROUGHT	KNOB	WROUGHT
VOLE	ZOO	VOLE	ZOO
DIP	DEED	DIP	DEED
PENCE	DAN	PENCE	DAN
THAM	COP	THAM	COP
TOOL	THOR	TOOL	THOR
HIELD	HIP	HIELD	HIP
RAT	REST	RAT	REST
PEST	PAN	PEST	PAN
FAULT	CHOCK	FAULT	CHOCK
DUES	NOTE	DUES	NOTE
SEE	TICK	SEE	TICK
THANK	CHAIR	THANK	CHAIR
ROO	DONS	ROO	DONS
SO	RUE	SO	RUE
NIP	WREATH	NIP	WREATH
DENSE	CALF	DENSE	CALF
BOSS	BONS	BOSS	BONS
POOM	DOUBH	POOM	DOUBH
ZEE	GILT	ZEE	GILT
PAD	TENT	PAD	TENT
ROC	WALL	ROC	WALL
RODE	MOOSE	RODE	MOOSE
CYIN	VIAL	CYIN	VIAL
BEND	DAB	BEND	DAB
SHAN	VON	SHAN	VON
GOOSE	THOLE	GOOSE	THOLE
TEAK	FIN	TEAK	FIN
GAT	PEG	GAT	PEG
ROT	SNAP	ROT	SNAP
COAT	TUNE	COAT	TUNE
HIT	MEET	HIT	MEET
THEN	SHAD	THEN	SHAD
JAWS	JOT	JAWS	JOT
NOON	BOWL	NOON	BOWL
KEY	DILL	KEY	DILL
NAP	NEO	NAP	NEO

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SOLE
FIN
KEG
RAW
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MEET
SHAD
JOT
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GILL
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TEST
VAULT
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NODE
CHIN
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SHAW
GOOSE
PEEK
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JAWS
NOON
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CHOCK
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TICK
CARE
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NEATH
GAFF
BOMB
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GILT
PFNT
YAWL
MOOSE
VFAL
NAB
RON
THOLE
THIN
PEG
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DUNE
BEET
SHAD
GOT
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GILL
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ROB
NAUNT
ROOT
CHEAT
JAR
TOT
GHOST
NILL
ZED
GNAW
CHNOSE
CHEEP
RANK
GOT
NOSE
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COO
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TOOL
WIELD
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TOOT
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BILL
GUEST
THOUGHT
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CAUGHT
NUDE
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WROUGHT
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GAUZE
MOON
KEY
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PAN
JOCK
OOTE
THICK
CHAIR
BONG
RUE
WREATH
CALF
MOM
DOUGH
JILY
TENT
WALL
ROOSE
FEEL
DAB
VON
SOLE
FIN
KEG
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TUNE
MEET
CHAD
JOT
BOWL
OILL
RED

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BOB TOOT
TAUNT BOND
MOOT BONE
CHEAT VILL
JAB GUEST
POT FOUGHT
GHOST POOP
NILL REAP
SAID FAST
DAW KNOCK
CHOOSE DOZE
KEEP SING
DANK MET
GOY TAUGHT
NOSE NUDE
DINT BEAN
DECK BAD
TONG VOX
CHEN JOE
REED DID
SAG YEN
ROB NOUGHT
FOAL ZOO
DIP NEED
FENCE DAN
THAW COP
TOOL THOR
WIELD HIT
GNAT REST

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PEST FAN
VAULT CHOCK
DUES NOT
VEE TICK
THANK CHAIR
ROD DONG
BO YOU
RIP NEATH
DENSE GAFF
MOSS BOMB
POD THOUGH
ZEE GILT
FAD TENT
POP YAWL
RODE ROOSE
CHIN FEEL
MEND NAB
SHAW BON
GOOSE THOLE
PEEK FIN
GAT PEG
NOT RAW
GNAT TUNE
MIT BEET
DEN SHAD
JANS JOT
MOON BOWL
KEY DILL
RAP NED

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GOR COOT
DAUNT POND
RODY MOAN
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GAR JEST
TOT THOUGHT
ROAST COOP
RILL NEAP
ZED VAST
GNAW DOCK
SHOES THOSE
CHEEP THING
BANK NET
DOT CAUGHT
ROSE RUDE
TINT PEEN
NECK MAD
THONG BOX
COO GO
NEED BIO
SHAG WREN
KNOB WROUGHT
VOLE SUE
NIP DEED
PENCE THAN
SAW CHOP
POOL FORE
YIELD FIT
RAT NEST

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TEST PAN
FAULTY JOCK
NEWS OOTE
BEE THICK
SANK CARE
MAD BONG
SHOW RUE
NIP WREATH
TENSE CALF
BOSS MON
POOH DOUGH
THREE JILT
THAD PENT
HOP WALL
NOOE NOOSE
GIN VEAL
BEND OAB
CHAW VON
JUICE SOLE
TEAK THIN
BAT KEG
ROT GNAW
COAT DUNE
BIT MEET
THEN CHAD
GAUZE GOT
NOON OOLE
TEA GILL
NAP RED

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TAUNT	BOND	VAULT	CHOCK	DAUNT	POND	FAULT	JOCK
MOOT	MOAN	QUES	DOVE	BOOT	BONE	NEWS	NOTE
CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
GAB	GUEST	SANK	CHAIR	JAB	JEST	THANK	CARE
TOT	THOUGHT	WAD	BONG	POT	FOUGHT	ROO	DONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
RILL	REAP	NIP	NEATH	NILL	NEAP	RIP	WREATH
SAID	VAST	DENSE	CALF	ZED	PAST	TENSE	GAFF
DAN	KNOCK	HOSS	BOMB	GNAW	DOCK	BOSS	HOM
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POOH	THOUGH
CHEEP	SING	THFE	GILT	KEEP	THING	ZEE	JILT
DANK	NET	PAD	PENT	BANK	MEY	THAO	TENT
DOT	CAUGHT	HOP	WALL	GOT	TAUGHT	POP	YAWL
NOSE	NUDE	RODE	ROOSE	ROSE	RUDE	NOOE	NOOSE
TINT	BEAN	GIN	FEEL	DINT	PEEN	CHIN	VEAL
DECK	MAD	MENO	DAB	NECK	BAD	BENO	NAB
TONG	VOX	SHAW	BON	THONG	BOY	CHAW	VON
CHEN	JOE	GOUSE	THOLE	CON	GO	JUICE	SOLE
REED	DID	PEPK	FIN	WEED	BID	TEAK	THIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAT	KEG
KNOB	WROUGHT	ROT	GNAW	ROB	NOUGHT	NOT	RAW
VOLE	ZOO	COAT	TUNE	FOAL	SUE	GOAT	DUNE
NIP	DEED	BIT	MEET	DIP	NEED	MIT	BEET
PENCE	DAN	THEN	SHAD	FENCE	THAN	DEN	CHAD
SAW	CHOP	GAUZE	GOT	THAW	COP	JAWS	JOT
TOOL	THOR	MOP	BOWL	POOL	FORE	NOON	DOLE
WIELD	FIT	KPY	GILL	YIELD	MIT	TEA	DILL
GNAT	REST	GAP	NED	RAT	NEST	NAP	RED

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PEST	FAN
FAULT	CHOCK
NEWS	NOTE
BEE	TICK
SANK	CHAIR
ROD	DONG
SO	RUE
RIP	NEATH
TENSE	CALF
MOSS	BOMB
POOH	DOUGH
THEE	JILT
FAD	PENT
FOP	WALL
RODE	NNOSE
CHIN	FEEL
MEND	DAB
SHAW	VON
JUICE	THOLE
TEAK	THIN
GAY	PEG
ROT	RAW
COAT	TUNE
MY	MEET
DEW	CHAD
JAWS	GOT
NOON	DOLE
KEY	DILL
RAP	RED

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BOB	COOT	PEST	PAN
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BOOT	MOAN	NEWS	DOPE
SHEET	VILL	REE	TICK
JAB	JEST	THANK	CARE
POT	THOUGHT	ROD	BONG
BOAST	COOP	SHOW	RUE
NILL	REAP	RIP	NEATH
SAID	VAST	DENSE	CALF
GNAW	DOCK	BOSS	MON
SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEE	JILT
DANK	MET	FAD	TENT
BOY	CAUGHT	FOP	WALL
NOSE	NUDE	RODE	ROOSE
TINT	PEEN	GIN	VFAL
DECK	BAD	MEND	NAB
TONG	BOX	SHAW	VON
COO	GO	JUICE	SOLE
WEED	DIO	TEAK	FIN
SHAG	YEN	RAT	PPG
KNOB	NOUGHT	ROT	RAW
FOAL	ZOO	GOAT	TUNE
DIP	DEED	HIT	MEET
PENCE	THAN	THEN	CHAD
THAW	COP	JAWS	JOT
POOL	THOR	NOON	BOWL
WIELD	HIT	KEY	DILL
RAT	NEST	NAP	RED
GOB	TOOT	GOB	TOOT
DAUNT	BOND	DAUNT	BOND
MOOT	BONE	MOOT	BONE
CHEAT	BILL	CHEAT	BILL
GAB	GUEST	GAB	GUEST
TOY	FOUGHT	TOY	FOUGHT
GHOST	POOP	GHOST	POOP
BILL	NEAP	BILL	NEAP
ZED	FAST	ZED	FAST
DAW	KNOCK	DAW	KNOCK
CHOOSE	THOSE	CHOOSE	THOSE
CHEEP	SING	CHEEP	SING
RANK	NET	RANK	NET
DOT	TAUGHT	DOT	TAUGHT
ROSE	RUDE	ROSE	RUDE
DINT	BEAN	DINT	BEAN
NECK	MAD	NECK	MAD
THONG	VOX	THONG	VOX
CHEW	JOE	CHEW	JOE
REED	BIO	REED	BIO
SAG	WREN	SAG	WREN
ROB	WROUGHT	ROB	WROUGHT
VOLE	SUE	VOLE	SUE
NIP	NRED	NIP	NRED
FENCE	DAN	FENCE	DAN
SAW	CHOP	SAW	CHOP
TOOL	FORE	TOOL	FORE
YIELD	FIT	YIELD	FIT
GNAT	REST	GNAT	REST
TEST	FAN	TEST	FAN
FAULT	CHOCK	FAULT	CHOCK
DUES	NOTE	DUES	NOTE
VEE	THICK	VEE	THICK
SANK	CHAIR	SANK	CHAIR
WAD	DONG	WAD	DONG
SO	YOU	SO	YOU
NIP	WREATH	NIP	WREATH
TENSE	GAFF	TENSE	GAFF
MOSS	BOMB	MOSS	BOMB
POO	DOUGH	POO	DOUGH
THEE	GILT	THEE	GILT
THAD	PENT	THAD	PENT
HOP	YAWL	HOP	YAWL
NOBE	NOOSE	NOBE	NOOSE
CHIN	FEEL	CHIN	FEEL
BEND	DAB	BEND	DAB
CHAW	BON	CHAW	BON
GOOSE	THOLE	GOOSE	THOLE
PEEK	THIN	PEEK	THIN
GAT	KEG	GAT	KEG
NOT	GNAW	NOT	GNAW
COAT	DUNE	COAT	DUNE
BIT	BERT	BIT	BERT
DEN	SHAD	DEN	SHAD
GAUZE	BOY	GAUZE	BOY
MOON	DOLE	MOON	DOLE
TEA	GILL	TEA	GILL
RAP	NED	RAP	NED

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KEEP THING
DANK NET
DOT TAUGHT
NOSE RUDE
DINT PEEN
DECK MAD
THONG BOX
CHEN GO
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PAD BENT
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RODE NOOSE
CHIN VEAL
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SHOES DOZE
CHFEF SING
RANK MET
GOT CAUGHT
ROSE NIDE
TINT BEAN
NECK BAD
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COO JOE
REFD BID
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THAD TENT
POP WALL
NIDE ROOSE
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BEND NAB
SHAW BON
JUICE THOLE
PFEK THIN
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DANK NET
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DECK MAD
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CHEW GO
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MEND DAB
CHAW BON
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PEEK THIN
GAT PFG
NOT RAW
COAT DUNE
BIT RFET
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ZEN FAST
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CHOOSE THOSE
KEFP SING
RANK MET
GOT CAUGHT
ROSE RUDE
DINT RFAN
NECK BAD
TONG BOX
COO JOE
WEFO DID
SHAG WREN
KNOB WROUGHT
FOAL ZOO
DIP DEED
PENCE THAN
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VEE TICK
THANK CHAIR
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SO RUE
RIP NEATH
TENSE GAFF
BOSS BOMB
FOO DCUGH
ZEE GILT
THAD TENT
POP WALL
NODE NOOSE
CHIN PEEL
BEND NAB
SHAW VON
JUICE THOLE
TEAK PIN
BAT KEG
ROT GNAW
GOAT TUNE
MIT MEET
THEN CHAD
JAWS GOT
MOON BOWL
KEY GILL
NAP REO

DIAGNOSTIC RHYME TEST

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BOB	COOT	PEST	PAN	BOB	TOOT	TEST	PAN
TAUNT	BOND	VAULT	CHOCK	DAUNT	POND	FAULTY	JOCK
ROOT	MOAN	NEWS	NOTE	MOOT	BONE	QUES	NOTE
CHEAT	VILL	VEE	TICK	SHEET	BILL	BEE	THICK
GAB	JEST	SANK	CARE	JAB	GUEST	THANK	CHAIR
TOT	FOUGHT	WAD	DONG	POT	THOUGHT	ROO	BONG
GHOST	COOP	SO	RUE	ROAST	POOP	SHOW	YOU
MILL	NEAP	RIP	WREATH	RILL	REAP	NIP	NEATH
ZED	FAST	TENSE	GAPP	SAID	VAST	OENSE	CALF
GNAW	KNOCK	BOSS	BOMB	DAW	DOCK	HOSS	MON
CHOOSE	THOSE	POO	DRUGH	SHOES	DOZE	POOH	THOUGH
CHEEP	THING	THEE	JTLY	KEEP	SING	ZEE	GILT
BANK	NET	THAD	PENT	DANK	MET	FAD	TENT
DOT	CAUGHT	HOP	WALL	GOT	TAUGHT	POP	YAWL
NOSE	RUDE	RODE	NNOSE	ROSE	NIJOE	NODE	MOOSE
TINT	BEAN	GIN	FEEL	DINT	PEEN	CHIN	VEAL
DECK	BAD	MEND	NAB	NECK	MAD	BEND	DAB
TONG	VOX	SHAN	BON	THONG	BOX	CHAW	VON
COO	JOE	JUICE	THOLE	CHEW	GO	GOOSE	SOLE
REED	BID	PEEK	THIN	WEED	DID	TEAK	FIN
SHAG	WREN	BAT	KEG	SAG	YEN	BAT	PEG
ROB	WROUGHT	NOT	GNAW	KNOB	NOUGHT	ROT	RAW
VOLF	ZOO	COAT	TUNE	FOAL	SIJE	GOAT	DUNE
NIP	DEEN	BIT	MFEET	DIP	NFED	MIT	BEET
PENCE	THAN	THEN	CHAD	PENCE	DAN	DEN	SHAD
THAW	CHOP	JAWS	GOT	SAW	COP	GAUZE	JOY
POOL	FORE	NOON	DOLE	TOOL	THOR	MOON	BOUL
WIELD	HIT	KEY	OTLL	YIELD	FIT	TEA	GILL
GNAT	NEST	RAP	RFO	RAT	REST	NAP	NED

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FAULT	JOCK
NEWS	ODDE
VEE	THICK
THANK	CHAIR
WAD	BONG
SHOW	RUE
RIP	WREATH
TENSE	GAPP
MOSS	MON
POO	THOUGH
ZEE	GILTY
FAD	PENT
HOP	YAWL
NOOE	ROOSE
GIN	FEEL
MEND	DAB
SHAW	VON
JUICE	SOLE
PEEK	PIN
BAT	PEG
ROY	RAW
COAT	DUNE
BIT	MEET
THEN	SHAD
JAWS	JOT
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TEA	DILL
NAP	NED

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GNS
TAUNT
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CHEAT
JAB
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BOAST
RILL
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BANK
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NECK
THONG
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HEED
SHAG
ROB
VOLF
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TOOL
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TAUGHT
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TEST
VAULT
NEWS
VEE
THANK
ROD
SNOW
NIP
TENSE
BOSS
POOM
THFE
THAD
FOP
RODE
GIN
BEND
CHAW
JUICE
TEAK
BAT
NOT
COAT
MIT
THEN
GAUZE
MOON
TEA
RAP

FAN
CHOCK
NOTE
TICK
CARE
BONG
YOU
WREATH
GAFF
MON
THOUGH
GILT
PENT
YANL
ROOSE
VEAL
NAB
BON
SOLE
THIN
KEG
RAW
TUNE
MEET
SHAD
GOT
DOLF
DILL
RED

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ROB
DAUNT
MOOT
SHEET
GAR
TOT
GHOST
NILL
SAID
DAM
CHOOSE
KEEP
DANK
LOT
ROSE
DINT
DECK
TONG
CHEW
REED
SAG
KNOB
FRAL
NIP
FENCE
THAW
POOL
WIELD
RAY

COOT
POND
MOAN
BILL
GUEST
FOUGHT
COOP
REAP
VAST
KNOCK
THOSE
THING
MET
CAUGHT
RUDE
BEAN
MAD
BOX
JOE
DIO
YEN
WROUGHT
SUE
NEED
THAN
COP
THOR
FIT
REST

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REST
FAULT
QUES
BEE
SANK
HAD
SO
RIP
DENSE
MOSS
FOO
ZEE
FAD
HOP
NODE
CHIN
MEND
SHAW
GOOSE
PEEK
GAT
ROT
GOAT
BIT
DEN
JAWS
NOON
KEY
NAP

PAN
JOCK
DOTE
THICK
CHAIR
DONG
RUE
NEATH
CALF
BOMB
DOUGH
JILY
TENT
WALL
NOOSE
FEEL
OAB
VON
THOLE
FIN
PEG
GNAW
DUNE
BEET
CHAD
JOT
BOWL
GILL
NED

DIAGNOSTIC RHYME TEST

WORD LIST 310A

PAGE 1		PAGE 2		PAGE 3		PAGE 4	
BOB	TOOT	PEST	FAN	GDB	COOT	TEST	PAN
DAUNT	POND	FAULT	JOCK	TAUNT	BOND	VAULT	CHOCK
MOOT	MOAN	DUES	NOTE	BOOT	BONE	NEWS	NOTE
CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
JAB	GUEST	THANK	CHAIR	GAB	JEST	BANK	CARE
POT	THOUGHT	ROD	BONG	TOY	FOUGHT	WAD	DONG
BOAST	COOP	SHOW	RUE	GHOST	POOP	SO	YOU
NILL	NEAP	RIP	WREATH	RILL	REAP	NIP	NEATH
ZED	FAST	TENSE	GAFF	SAID	VAST	DENSE	CALF
DAW	KNOCK	MOSS	BOMM	GNAW	DOCK	BOSS	MOM
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEE	JILT	CHEEP	SING	THEE	GILT
BANK	MET	THAD	TENT	DANK	NET	PAD	PENT
GOT	CAUGHT	POP	WALL	DOT	TAUGHT	HOP	YAWL
ROSE	RUDE	NODE	NNOSE	NOSE	NUDE	RODE	ROOSE
DINT	PEEN	CHIN	VEAL	TINT	BEAN	GIN	PEEL
NECK	MAD	BEND	DAB	DECK	BAD	MEND	NAB
THONG	BOX	CHAW	VON	TONG	VOX	SHAW	BON
CHEW	JOE	GOOSE	THOLE	CON	GO	JUICE	SOLE
WEED	BID	TEAK	THIN	REED	DID	PEEK	FIN
SAG	YEN	GAT	PEG	SHAG	WREN	BAT	KEG
ROB	NOUGHT	NOT	RAW	KNOB	WROUGHT	ROT	GNAW
POAL	ZOO	GOAT	TUNE	VOLE	SUE	COAT	DUNE
NIP	DEED	BIT	MEET	DIP	NEED	MIT	BFET
FENCE	THAN	DEN	CHAD	PENCE	DAN	THEN	SHAD
THAW	CHOP	JAWS	GOT	SAW	COP	GAUZE	JOT
POOL	THOR	NOON	BOWL	TOOL	PORE	MOON	DOLE
YIELD	FIT	TEA	GILL	WIELD	HIT	KEY	DILL
RAT	NEST	NAP	RED	GNAT	REST	RAP	NED

DIAGNOSTIC RHYME TEST

WORD LIST 3100

PAGE 1		PAGE 2		PAGE 3		PAGE 4	
ROB	COOT	PEST	PAN	GOR	TOOT	TEST	PAN
DAUNT	BOND	FAULT	CMOCK	TAUNT	POND	VAULT	JOCK
MOOT	BONE	DUES	NOTE	ROOT	MOAN	NEWS	DOTE
CHEAT	BILL	VEE	THICK	SHEET	VILL	BEE	TICK
JAB	JEST	THANK	CARE	GAB	GUEST	SANK	CHAIR
TOT	THOUGHT	HAD	BONG	POT	FOUGHT	ROD	DONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
RILL	REAP	NIP	NEATH	HILL	NEAP	RIP	WREATH
ZED	FAST	TENSE	GAFF	SAID	VAST	DENSE	CALF
GNAW	DOCK	BOSS	NOM	DAW	KNOCK	MOSS	BOMB
CHOOSE	THOSE	FOO	DOUGH	SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEF	JILT	CHEEP	SING	THEE	GILT
DANK	MET	FAD	TENT	BANK	NET	THAD	PENT
DOT	CAUGHT	HOP	HALL	GOT	TAUGHT	FOP	YAWL
NOSE	NUDE	RODE	ROOSE	ROSE	RUDE	NODE	NOOSE
DINT	PEEN	CHIN	VEAL	TINT	BEAN	GIN	FEEL
DECK	BAD	HEND	NAB	NECK	HAD	BEND	DAB
THONG	VOX	CHAW	BON	TONG	BOX	SHAW	VON
CHEW	JOE	GOOSE	THOLE	COO	GO	JUICE	SOLE
REED	BID	PEEK	TWIN	WEED	DID	TEAK	FIN
SHAG	YEN	BAT	PEG	SAG	WREN	GAT	KEG
KNOB	WROUGHT	ROT	GNAW	ROB	NOUGHT	NOT	RAW
VOLE	SUE	COAT	DINE	FOAL	ZOO	GOAT	TUNE
DIP	NEED	HIT	BEET	NIP	DEED	BIT	MEET
PENCE	THAN	THEN	CHAD	FENCE	DAN	DEN	SHAD
THAW	COP	JAW	JOT	SAW	CHOP	GAUZE	GOT
TOOL	THOR	MOON	BOWL	POOL	FORE	NOON	DOLE
WIELD	HIT	KEY	DILL	YIELD	FIT	TEA	GILL
RAT	REST	NAP	NED	GNAT	NEST	RAP	RED

DIAGNOSTIC RHYME TEST

WORD LIST 311A

PAGE 1	PAGE 2	PAGE 3	PAGE 4
BOB	COOT	GOR	TEST
DAUNT	BOND	TAUNT	VAULT
BOOT	MOAN	MOOT	DUES
CHEAT	BILL	SHEET	BEE
GAB	JEST	JAB	GUEST
TOY	THOUGHT	POT	FOUGHT
BOAST	COOP	GHOST	POOP
RILL	NEAP	NILL	REAP
SAID	FAST	ZED	VAST
GNAW	DOCK	DAW	KNOCK
SHOES	THOSE	CHOOSE	DOZE
CHEEP	THING	KEEP	SING
DANK	NET	RANK	NET
GOT	CAUGHT	DOT	TAUGHT
NOSE	NUDE	ROSE	RUDE
TINT	BEAN	DINT	PEEN
DECK	HAD	NECK	BAD
THONG	VOX	TONG	BOX
CHEW	JOE	COO	GO
REED	BID	WEED	DID
SHAG	YEN	SAG	WREN
ROB	WROUGHT	KNOB	NOUGHT
VOLE	ZOO	FOAL	SUE
NIP	NEED	DIP	DEED
PENCE	DAN	FENCE	THAN
THAN	COP	SAW	CHOP
TOOL	THOR	POOL	FORE
WIELD	HIT	YIELD	FIT
RAT	NEST	GNAT	REST
PEST	PAN		PAN
FAULT	CHOCK		JOCK
NEWS	DOT		NOTE
VEE	THICK		TICK
SANK	CARE		CHAIR
WAD	BONG		ROD
SHOW	RUE		DONG
NIP	WREATH		YOU
DENSE	GAPP		NEATH
BOSS	MOH		CALF
POOH	DOUGH		BOMB
THEE	JILT		THOUGH
FAD	TENT		GILT
FO	WALL		PENT
GIN	ROOSE		YAWL
HEND	PEEL		MOOSE
CHAW	DAB		VEAL
GOOSE	BON		NAB
PEEK	THOLE		VON
BAT	THIN		SOLE
NOT	PEG		FIN
COAT	GNAW		KEG
AIT	TUNE		RAW
THEN	BEET		DUNE
JAWS	SHAD		MEET
MOON	JOT		CHAD
KEY	BOWL		GOT
NAP	DILL		DOLE
	REO		GILL
			NEO

DIAGNOSTIC RHYME TEST

WORD LIST 3118

PAGE 1	PAGE 2	PAGE 3	PAGE 4
GOB	TEST	ROB	PEST
TAUNT	VAULT	DAUNT	FAULT
BOOT	NEWS	MOOT	DUES
CHEAT	VEE	SHEET	BEE
JAB	THANK	GAB	SANK
TOT	WAD	POT	ROD
BOAST	SHOW	GHOST	SO
NILL	RIP	RILL	NIP
SAID	DENSE	ZED	TENSE
GNAW	BOSS	DAW	MOSS
SHOES	POOH	CHOOSE	FOO
KEEP	ZEE	CHEEP	THEE
DANK	PAD	RANK	THAD
GOT	FOP	DOT	HOP
ROSE	NODE	NOSE	RUDE
DINT	CHIN	TINT	GIN
DECK	MEND	NECK	BEND
THONG	CHAW	TONG	BOX
CHEW	GOOSE	COO	GO
WEED	TEAK	REED	BID
SHAG	BAT	SAG	YEN
KNOB	ROT	ROB	WROUGHT
FOAL	GOAT	VOLE	ZOO
DIP	HIT	NIP	DEED
PENCE	THEN	FENCE	THAN
THAW	JAWS	SAW	COP
POOL	NOON	TOOL	THOR
YIELD	TEA	WIELD	HIT
RAT	NAP	GNAT	NEST
COOT	PAN	TOOT	FAN
BOND	CHOCK	POND	JOCK
BONE	NOTE	MOAN	DOE
BILL	THICK	VILL	TICK
GUEST	CHAIR	JEST	CARE
FOUGHT	DONG	THOUGHT	BONG
POOP	YOU	COOP	RUE
REAP	NFAYH	NEAP	WREATH
FAST	GAPP	VAST	CALF
KNOCK	BOMB	DOCK	NOM
THOSE	DOUGH	DOZE	THOUGH
SING	GILT	THING	JILT
NET	PENT	NET	TENT
TAUGHT	YAWL	CAUGHT	WALL
NUDE	ROOSE	RUDE	NOOSE
PEEN	VEAL	BEAN	FEEL
BAD	NAB	MAD	DAB
VOX	BON	BOX	VON
JOE	THOLE	GO	SOLE
DID	PIN	BID	THIN
WREN	KEG	YEN	PEG
NOUGHT	RAW	WROUGHT	GNAW
SUE	OLINE	ZOO	TUNE
NEED	BREY	DEED	HEET
DAN	SHAD	THAN	CHAD
CHOP	GOT	COP	JOT
FORE	DOLE	THOR	BOHL
FIT	GILL	HIT	OILL
REST	NED	NEST	RED

DIAGNOSTIC RHYME TEST

WORD LIST 312A

PAGE 1	PAGE 2	PAGE 3	PAGE 4
ROB	TOOT	GOR	TEST
TAUNT	POND	DAUNT	FAULTY
ROOT	BONE	MOOT	QUES
SHEET	VILL	CHEAT	VEE
JAB	JEST	GAR	GUEST
POT	FOUGHT	TOT	THOUGHT
GHOST	POOP	ROAST	COOP
NILL	REAP	RILL	NEAP
SAID	VAST	ZED	FAST
DAW	DOCK	GNAW	KNOCK
CHOOSE	THOSE	SHOES	DOZE
CHEEP	SING	KEEP	THING
RANK	NET	DANK	MET
GOT	CAUGHT	DOT	TAUGHT
ROSE	NUDE	NOSE	RUDE
DINT	BEAN	TINT	PFEN
NECK	BAD	DECK	MAD
THONG	VOX	TONG	ROY
COO	JOE	CHEW	GO
REED	DIO	WEED	BIO
SHAG	WREN	SAG	YEN
ROB	NOUGHT	KNOR	WROUGHT
FOAL	SUE	VOLE	ZOD
DIP	DEED	NIP	NEED
FENCE	DAN	PENCE	THAN
SAW	CHOP	THAW	COP
POOL	FORE	TOOL	THOR
WIELD	FIT	YIFLD	HIT
RAT	NEST	GNAT	REST
PEST	FAN		PAN
VAULT	JOCK		CHOCK
NEWS	NOTE		DOVE
BEE	TICK		THICK
THANK	CARE		CHAIR
ROD	DONG		BONG
SO	YOU		RUE
RIP	NEATH		WREATH
DENSE	CALF		GAFF
MOSS	MOM		BOMB
FOO	DOUGH		THOUGH
THEE	GILT		JILT
THAD	PENT		TENT
FOP	WALL		YAWL
NODE	ROOSE		NOOSE
CHIN	FEEL		VEAL
BEND	NAB		DAH
CHAW	BON		VON
JUICE	THOLE		SOLF
PEEK	FIN		THIN
RAT	KFG		PEG
NOT	RAW		GNAW
GOAT	DUNF		TUNE
MIT	MEET		BEET
DEN	SHAD		CHAD
GAUZE	GOT		JOT
KEY	OLDF		BOWL
NAP	GILL		DILL
	RED		NEO

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GOR COOT
 TAUNT BOND
 ROOT MOAN
 SHEET VILL
 JAB GUEST
 POT THOUGHT
 ROAST COOP
 RILL REAP
 SAID FAST
 GNAW KNOCK
 SHOES DOZE
 CHEEP SING
 BARK MEY
 GOT CAUGHT
 NOSE RUDE
 DINT PEEN
 NECK MAD
 THONG ROX
 COO GO
 WEED DID
 SAG YEN
 KNOR NOUGHT
 FOAL ZOO
 NIP NEED
 PENCE THAN
 SAW COP
 POOL FORF
 WIELD FIT
 GNAT NEST

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TEST PAN
 VAULT CHOCK
 NEWS DOTE
 REF TICK
 THANK CHAIR
 ROD BONG
 SHOW RIE
 NIP NEATH
 DENSE GAFF
 ROSS BOMB
 POOH THOUGH
 THEE GILT
 THAD TENT
 FOP WALL
 RODE NOOSE
 CHIN VFAI
 REND DAR
 CHAW VON
 JUICE SOLE
 TEAK FIN
 GAT PEG
 POT RAW
 GOAT THINE
 RIT MEET
 THEN CHAD
 GAUZE JOT
 NOON OOLE
 KEY GILL
 PAP RFD

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ROR TOOT
 DAUNT POND
 MONT BONE
 CHEAT OTLL
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 TOT FOUGHT
 GHOST POOP
 MILL NEAP
 ZED VAST
 RAW DOCK
 CHOOSE THOSE
 KEPP THING
 DANK NET
 DOT TAUGHT
 ROSE NUOF
 TINT BFAN
 DECK MAD
 TONG VOX
 CHEW JOF
 REED RIO
 SHAG WREN
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 VOLF SUE
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 SO YOU
 RIP WREATH
 TENSE CALF
 MOSS MOM
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 ZEE JILT
 FAD PENT
 HOP YAWL
 NONE RHOSE
 GIN FEEL
 MEND NAB
 SHAW BON
 GOOSE THOLE
 PEEK THIN
 RAT KEG
 NOT GNAW
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 DEN SHAD
 JAWS GOT
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CHOOSE DOZE
KEEP SING
DANK MET
DOT CAUGHT
NOSE NUDE
TINT BEAN
NECK BAD
TONG VOX
CHEW GO
REED DID
SHAG WREN
ROB HOUGHT
VOLE ZOO
DIP NEED
FENCE THAN
SAW COP
POOL THOR
WIELD FIT
RAT NEST

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FAULT JOCK
DUES NOTE
VEE TWICK
THANK CARE
WAD BONG
BO RUE
RIP NEATH
TENSE CALF
BOSS BOMB
FOO THOUGH
ZEE GILT
FAD TENT
HOP WALL
RIDE ROOSE
GIN FEEL
BEND NAB
SHAW BON
GOOSE SOLE
PEEK PIN
BAT KEG
NOT RAW
COAT TIME
MIT BEET
DEN CHAD
GAUZE JOT
NOON BOWL
KEY GILL
NAP RED

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BOR TOOT
TAUNT BOND
ROST MOAN
SHFET VILL
GAR GUEST
POY FROUGHT
BOAST POOP
RILL NEAP
SAID FAST
DAW DOCK
SHDES THOSE
CHEEP THING
RANK NET
GOT TAUGHT
ROSE RUDE
DINT PEEN
DECK MAD
THONG BOX
COO JOE
WEED BIO
SAG VEN
KNOB WROUGHT
FOAL SUE
NIP DEED
PENCE DAN
THAW CHOP
TOOL FORE
YIELD HIT
GNAT REST

PAGE 4

PEST FAN
VAULT CHOCK
NEWS DOTE
BEE TICK
BANK CHAIR
ROD DONS
SHOW YOU
NIP WREATH
DENSE GAFF
MOSS MON
POOH DOUGH
THRE JILT
THAD PENT
POP YAWL
NODE NOOSE
CHIN VEAL
MEND DAB
CHAW VON
JUICE THOLE
TEAK THIN
GAT PEG
ROT GNAW
GOAT DUNE
BIT MEET
THEN SHAD
JAWS GOT
MOON DOLE
TEA DILL
RAP NED

DIAGNOSTIC RHYME TEST

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BOB	TOOT
DAUNT	BOND
MOOT	MOAN
CHEAT	VILL
JAB	JEST
POT	THOUGHT
GHOST	COOP
NILL	NEAP
SAID	VAST
GNAW	KNOCK
CHOOSE	ODDE
CHEEP	SING
BANK	MET
GOT	CAUGHT
ROSE	RUDE
DINT	PEEN
DECK	MAD
THONG	VOY
CHEW	JOB
WEED	DID
SAG	YEN
KNOB	WROUGHT
FOAL	ZOO
DIP	DEED
FENCE	DAN
SAW	COP
TOOL	THOR
YIELD	FIT
GNAT	NEST

PAGE 2

PEST	PAN
FAULTY	CHOCK
DUES	DOTE
VEE	TICK
THANK	CARE
RUD	SONG
SO	RUE
RIP	WREATH
DENSE	CALF
BOSS	BOMB
FOO	THOUGH
THEE	GILT
THAD	TENT
POP	WALL
NONE	NOOSE
CHIN	VEAL
MEND	DAB
CHAW	BON
GOOSE	THOLE
TEAK	PIN
GAY	PEG
ROT	GNAW
GOAT	TUNE
HIT	MEET
DEN	SHAD
GAUZE	JOT
MOON	BOWL
TEA	GILL
RAP	RED

PAGE 3

GOB	COOT
TAUNT	POND
MOOT	BONE
SMEET	STILL
GAB	GUEST
TOY	FOUGHT
ROAST	POOP
RILL	REAP
ZED	PAST
PAW	DOCK
SHOES	THOSE
KEEP	THING
DANK	NET
DOT	TAUGHT
NOSE	NIDE
TINT	BEAN
NECK	BAD
TONG	BOX
CON	GO
REED	BID
SHAG	WREN
ROB	NOUGHT
VOLE	SUE
NIP	NEED
PENCE	THAN
THAW	CHOP
POOL	FORE
WIELD	HIT
RAT	REST

PAGE 4

TEST	PAN
VAULT	JOCK
NEWS	NOTE
BEE	THICK
SANK	CHAIR
WAO	DONG
SHOW	YOU
NIP	NEATH
TENSE	GAFF
MOSS	MON
POOH	DOUGH
ZEE	JILT
PAD	PENT
HOP	YAWL
RODE	ROOSE
GIN	FEEL
BEND	NAB
SHAW	VON
JUICE	SOLE
FECK	THIN
BAT	KEG
NOT	RAW
COAT	DUNE
BIT	BEEY
THEN	CHAD
JAWS	GOT
NOON	DOLE
KEY	DILL
NAP	NED

DIAGNOSTIC RHYME TEST

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PAGE 1

GOB TOOT
DAUNT POND
MOOT MOAN
SHEET VILL
GAB JEST
TOT THOUGHT
BOAST POOP
MILL NEAP
ZED VAST
DAM DOCK
SHOES DOZE
CHEEP THING
DANK MET
GOT CAUGHT
NOSE RJOE
DINT BEAN
NECK MAD
THONG VOX
CHEW JOE
REED DID
SAG YEN
KNOB NOUGHT
FOAL ZOO
NIP DEED
PENCE THAN
SAW CHOP
TOOL FORE
YIELD HIT
RAT REST

PAGE 2

TEST FAN
FAULT JOCK
DUFF DOTY
REE TICK
SANK CARE
WAD BONG
SMOW YOU
NIP WREATH
TENSE CALF
MOSS MOM
POOH THROUGH
THRE JILY
FAD TENT
FOP WALL
RODE NOOSE
CHIN FEEL
BEND DAB
CHAW BON
GOOSE THOLE
PEEK FIN
GAT PEG
ROT RAW
GOAT TUNF
BIT MEET
OEN CHAD
GAUZE GOT
MOON ONLE
TEA DILL
NAP NED

PAGE 3

ROB COOT
TAUNT BONO
ROOT BONE
CHEAT BILL
JAR GUEST
POT FROUGHT
GHOST COOP
NILL REAP
SAID FAST
GNAW KNOCK
CHOOSE THOSE
KEEP SING
RANK NET
DOT TAUGHT
ROSE NUOE
TINT PEEN
DECK BAD
TONG ROX
COO GO
WEED RIO
SHAG WREN
ROR WROUGHT
VOLE SUE
DIP NEED
PENCE DAN
THAW COP
POOL THOR
WIFLD FIT
GNAT NEST

PAGE 4

PEST PAN
VAULT CHOCK
NEWS NOTE
VEE THICK
THANK CHAIR
ROD DONG
SO RUE
RIP NEATH
DENSE GAFF
BOSS BOMB
FOO DOUGH
ZEE GILT
THAD PENT
HOP YAWL
NODE ROOSE
GIN VEAL
MEND NAB
SHAW VON
JUICE SOLE
TEAK THIN
BAT KEG
NOT GNAW
COAT DUNE
MIT BEET
THEN SHAD
JAWS JOT
NUCH BOWL
KEY GILL
RAP RED

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PAGE 4

TEST	FAN
VAULT	CHOCK
NEWS	OOTE
VEE	TICK
THANK	CHAIR
WAO	BONG
SHOW	RUE
RIP	WREATH
TENSE	CALF
BOSS	BOMB
POOH	THOUGH
ZEE	GILY
FAD	PENT
POP	WALL
NODE	ROOSE
GIN	FEEL
MEND	NAB
SHAW	BON
GOOSE	THOLE
PEEK	THYN
GAT	PEG
ROY	RAW
GOAT	TUNE
HIT	BEET
MIN	SHAD
GAUZE	JOT
NOON	BOWL
TEA	GILL
RAP	RED

DIAGNOSTIC RHYME TEST

WORD LIST 318A

PAGE 1		PAGE 2		PAGE 3		PAGE 4	
BOB	TOOT	PEST	FAN	GOB	COOT	TEST	PAN
DAUNT	BOND	FAULT	CHOCK	TAUNT	POND	VAULT	JOCK
MOOT	MOAN	DUES	DOTE	BOOT	BONE	NEWS	NOTE
CHEAT	BILL	VEP	THICK	SHEET	VILL	BEF	TICK
JAB	GUEST	THANK	CHAIN	GAB	JEST	SANK	CARE
TOT	FOUGHT	HAD	DONG	POT	THOUGHT	ROD	BONG
BOAST	POOP	SHOW	YOU	GHOST	COOP	SO	RUE
RILL	NEAP	NIP	WREATH	NILL	REAP	RIP	NEATH
ZED	VAST	TENSE	CALF	SAID	PAST	DENSE	GAFF
DAN	DOCK	MOSS	MON	GNAW	KNOCK	BOSS	BOMB
SHOES	DOZE	POOH	THOUGH	CHOOSE	THOSE	POO	DRUGH
KEEP	THING	ZEE	JILY	CHEEP	SING	THEE	GILY
DANK	NET	FAD	PENT	RANK	MEY	THAD	TENT
GOT	TAUGHT	POP	YAWL	DOT	CAUGHT	HOP	WALL
NOSE	RUDE	RODE	NOOSE	ROSE	NUDE	NODE	ROOSE
TINT	PEEN	GIN	VEAL	DINT	BEAN	CHIN	FEEL
NECK	BAD	BEND	NAB	DECK	HAD	MEND	DAB
THONG	VOX	CHAW	BON	TONG	BOX	SHAW	VON
COO	JOE	JUICE	THOLE	CHEN	GO	GOOSE	SOLE
REED	OIO	PEEK	PIN	WEED	BID	TEAK	THIN
SAG	YEN	GAT	PEG	RHAG	WREN	BAT	KEG
KNOB	WROUGHT	ROT	GNAW	ROR	NOUGHT	NOT	RAW
FOAL	SUE	GOAT	DUNE	VOLE	ZOO	COAT	TUNE
OIP	NEED	MIT	BEET	NIP	DEED	BIT	MEET
PENCE	DAN	DEN	SHAD	PENCE	THAN	THEN	CHAD
SAW	COP	GAUZE	JOT	THAW	CHOP	JAWS	GOT
TOOL	FORE	MOON	DOLE	POOL	THOR	NOON	BOWL
YIELD	MIT	TEA	DILL	WIELD	FIT	KEY	GILL
RAT	NEST	NAP	RED	GNAT	REST	RAP	NED

DIAGNOSTIC RHYME TEST

WORD LIST
315A

PAGE 1

ROB	COOT
TAUNT	POND
ROOT	BONE
SHEET	BILL
JAR	GUEST
PCT	FOUGHT
BOAST	COOP
WILL	REAP
SAID	FAST
DAN	KNOCK
SHOES	THOSE
CHEEP	SING
RANK	MET
DOY	TAUGHT
ROSE	NUDE
DINT	BEAN
NECK	BAO
TONG	VOX
COO	JOE
WEED	BYO
SHAG	WREN
ROB	WROUGHT
VOLE	SUE
DIP	DEED
PENCE	THAN
THAW	CHOP
TOOL	FORE
WIELD	HIT
RAT	REST

PAGE 2

PEST	PAN
VAULT	JOCK
NEWS	NOTF
REF	THICK
THANK	CHAIR
ROD	DONG
SHOW	RIFE
RIP	NEATH
DENSE	GAFF
MOSS	BOMB
POOH	DOUGH
THEE	GILY
THAD	TENT
HOP	YAWL
NODE	ROOSE
CHIN	PFEL
BEND	NAB
SHAW	BON
JUICE	THOLE
TEAK	THIN
BAY	KEG
NOT	GNAW
COAT	DUNE
MIT	HEFY
THEN	CHAD
JAWS	GOT
MOON	DOLE
KEY	DILL
NAP	NED

PAGE 3

GOR	TOOT
DAUNT	BOND
MOOT	MOAN
CHEAT	VILL
GAB	JEST
TOY	THOUGHT
GHOST	POOP
RILL	NEAP
ZED	VAST
GNAW	DOCK
CHOOSE	DOZE
KEEP	THING
NANK	NET
GOY	CAUGHT
NOSE	RUDE
TINT	PEEN
DECK	HAD
THONG	BOX
CHEW	GO
REFO	DID
SAG	YEN
KNOB	NOUGHT
FOAL	ZOO
NIP	NEED
FENCE	DAN
SAN	COP
POOL	THOR
VIELD	FIT
GNAT	NEST

PAGE 4

TEST	PAN
PAULY	CHOCK
DUES	DOTE
VEE	TICK
SANK	CARE
WAD	BONG
SO	YOU
NIP	WREATH
TENSE	CALP
BOSS	MON
FOO	THOUGH
ZEE	JILT
FAD	PENT
POP	WALL
RODE	NROSE
GIN	VEAL
MEND	DAB
CHAW	VON
GOOSE	SOLE
PEEK	FIN
GAT	PEG
ROT	RAW
GOAT	TUNE
BIT	BEEY
DEN	SHAD
GALIZE	JOY
NORN	BOWL
TEA	GILL
RAP	RED

DIAGNOSTIC RHYME TEST

WORD LIST 318A

PAGE 1	PAGE 2	PAGE 3	PAGE 4
BON	PEST	GOR	TEST
TAUNT	VAULT	DAUNT	FAULT
ROOT	NEWS	MOOT	QUES
SHEET	BEE	CHEAT	VEE
JAR	THANK	GAB	SANK
TOT	HAD	POT	ROD
BOAST	SHOW	GHOST	POOP
NILL	RIP	RILL	NEAP
ZED	TENSE	SAID	PAST
GNAW	BOSS	DAN	DOCK
SHOES	POOM	CHOOSE	THOSE
KEEP	ZEE	CHEEP	SING
DANK	FAD	RANK	NET
DOT	HOP	GOY	TAUGHT
ROSE	NODE	NOSE	NUDE
TINY	GIN	DINT	PEEN
DECK	MEND	NECK	MAD
THONG	CHAW	TONG	VOX
CHEW	GOOSE	COO	JOE
REED	PEEK	NEED	DIO
SAG	GAT	SHAG	WREN
KNOB	ROT	ROB	NOUGHT
FOAL	GOAT	VOLE	ZOO
DIP	MIT	NIP	NEED
FENCE	DEN	PENCE	THAN
SAW	GAUZE	THAW	COP
POOL	NOON	TOOL	THOR
YIELD	TEA	WIELD	HIT
RAT	NAP	GNAT	REST
COOT	PAN	TOOT	FAN
POND	JOCK	BOND	FAULT
BONE	NOTE	MOAN	QUES
BILL	THICK	VILL	VEE
JEST	CARE	GUEST	SANK
THOUGHT	BONG	FOUGHT	ROD
COOP	RUE	POOP	SO
REAP	NEATH	NEAP	NIP
VAST	CALF	PAST	DENSE
KNOCK	BOMB	DOCK	MOSS
DOZE	THOUGH	THOSE	POO
THING	JILT	SING	THEE
MEY	TENT	NET	THAD
CAUGHT	WALL	TAUGHT	POP
RUDE	NOOSE	NUDE	RODE
BEAN	PEEL	PEEN	CHIN
BAD	NAB	MAD	BEND
BOX	VON	VOX	SHAW
GO	SOLE	JOE	JUICE
BID	THIN	DIO	TEAK
VEN	PEG	WREN	BAT
WROUGHT	GNAW	NOUGHT	NOT
SUE	DIUNE	VOLE	COAT
DEED	MEET	NIP	BIT
DAN	SHAD	THAN	THEN
CHOP	GOT	COP	JAWS
FORE	DOLF	THOR	MOON
FIT	GILL	HIT	KEY
NEST	RED	REST	RAP
			NED

DIAGNOSTIC RHYME TEST

WORD LIST 3100

PAGE 1

GOB
TAUNT
MOOT
CHEAT
GAB
TOT
ROAST
MILL
ZED
GNAR
SHOES
KEEP
BANK
GOT
ROSE
DINT
NECK
TONG
CHEW
REED
SAG
KNOB
VOLE
DIP
PENCIL
THAW
POOL
YIELD
RAT

COOT
BOND
BONE
VILL
JEST
THOUGHT
POOP
NEAP
FAST
KNOCK
DOZE
SING
NET
TAUGHT
RUDE
PEEN
BAD
BOX
GO
DID
YEN
WROUGHT
ZOO
NEED
THAN
COP
THOR
HIT
REST

PAGE 2

TEST
VAULT
DUES
VEF
BANK
WAD
SHOW
RIP
TENSE
BOSS
POOH
ZEE
THAD
POP
NODE
CHIN
BEND
SHAW
GOOSE
PEEK
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ROT
COAT
MIT
THEN
JAWS
NOON
TEA
NAP

PAN
CHOCK
NOTE
TICK
CARE
BONG
YOU
WREATH
GAFF
BOMB
THOUGH
GILY
PFNT
YAWL
NOOSE
VEAL
NAB
VON
SOLE
FIN
PEG
GNAW
TUNE
BEET
CHAD
JOY
BOWL
DILL
NED

PAGE 3

ROR
DAUNT
BOOT
SHEET
JAB
POT
GHOST
RILL
SAID
RAW
CHOOSE
CHEEP
DANK
DOT
NOSE
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FOAL
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FENCE
SAW
TOOL
WIELD
GNAT

TOOT
POND
MOAN
BILL
GUEST
FOUGHT
COOP
REAP
VAST
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THOSE
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NUDE
BEAN
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JOE
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WREN
NOUGHT
SIE
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DAN
CHOP
FORE
FIT
NEST

PAGE 4

PEST
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NEWS
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THANK
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MOSS
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RODE
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JUICE
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DEN
GAUZE
MOON
KEY
RAP

PAN
JOCK
DOTE
THICK
CHAIR
DONG
RUE
NEATH
CALF
MOM
DOUGH
JILT
TENT
WALL
ROOSE
FEEL
DAB
BON
THOLE
THIN
KEO
RAW
DUNE
MEET
SHAD
GOT
DOLE
GILL
REO

DIAGNOSTIC RHYME TEST

WORD LIST 3174

PAGE 1	PAGE 2	PAGE 3	PAGE 4
GOB	TOOT	TEST	PAN
DAUNT	POND	FAULT	JOCK
MOOT	MOAN	QUES	DOPE
CHEAT	BILL	VEE	THICK
GAB	JEST	SANK	CARE
TOY	FOUGHT	HAD	DONG
BOAST	POOP	SHOW	YOU
RILL	NEAP	NIP	WREATH
ZED	FAST	TENSE	GAPP
GNAW	KNOCK	BOSS	BOHB
SHOES	DOZE	POOH	THOUGH
KEEP	THING	ZEE	JILT
DANK	NET	FAD	PENT
GOT	TAUGHT	POP	YAWL
NOSF	RUDE	RODE	NOOSE
DINT	BEAN	CHIN	PEEL
NECK	BAD	MEND	NAB
THONG	VOX	CHAW	RON
COO	JOE	JUICE	THOLE
FEED	DIO	PEEK	FIN
SHAG	WREN	BAT	KEG
KNOB	NOUGHT	ROT	RAW
VOLE	SUE	COAT	DIINE
NIP	DEED	HIT	MEET
PENCE	THAN	THFN	CHAD
SAW	CHOP	GALIZE	GOT
TOOL	THOR	MOON	BOWL
WIELD	HIT	KEY	DYLL
RAT	NEST	NAP	RFO
		ROB	COOT
		TAUNT	ROND
		ROOT	BONE
		SHFET	VILL
		JAB	GUEST
		POT	THOUGHT
		GHOST	COOP
		NILL	REAP
		SAID	VAST
		PAW	DOCK
		CHOOSE	THOSE
		CHEEP	SING
		RANK	MET
		DOT	CAUGHT
		ROSE	NUDE
		TINT	PEEN
		NECK	MAD
		TONG	BOX
		CHEW	GO
		WEED	BID
		SAG	YEN
		ROR	WROUGHT
		FOAL	ZOO
		NIP	NEED
		FENCE	DAN
		THAW	COP
		POOL	FORE
		VIFLD	FIT
		GNAT	REST
			PEST
			VAULT
			NEWS
			SEE
			THANK
			ROD
			SO
			RIP
			DENSE
			MOSS
			POO
			THEE
			THAD
			HOP
			NODE
			GIN
			BEND
			SHAW
			GOOSE
			TEAK
			GAT
			NOT
			GOAT
			BIT
			DEN
			JAWS
			NOON
			TEA
			RAP
			PAN
			CHOCK
			NOTE
			TICK
			CHAIR
			BONG
			RUE
			NEATH
			CALF
			MOM
			DOUGH
			GILT
			TENT
			WALL
			ROOSE
			VEAL
			DAB
			VON
			SOLE
			THIN
			PEG
			GNAW
			TUNE
			REET
			SHAD
			JOT
			DOLE
			GILL
			NED

DIAGNOSTIC RHYME TEST

WORD LIST
3178

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BOB
TAUNT
MOOT
CHEAT
JAB
TOT
BOAST
RILL
SAID
DAW
SHOES
CHEEP
DANK
GOY
ROSE
TINT
NECK
TONG
CHEW
REED
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ROB
FOAL
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THAW
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WIELD
GNAT

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VILL
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KNOCK
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CAUGHT
RUDE
PEEN
BAD
VOX
JOE
BID
WREN
NOUGHT
SUE
NEED
DAN
CHOP
FORE
FIT
REST

PAGE 2

TEST
VAULT
QUES
VEF
THANK
HAD
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MOSS
POOH
THEE
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NODE
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REND
SHAW
GOOSE
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THEN
JAWS
MOON
KEY
RAP

PAN
CHOCK
DOVE
TICK
CARE
BONG
YOU
WREATH
CALF
BOMB
DOUGH
JILT
TENY
WALL
NUOSE
VEAL
HAB
SON
THOLE
THIN
KEG
RAW
DUNE
BEET
SHAD
GOT
DOLE
GILL
NED

PAGE 3

ROB
DAUNT
ROOT
SHEET
GAB
POY
GHOST
NILL
ZED
GNAW
CHOOSE
KEEP
RANK
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NOSE
DINT
DECK
THONG
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WEED
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KNOB
VOLE
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SAW
POOL
YIELD
RAT

TOOT
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BONE
BILL
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FOUGHT
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TAUGHT
NUDE
BEAN
HAD
BOX
GO
DID
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WROUGHT
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DEED
THAN
COP
THOR
HIT
NEST

PAGE 4

PEST
FAULT
NEWS
BEE
SANK
ROO
SO
RIP
TENSE
BOSS
POO
ZEE
THAD
HOP
RODE
CHIN
MEND
CHAW
JUICE
TEAK
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GAUZE
NOON
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NAP

PAN
JOCK
NOTE
THICK
CHAIR
DOON
RUE
NEATH
GAFF
MOM
THOUGH
GILT
PENT
YAWL
ROOSE
FEEL
DAB
VON
SOLE
FIN
PEG
GNAW
TUNE
MEET
CHAD
JOY
BOWL
DILL
RED

DIAGNOSTIC RHYME TEST

WORD LIST
310A

PAGE 1

GOB	COOT
TAUNT	POND
BOOT	BONE
CHEAT	BILL
GAB	JEST
TOT	FOUGHT
GHOST	COOP
HILL	NEAP
SAID	VAST
DAN	DOCK
SHOES	THOSE
CHEEP	SING
DANK	NET
DOT	CAUGHT
ROSE	NUOG
DINT	BEAN
DECK	HAD
TONG	BOX
COO	GO
REED	DID
SAG	YEN
KNOB	NOUGHT
FOAL	SUE
NIP	DEED
PENCE	DAN
SAW	COP
TOOL	THOR
YIELD	HIT
RAT	REBT

PAGE 2

TEST	PAN
VAULT	JOCK
NEWS	NOTE
VEE	THICK
SANK	CARE
HAD	DONG
BO	RUE
RIP	WREATH
DENSE	CALF
MOSS	MOM
POOH	DOUGH
THEE	GILY
PAD	PENT
HOP	WALL
NODE	MOOSE
CHIN	PEEL
MEND	DAB
SHAW	VON
JUICE	SOLE
PEEK	PIN
GAT	PEG
ROT	RAW
GOAT	DUNE
BIT	MEET
OEN	SHAD
GAUZE	JOT
MOON	BOWL
TEA	DILL
NAP	NED

PAGE 3

ROB	TOOT
DAUNT	BOND
MOOT	MOAN
SHEET	VILL
JAB	GUEST
POT	THOUGHT
BOAST	POOP
RILL	REAP
ZED	FAST
GNAW	KNOCK
CHOOSE	DOZE
KEEP	THING
BANK	MEY
GOT	TAUGHT
NOSE	RIDE
TINT	PEEN
NECK	BAD
THONG	VOX
CHEW	JOE
WEED	BID
SHAG	WREN
ROB	WROUGHT
VOLE	ZOO
DIP	NEED
PENCE	THAN
THAW	CHOP
POOL	FORE
WIELD	FIT
GNAT	NEST

PAGE 4

PEST	FAN
FAULT	CHOCK
QUES	DOYE
BEE	TICK
THANK	CHAIR
ROD	BONG
SHOW	YOU
NIP	NEATH
TENSE	GAFF
BOSS	BOMB
FOO	THOUGH
ZEE	JILT
THAD	TENT
POP	YAWL
RODE	NOOSE
GIN	VEAL
BEND	NAB
CHAW	BON
GOOSE	THOLE
TEAK	THIN
BAT	KEG
NOT	GNAW
COAT	TUNE
HIT	BEET
THEN	CHAD
JAWS	GOT
NOON	DOLE
KEY	GILL
RAP	RED

DIAGNOSTIC RHYME TEST

WORD LIST 3188

PAGE 1

BOB TOOT
GAUNT POND
BOOT BONE
SHEET VILL
GAB JEST
POT FOUGHT
GHOST POOP
NILL REAP
ZED VAST
DAN DOCK
SHOES DOZE
CHEEP THING
DANK MET
GOT TAUGHT
ROSE RUDE
TINT BEAN
NECK BAD
TONG VOX
COO JOE
REED DID
SHAG YEN
KNOB WROUGHT
VOLE ZOO
DIP NEED
FENCE THAN
THAW COP
POOL THOR
WIELD HIT
GNAT REST

PAGE 2

PEST FAN
FAULT JOCK
NEWS NOTE
BEE TICK
BANK CARE
ROD DRUG
SO YOU
RIP NEATH
MOSS HON
POOH THOUGH
THFE JILT
FAD TENT
POP YAWL
NODE NOOSE
GIN FEEL
BEND NAB
SHAW BON
JUICE THOLE
PERK FIN
RAY PEG
ROT GNAW
COAT THINP
MIT BEET
DEN CHAD
JAWS JOT
NOON BOWL
KEY DILL
RAP NED

PAGE 3

GOR CROT
TAUNT ROND
MORT MOAN
CHEAT BILL
JAB GUEST
TOT THOUGHT
ROAST COOF
RILL NEAP
SAID FAST
GNAW KNOCK
CHOOSE THOSE
KEEP SING
RANK NET
DOT CAUGHT
NOSE NUDE
DINT PEEN
DECK MAD
THONG BOX
CHEW GO
WEED BIO
SAG WREN
ROB NOURHT
FOAL SUE
NIP DEED
PENCE DAN
SAW CHOP
TOOL FORE
YIELD FIT
RAT NEST

PAGE 4

TEST PAN
VAULT CHOCK
DUES DOTE
VEE THICK
THANK CHAIR
MAD BONG
SHOW RUE
NIP WREATH
DENSE GAFF
BOSS BOMB
POO DOUGH
ZEE GILT
THAD PENT
HOP WALL
RODE ROOSE
CHTN VEAL
HEND DAB
CHAW VON
GOOSE SOLE
TEAK THIN
GAT KEG
NOT RAW
GOAT DUNE
BIT MEET
THEN SHAD
GAUZE GOT
MOON DOLE
TEA GILL
NAP RED

Appendix B

Diagnostic Rhyme Test
Scoring Software
and
Sample Printout
CSP-30 Implementation

DIAGNOSTIC RHYME TEST SCORING PROGRAM
WITH CARTRIDGE OUTPUT

CSP-3B IMPLEMENTATION

5 MAR 76

FOR INFORMATION CONCERNING THIS PROGRAM CONTACT:

CAPTAIN STEVEN HEISTER
ESD/MCE
HANSCOM AFB, MA 01731

TELEPHONE:
COMM, (617) 861-4433
AUTOVON 478-4433

WRITTEN BY STEVEN HEISTER, ESD/DCWL, HANSCOM AFB, MA 01731

NUMSUB = NUMBER OF SUBFEATURES CORRECT EACH LISTENER
NUMT = NUMBER OF MAIN FEATURES CORRECT EACH LISTENER
NUML = NUMBER OF LISTENERS
NUMS = NUMBER OF SPEAKERS
LIST = CURRENT LISTENER
ISPKR = CURRENT SPEAKER
IKEY = CURRENT KEY NUMBER
NKEY = CURRENT KEY INDEX NUMBER FOR KEY ARRAY
IPAGE = PAGE BEING SCORED
IFEAT = INDEX FOR MAIN FEATURE:
1 = VOICING
2 = NASALITY
3 = SUSTENTION
4 = SIBILATION
5 = GRAVENESS
6 = COMPACTNESS
7 = EXPERIMENTAL

FEATURE ARRAY KEY:

	PRESENT	ABSENT	
MAIN FEATURE	(L,1,1)	(L,2,1)	L = LISTENER NUMBER
SUB FEAT PRES	(L,1,2)	(L,2,2)	
SUB FEAT ABS	(L,1,3)	(L,2,3)	

FEAT(10,N,M) = MEAN FOR N,M
FEAT(20,N,M) = STANDARD ERROR FOR N,M
FEAT(10,1,M) = MEAN FOR PRESENT + ABSENT STATE OF M
FEAT(10,2,M) = S.E. FOR PRESENT + ABSENT STATE OF M
TOT(1,1) = TOTAL FOR PRESENT STATE ALL FEATURES
TOT(2,1) = TOTAL FOR ABSENT STATE ALL FEATURES
TOT(3,1) = TOTAL FOR PRESENT + ABSENT ALL FEATURES
WHERE I = 1 FOR MEAN
I = 2 FOR S.E.

1 1,3*0,3*1,0,1,4*0,1,0,1,0,0,1,1,0,0,1,1,0,3*1,0,
 1 3*1,3*0,5*1,0,1,1,0,1,0,0,1,0,1,4*0,4*1,
 C
 C 100 B KEY
 1 0,0,1,1,3*0,3*1,0,0,1,1,3*0,5*1,0,1,0,0,3*1,
 1 0,0,3*1,5*0,1,0,1,1,0,0,3*1,0,3*1,0,0,1,1,0,1,
 C
 C 111 A KEY
 1 1,1,0,0,3*1,3*0,3*1,3*0,1,0,1,0,0,1,
 1 3*0,3*1,0,0,6*1,0,1,0,1,1,3*0,4*1,0,0,3*1,0,0,1,0,1,
 C
 C 111 B KEY
 1 0,0,3*1,3*0,1,0,1,0,1,1,4*0,1,1,0,1,0,
 1 3*1,0,3*1,0,1,0,1,7*0,1,1,0,1,1,5*0,1,0,0,1,0,1,1,
 C
 C 112 A KEY
 1 1,3*0,1,1,3*0,3*1,0,1,1,0*0,1,5*0,1,0,
 1 0,1,0,0,1,5*0,1,1,0,1,0,1,0,0,1,0,1,4*0,4*1,
 C
 C 112 B KEY
 1 0,4*1,0,1,0,0,1,0,0,1,0,4*1,3*0,1,3*0,4*1,
 1 4*0,1,0,4*1,0,0,1,1,3*0,1,1,3*0,1,1,0,1,1,0,1,
 C
 C 113 A KEY
 1 3*0,6*1,0,0,1,1,0,3*1,0,0,3*1,0,1,0,1,
 1 0,0,1,1,0,3*1,0,1,0,0,3*1,0,1,0,1,1,0,4*1,3*0,1,0,1,1,
 C
 C 113 B KEY
 1 1,0,1,1,0,0,1,0,1,1,0,1,1,0,1,0,4*1,
 1 0,1,0,1,0,1,0,0*1,0,1,0,1,6*0,1,0,3*1,0,1,4*0,1,
 C
 C 115 A KEY
 1 1,0,1,1,0,5*1,0,0,1,1,0,0,1,0,1,1,0,1,0,3*1,3*0,
 1 0,1,0,1,3*0,4*1,0,4*1,0,0,1,0,0,1,3*0,1,0,1,1,
 C
 C 115 B KEY
 1 4*0,1,4*0,3*1,3*0,1,1,4*0,1,0,3*1,3*0,
 1 1,1,0,0,4*1,4*0,3*1,0,1,0,3*1,0,3*1,0,3*1,
 C
 C 116 A KEY
 1 0,4*1,0,1,0,1,0,0,1,0,0,1,0,1,3*0,1,0,0,1,0,1,1,0,1,
 1 0,1,1,3*0,4*1,0,5*1,6*0,1,0,4*1,0,
 C
 C 116 B KEY
 1 3*1,0,0,3*1,5*0,1,3*0,1,0,1,0,1,0,1,1,0,0,1,0,
 1 0,0,3*1,0,0,3*1,0,0,1,0,0,1,0,1,0,1,0,0,1,0,3*1,
 C
 C 301 A KEY
 1 0,0,1,1,1,0,0,0,1,0,0,1,0,0,0,1,1,0,1,0,1,0,0,1,1,0,0,
 1 1,0,0,1,1,0,0,0,1,0,1,1,1,0,0,0,0,1,1,1,0,0,0,1,1,1,1,
 C
 C 301 B KEY
 1 0,0,1,1,1,0,1,1,0,0,0,1,0,1,1,1,1,0,1,0,0,0,0,0,1,1,1,
 1 1,1,1,0,1,1,0,0,1,0,1,1,0,0,0,1,0,1,0,1,0,1,0,1,0,1,
 C
 C 302 A KEY
 1 0,1,0,1,0,0,1,0,1,1,1,1,0,0,1,1,1,0,0,1,0,1,0,0,1,1,1,
 1 0,0,0,0,1,0,0,0,1,1,1,0,1,0,0,0,1,1,0,0,1,0,0,1,0,0,1,1,
 C
 C 302 B KEY
 1 0,0,1,1,0,0,0,1,0,1,1,1,0,0,0,0,1,1,1,0,1,0,0,0,1,0,0,1,0,
 1 0,1,1,0,0,0,1,0,1,0,1,0,0,0,0,1,0,1,1,0,1,0,0,0,1,1,1,0,1,
 C
 C 303 A KEY

1 0,0,1,0,0,1,1,0,0,1,0,0,1,0,1,1,0,0,1,0,0,0,1,1,1,1,0,0,1,
 1 1,0,1,1,1,0,1,1,1,1,0,1,1,0,0,0,1,0,0,0,1,0,1,1,0,0,1,1,
 C
 C 303 B KEY
 1 0,1,1,1,1,0,1,1,0,0,1,0,0,1,1,1,0,0,0,0,1,0,0,0,1,0,1,0,
 1 0,0,1,0,1,0,0,1,0,0,1,0,1,1,0,0,1,0,0,0,1,0,0,0,1,0,0,0,
 C
 C 304 A KEY
 1 0,1,1,1,1,1,1,0,1,1,0,0,1,1,1,1,0,1,1,0,1,1,0,0,0,0,0,
 1 0,1,0,1,0,1,1,1,1,1,1,1,1,1,0,0,1,0,1,0,1,1,1,0,0,0,0,1,0,
 C
 C 304 B KEY
 1 1,1,0,1,1,0,0,0,1,0,0,0,1,1,1,1,1,0,1,0,1,1,0,1,1,1,1,1,
 1 0,1,1,0,0,0,0,1,1,0,0,1,1,0,1,0,1,0,0,0,0,0,0,0,0,0,0,1,0,
 C
 C 305 A KEY
 1 0,1,0,0,1,0,1,0,1,1,0,1,1,1,1,0,0,1,0,1,1,0,1,1,1,1,0,0,0,
 1 0,0,1,0,0,0,1,1,1,0,1,0,1,1,1,1,1,0,0,0,0,1,1,0,1,0,0,1,1,
 C
 C 305 B KEY
 1 1,1,0,1,0,0,0,1,1,1,1,1,1,0,0,0,1,1,0,1,1,1,1,1,0,1,1,1,0,
 1 1,0,1,0,1,0,1,1,1,0,1,0,0,1,0,0,1,0,0,1,0,0,1,0,1,0,0,1,1,0,1,
 C
 C 306 A KEY
 1 1,1,0,1,1,1,1,0,1,1,1,0,1,1,0,1,1,1,0,1,1,0,0,0,1,0,1,1,0,
 1 0,0,0,1,1,1,1,1,0,0,0,0,1,0,0,0,0,0,0,1,0,0,0,1,1,0,1,1,1,
 C
 C 306 B KEY
 1 0,1,0,1,0,1,1,0,1,0,1,1,0,1,1,1,0,0,0,1,0,1,1,0,1,0,1,0,1,
 1 0,1,0,1,0,1,1,0,1,1,1,0,0,1,0,1,1,0,1,1,1,0,1,0,1,1,1,1,1,
 C
 C 307 A KEY
 1 1,1,1,0,0,0,1,1,1,0,0,1,1,0,0,1,1,1,1,0,0,1,1,1,1,0,1,1,
 1 0,1,0,0,0,1,0,1,0,1,1,1,0,0,0,1,1,1,1,0,1,0,1,0,1,0,1,1,0,0,
 C
 C 307 B KEY
 1 1,0,1,1,1,0,1,0,1,1,1,1,1,1,0,0,1,0,0,0,1,1,0,1,1,0,0,1,1,
 1 1,1,1,0,0,0,1,1,0,1,0,1,1,1,1,1,0,1,1,1,0,0,1,0,0,1,0,1,0,
 C
 C 308 A KEY
 1 1,0,1,0,1,0,1,0,1,1,0,0,1,1,0,0,1,1,0,0,1,1,1,0,0,0,0,0,0,
 1 0,1,1,1,0,0,1,0,0,1,1,1,1,1,0,1,0,0,1,0,0,1,1,0,1,1,0,0,1,
 C
 C 308 B KEY
 1 1,1,1,1,1,1,0,1,0,0,1,0,0,1,0,1,1,1,1,1,0,1,0,0,1,1,0,1,0,
 1 0,0,0,0,0,0,0,0,1,0,0,1,1,0,1,0,1,0,0,0,1,0,0,1,0,0,0,0,0,
 C
 C 309 A KEY
 1 1,1,0,0,1,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,1,1,1,0,0,1,1,0,
 1 0,0,1,0,0,0,1,1,0,0,0,1,0,0,1,1,1,0,0,0,1,0,0,0,0,0,1,1,0,
 C
 C 309 B KEY
 1 0,1,1,1,0,0,1,0,0,0,0,0,0,0,0,0,1,0,0,1,0,0,1,0,1,1,0,1,0,
 1 1,0,1,0,0,1,1,0,1,1,1,0,1,1,0,1,1,0,1,0,1,1,0,1,1,0,0,0,0,
 C
 C 310 A KEY
 1 1,0,0,1,0,0,1,1,0,1,1,1,0,0,1,0,0,0,0,0,1,1,1,0,0,1,0,0,1,
 1 1,1,0,1,1,1,0,0,1,0,0,1,0,0,1,1,0,1,0,0,0,1,0,1,0,0,1,1,0,
 C
 C 310 B KEY
 1 1,0,0,1,0,1,1,0,0,0,1,1,1,1,0,0,1,0,0,1,0,0,0,1,1,1,1,1,1,
 1 0,0,1,1,0,1,1,1,1,1,0,1,0,0,0,1,1,0,0,0,0,0,1,0,0,1,1,0,1,
 C
 C 311 A KEY

1 1,0,1,1,1,1,1,0,1,0,0,0,1,0,0,1,1,0,0,1,0,1,0,0,1,1,1,1,1,
 1 0,0,0,1,0,1,0,0,1,1,0,1,0,0,0,0,0,0,0,0,0,0,0,0,1,1,1,0,0,
 C
 C 311 B KEY
 1 0,1,1,1,0,1,1,1,1,0,0,1,1,0,1,0,1,0,0,0,0,1,1,1,1,0,0,1,
 1 0,0,1,1,1,0,1,1,1,0,0,0,1,1,0,1,1,0,0,1,1,1,1,0,1,0,0,1,1,
 C
 C 312 A KEY
 1 1,1,1,0,0,0,0,1,1,1,1,0,0,0,1,0,0,0,1,1,0,1,1,1,0,0,0,1,1,
 1 1,1,1,0,0,0,1,1,0,1,0,0,1,0,0,0,1,0,0,1,1,1,1,1,1,0,0,1,0,
 C
 C 312 B KEY
 1 0,1,1,0,0,0,1,0,1,0,0,0,0,0,0,0,0,1,0,1,0,1,0,1,0,0,1,0,
 1 0,0,0,0,1,1,0,1,1,0,1,0,0,0,1,1,0,1,1,1,0,1,0,0,0,1,0,1,0,
 C
 C 313 A KEY
 1 0,0,0,1,0,1,0,1,0,0,1,1,1,1,0,1,0,1,0,1,0,1,0,0,0,1,1,
 1 0,1,1,1,0,1,0,1,0,0,1,0,0,0,0,0,1,0,1,1,1,1,0,0,0,1,1,1,0,
 C
 C 313 B
 1 1,0,0,1,0,0,0,1,1,0,1,0,0,0,1,0,1,0,0,0,1,0,1,1,0,0,1,0,0,
 1 1,0,0,0,0,1,0,0,0,0,1,0,0,0,1,1,0,0,0,1,0,0,0,1,1,1,1,1,0,
 C
 C 314 A KEY
 1 0,0,0,0,1,1,1,0,0,1,0,0,1,0,0,0,0,0,0,1,1,0,1,0,0,0,1,0,1,
 1 1,1,0,0,0,1,1,0,0,1,1,1,0,0,1,0,0,0,0,1,0,1,0,1,0,0,0,0,1,
 C
 C 314 B KEY
 1 1,0,0,0,1,0,0,0,1,1,1,0,0,1,0,0,0,0,1,0,0,1,0,0,1,1,1,1,1,
 1 0,1,1,1,0,0,1,1,1,1,0,1,0,1,1,1,0,1,1,1,0,1,1,0,0,0,0,1,
 C
 C 315 A KEY
 1 1,0,0,1,0,1,1,0,0,1,0,1,1,0,0,1,0,0,1,1,1,0,1,1,0,0,1,0,1,
 1 1,0,0,1,1,0,1,0,0,1,1,1,1,1,1,1,1,0,0,1,0,0,1,0,1,1,0,0,0,
 C
 C 315 B KEY
 1 1,1,1,0,0,0,1,1,1,1,0,0,0,1,1,0,0,1,1,0,0,1,0,1,1,1,1,1,1,
 1 0,1,1,1,1,0,0,1,1,0,0,0,0,1,0,0,1,0,0,0,1,0,1,1,0,0,0,0,1,
 C
 C 316 A KEY
 1 1,1,1,0,0,1,1,1,0,0,0,1,1,1,1,1,1,0,0,1,1,0,1,1,0,0,0,0,1,
 1 0,1,1,1,0,0,1,0,0,1,1,0,0,1,0,1,1,1,0,0,0,1,1,1,0,0,1,0,
 C
 C 316 B KEY
 1 0,1,0,1,1,1,1,1,0,0,0,1,0,0,1,0,0,1,0,1,1,0,0,1,1,1,0,0,1,
 1 0,0,1,0,0,1,1,0,1,0,1,0,1,1,1,1,1,1,1,1,0,0,0,0,0,1,1,0,1,
 C
 C 317 A KEY
 1 0,0,0,1,1,1,1,0,0,0,0,1,1,0,0,0,1,0,1,1,0,0,0,1,1,0,1,1,1,
 1 1,1,0,1,0,0,1,0,1,0,1,1,1,1,1,0,1,0,0,1,1,1,1,0,0,1,0,0,
 C
 C 317 B KEY
 1 0,1,0,1,0,1,1,0,1,1,0,0,1,0,1,1,0,1,0,1,1,1,1,0,1,1,1,1,0,
 1 0,0,0,0,0,1,1,0,0,0,0,1,0,0,1,1,1,0,0,0,1,1,1,0,1,0,0,1,1,
 C
 C 318 A KEY
 1 0,1,1,1,1,1,0,1,1,1,0,0,1,1,1,0,1,1,1,1,1,0,1,0,0,0,1,0,1,
 1 0,1,1,1,0,0,0,0,0,1,0,0,1,0,0,0,0,1,1,1,0,1,1,1,1,1,1,0,1,
 C
 C 318 B KEY
 1 1,0,1,0,1,0,0,1,0,1,0,0,1,0,1,1,0,1,1,1,0,0,0,1,0,1,0,1,0,
 1 1,1,1,0,0,0,1,1,0,1,1,1,0,1,1,0,1,0,0,1,0,0,0,0,0,1,0,1,1,
 C
 C SUB FEATURES KEY

```

DATA KEYSUB/0,0,1,0,1,0,3*1,3*0,1,1,5*0,1,0,1,1,4*0,1,3*0,3*1,
1 3*0,1,0,1,0,1,3*0,7*1,0,1,4*0,1,1,0,1,0,1,3*0,1,0,1,3*0,1,1,
1 0,1,0,1,1,0,4*1,3*0,1,3*0,3*1,0,3*1,0,3*1,0,1,0,1,0,1,0,4*1/
CHCT(X,Y) = (2.*X/Y - 1.)*100.
SE(X,Y,Z) = SQRT((X/Z-Y*Y)/Z)
DO 1 I=1,20
DO 1 J=1,2
EXPER(I,J)=0.
DO 1 K=1,3
VOIC(I,J,K)=0.
XNASAL(I,J,K)=0.
SUST(I,J,K)=0.
SIBIL(I,J,K)=0.
GRAV(I,J,K)=0.
COMP(I,J,K)=0.
1 CONTINUE
DO 315 I=1,3
DO 315 J=1,2
315 TOT(I,J)=0.
02420,0116000,014
WRITE(6,270)
270 FORMAT(30X,'DIAGNOSTIC RHYME TEST'///)
WRITE(6,271)
271 FORMAT('LISTENER SUMMARIES')
02400,0116000,014
WRITE(5,100)
100 FORMAT('' DIAGNOSTIC RHYME TEST SCORING'//)
WRITE(5,000)
000 FORMAT('INSERT 150 FT CARTRIDGE IN UPPER DECKI/
1 '1/U RESET = CONTINUE'//)
PAUSE
WRITE(5,1000)
1000 FORMAT('SYSTEM UNDER TEST?'/ ' 1,50('S'))
READ(5,1001) (ISYSTE(I),I=1,50)
1001 FORMAT(50A1)
WRITE(5,101)
101 FORMAT('HOW MANY LISTENERS?'/ ' LL')
READ(5,102) NUML
102 FORMAT(12)
WRITE(5,103)
103 FORMAT('/HOW MANY SPEAKERS?'/ ' SS')
READ(5,102) NUMS
NUM1 = 16*NUMS
NUMSUB = 8*NUMS
WRITE(7,601) (ISYSTE(I),I=1,50),NUML,NUMS
601 FORMAT(50A1,2I3)
DO 200 LIST = 1,NUML
WRITE(6,3001)
WRITE(6,3000) (ISYSTE(I),I=1,50)
3000 FORMAT(50A1)
3001 FORMAT(' ')
WRITE(5,2000) LIST
2000 FORMAT('/LISTENER',I3,' NAME'/ ' 1,24('N'))
READ(5,2001) (NAME(LIST,J),J=1,24)
2001 FORMAT(24A1)
WRITE(6,275) LIST, (NAME(LIST,J),J=1,24)
WRITE(7,2001) (NAME(LIST,J),J=1,24)
DO 010 ISPKR = 1,NUMS
DO 010 I=1,7
DO 010 J=1,2
DO 010 K=1,3
010 PAGE(I,J,K) = 0.0
10/ WRITE(5,104) LIST,ISPKR

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104  FORMAT(/'FOR LISTENER',13,' SPEAKER',13//
1  'ENTER KEY NUMBER AND LETTER'/' MNML')
    READ(5,100)IKEY,LETTER
105  FORMAT(13,A1)
470  FORMAT(/6X,'*****',16X,'**/'IKEY = ',13,A1,
1  5X,'SPEAKER IS ',A2/6X,'*****',16X,'**/'IF OK ENTER 0'//)
470  FORMAT(11)
    IF(IKEY,EQ,102)NKEY = 10MSPK+'BV'OGOTO 150
    IF(IKEY,EQ,103)NKEY = 30MSPK+'BV'OGOTO 150
    IF(IKEY,EQ,104)NKEY = 80MSPK+'RD'OGOTO 150
    IF(IKEY,EQ,105)NKEY = 70MSPK+'RD'OGOTO 150
    IF(IKEY,EQ,106)NKEY = 00MSPK+'BL'OGOTO 150
    IF(IKEY,EQ,107)NKEY = 110MSPK+'CH'OGOTO 150
    IF(IKEY,EQ,108)NKEY = 130MSPK+'CH'OGOTO 150
    IF(IKEY,EQ,111)NKEY = 150MSPK+'JE'OGOTO 150
    IF(IKEY,EQ,112)NKEY = 170MSPK+'SN'OGOTO 150
    IF(IKEY,EQ,113)NKEY = 190MSPK+'JE'OGOTO 150
    IF(IKEY,EQ,115)NKEY = 210MSPK+'SN'OGOTO 150
    IF(IKEY,EQ,116)NKEY = 230MSPK+'BL'OGOTO 150
    IF(IKEY,GT,318)GOTO 151
    IF(IKEY,GT,300)NKEY = 25+2*(IKEY-301)OGOTO 150
    GOTO 151
150  IF(LETTER,EQ,'B')NKEY = NKEY+1OGOTO 152
    IF(LETTER,EQ,'A')GOTO 152
151  WRITE(5,100)IKEY,LETTER
100  FORMAT(/'***** NO KEY',14,A1,' *****'//)
    GOTO 107
152  CONTINUE
    IF(IKEY,LT,117)GOTO 700
    WRITE(5,701)
701  FORMAT(/'SPEAKER ?'/' S3')
    READ(5,702)MSPK
702  FORMAT(A2)
700  WRITE(5,475)IKEY,LETTER,MSPK
    READ(5,476)KEYCHK
    IF(KEYCHK,NE,0)GOTO 107
    WRITE(6,200)MSPK,IKEY,LETTER
200  FORMAT(21X,A2,7X,13,A1)
    DO 110 IPAGE = 1,4
350  WRITE(5,100)IKEY,LETTER,LIST,IPAGE
100  FORMAT(/'FOR KEY',14,A1,' LISTENER',13,' PAGE',12//
1  'ENTER RESPONSE BY COLUMNS'//') = FIRST WORD 2 = SECOND WORD'//
1  ' *****')
    DO 112 I=1,2
112  READ(5,111)(IRESP(I,J),J=1,20)
111  FORMAT(20I1)
    CALL CHECK(0350)
    DO 202 I=1,2
    DO 202 J=1,20
202  IRESP(I,J)=IRESP(I,J)-1
    DO 203 ICOL=1,2
    DO 204 IROW=2,20
C  ESTABLISH FEATURE BEING SCORED
    IF(IROW,LE,0)IFEAT=IROW-1
    ITEMP =IROW-1
    IFEAT=MOD(ITEMP,7)
    IF(IFEAT,EQ,0)IFEAT=7
C  ESTABLISH WHICH COLUMN PRESENT STATE OF FEATURE IS IN.
    IPRES=1
    IF(IPAGE,LE,2)IPRES=0
C  FIND KEY ELEMENT
    KEYEL=IROW
    IF(ICOL,EQ,2)KEYEL=IROW+20
    INDEX = 2

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IF(IPAGE,EQ,1)GOTO 208
IF(IPAGE,EQ,3)GOTO 208
IF(KEY(KEYEL,NKEY),NE,IPRES)INDEX=1
GOTO 299
208 IF(KEY(KEYEL,NKEY),EQ,IPRES)INDEX=1
C INDEX =1 IMPLIES MAIN FEATURE PRESENT; 2 IMPLIES ABSENT,
C SCORE THE RESPONSE
299 ANSWER = 0.0
IF(IPAGE,EQ,1)GOTO 295
IF(IPAGE,EQ,3) GOTO 295
IF(KEY(KEYEL,NKEY),NE,IRES(ICOL,IROW))ANSWER=1.0
GOTO 296
295 IF(KEY(KEYEL,NKEY),EQ,IRES(ICOL,IROW))ANSWER=1.0
296 CONTINUE
IF(IFEAT,EQ,7)GOTO 257
ISUBP=2
NSUBP=2
IF(IPAGE,EQ,1)ISUBP=1
IF(IPAGE,EQ,3)ISUBP=1
IF(KEYSUB(KEYEL,ISUBP),EQ,0)NSUBP=3
GOTO(251,252,253,254,255,256),IFEAT
251 VOIC(LIST,INDEX,1)=VOIC(LIST,INDEX,1)+ANSWER
VOIC(LIST,INDEX,NSUBP)=VOIC(LIST,INDEX,NSUBP)+ANSWER
PAGE(1,INDEX,1)=PAGE(1,INDEX,1)+ANSWER
PAGE(1,INDEX,NSUBP)=PAGE(1,INDEX,NSUBP)+ANSWER
GOTO 260
252 XNASAL(LIST,INDEX,1)=XNASAL(LIST,INDEX,1)+ANSWER
XNASAL(LIST,INDEX,NSUBP)=XNASAL(LIST,INDEX,NSUBP)+ANSWER
PAGE(2,INDEX,1)=PAGE(2,INDEX,1)+ANSWER
PAGE(2,INDEX,NSUBP)=PAGE(2,INDEX,NSUBP)+ANSWER
GOTO 260
253 SUST(LIST,INDEX,1)=SUST(LIST,INDEX,1)+ANSWER
SUST(LIST,INDEX,NSUBP)=SUST(LIST,INDEX,NSUBP)+ANSWER
PAGE(3,INDEX,1)=PAGE(3,INDEX,1)+ANSWER
PAGE(3,INDEX,NSUBP)=PAGE(3,INDEX,NSUBP)+ANSWER
GOTO 260
254 SIBIL(LIST,INDEX,1)=SIBIL(LIST,INDEX,1)+ANSWER
SIBIL(LIST,INDEX,NSUBP)=SIBIL(LIST,INDEX,NSUBP)+ANSWER
PAGE(4,INDEX,1)=PAGE(4,INDEX,1)+ANSWER
PAGE(4,INDEX,NSUBP)=PAGE(4,INDEX,NSUBP)+ANSWER
GOTO 260
255 GRAV(LIST,INDEX,1)=GRAV(LIST,INDEX,1)+ANSWER
GRAV(LIST,INDEX,NSUBP)=GRAV(LIST,INDEX,NSUBP)+ANSWER
PAGE(5,INDEX,1)=PAGE(5,INDEX,1)+ANSWER
PAGE(5,INDEX,NSUBP)=PAGE(5,INDEX,NSUBP)+ANSWER
GOTO 260
256 COMP(LIST,INDEX,1)=COMP(LIST,INDEX,1)+ANSWER
COMP(LIST,INDEX,NSUBP)=COMP(LIST,INDEX,NSUBP)+ANSWER
PAGE(6,INDEX,1)=PAGE(6,INDEX,1)+ANSWER
PAGE(6,INDEX,NSUBP)=PAGE(6,INDEX,NSUBP)+ANSWER
GOTO 260
257 EXPER(LIST,INDEX)=EXPER(LIST,INDEX)+ANSWER
PAGE(7,INDEX,1)=PAGE(7,INDEX,1)+ANSWER
260 CONTINUE
204 CONTINUE
203 CONTINUE
110 CONTINUE
DO 611 I=1,7
DO 611 J=1,2
DO 611 K=1,3
611 NPAGE(I,J,K)=IFX(PAGE(I,J,K)+.5)
WRITE(7,675)MSPK
675 FORMAT(A2)
WRITE(7,612)((NPAGE(I,J,K),I=1,7),J=1,2),K=1,3)

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012  FORMAT(I3)
201  CONTINUE
    IPASS = 1
275  FORMAT(/5X,'LISTENER',I3,' SPEAKER',3X,' KEY',5X,24A1)
    WRITE(6,201)
291  FORMAT(/5X,'NUMBER OF CORRECT RESPONSES',I1//)
303  WRITE(6,276)
276  FORMAT(10X,'MAIN ATTRIBUTE:',10X,'PRESENT',7X,'ABSENT'//)
    WRITE(6,277) (VOIC(LIST,I,1),I=1,2)
277  FORMAT(15X,'VOICING',20X,F7,2,6X,F7,2)
    WRITE(6,278) (VOIC(LIST,I,2),I=1,2)
278  FORMAT(20X,'FRICTIONAL',15X,F7,2,6X,F7,2)
    WRITE(6,279) (VOIC(LIST,I,3),I=1,2)
279  FORMAT(20X,'NON-FRICTIONAL',9X,F7,2,6X,F7,2//)
    WRITE(6,280) (XNASAL(LIST,I,1),I=1,2)
280  FORMAT(15X,'NASALITY',10X,F7,2,6X,F7,2)
    WRITE(6,281) (XNASAL(LIST,I,2),I=1,2)
281  FORMAT(20X,'GRAVE',10X,F7,2,6X,F7,2)
    WRITE(6,282) (XNASAL(LIST,I,3),I=1,2)
282  FORMAT(20X,'ACUTE',10X,F7,2,6X,F7,2//)
    WRITE(6,283) (SUST(LIST,I,1),I=1,2)
283  FORMAT(15X,'SUSTENTION',17X,F7,2,6X,F7,2)
    WRITE(6,284) (SUST(LIST,I,2),I=1,2)
284  FORMAT(20X,'VOICED',17X,F7,2,6X,F7,2)
    WRITE(6,285) (SUST(LIST,I,3),I=1,2)
285  FORMAT(20X,'UNVOICED',15X,F7,2,6X,F7,2//)
    WRITE(6,286) (SIBIL(LIST,I,1),I=1,2)
286  FORMAT(15X,'SIBILATION',17X,F7,2,6X,F7,2)
    WRITE(6,287) (SIBIL(LIST,I,2),I=1,2)
    WRITE(6,288) (SIBIL(LIST,I,3),I=1,2)
    WRITE(6,289) (GRAV(LIST,I,1),I=1,2)
287  FORMAT(15X,'GRAVENESS',10X,F7,2,6X,F7,2)
    WRITE(6,290) (GRAV(LIST,I,2),I=1,2)
    WRITE(6,291) (GRAV(LIST,I,3),I=1,2)
    WRITE(6,292) (COMP(LIST,I,1),I=1,2)
288  FORMAT(15X,'COMPACTNESS',10X,F7,2,6X,F7,2)
    WRITE(6,293) (COMP(LIST,I,2),I=1,2)
    WRITE(6,294) (COMP(LIST,I,3),I=1,2)
    IF (IPASS.EQ.2) GOTO 304
    02420,0116000,014
200  CONTINUE
    X=FLOAT(NUMT)
    Y=FLOAT(NUMSUB)
    DO 300 L=1,NUML
    DO 300 I=1,2
    DO 300 J=1,3
    Z=X
    IF (J.GT.1) Z=Y
    W=VOIC(L,I,J)
    VOIC(L,I,J)=CRCT(W,Z)
    W=SUST(L,I,J)
    SUST(L,I,J)=CRCT(W,Z)
    W=GRAV(L,I,J)
    GRAV(L,I,J)=CRCT(W,Z)
    W=COMP(L,I,J)
    COMP(L,I,J)=CRCT(W,Z)
    W=XNASAL(L,I,J)
    XNASAL(L,I,J)=CRCT(W,Z)
    W=SIBIL(L,I,J)
    SIBIL(L,I,J)=CRCT(W,Z)
300  CONTINUE
    IPASS=2
    DO 301 LIST=1,NUML

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      R2420,0110000,014
      WRITE(6,3001)
      WRITE(6,3000)(ISYS(I),I=1,50)
      WRITE(6,302)LIST,(NAME(LIST,J),J=1,24)
302  FORMAT('LISTENER',I3,' PERCENT CORRECT WITH GUESSING',
      1  ' TRANSFORMATION'/24A1//)
      GOTO 303
304  CONTINUE
301  CONTINUE
      DO 310 I=19,20
      M=1
      IF(I.EQ.20)M=2
      Z=FLOAT(NUML)
      IF(I.EQ.20)Z=1.0
      DO 310 J=1,2
      DO 310 K=1,3
      DO 310 L=1,NUML
      VOIC(I,J,K)=VOIC(I,J,K)+VOIC(L,J,K)**M/Z
      XNASAL(I,J,K)=XNASAL(I,J,K)+XNASAL(L,J,K)**M/Z
      SUST(I,J,K)=SUST(I,J,K)+SUST(L,J,K)**M/Z
      SIBIL(I,J,K)=SIBIL(I,J,K)+SIBIL(L,J,K)**M/Z
      GRAY(I,J,K)=GRAY(I,J,K)+GRAY(L,J,K)**M/Z
      COMP(I,J,K)=COMP(I,J,K)+COMP(L,J,K)**M/Z
310  CONTINUE
      Z=FLOAT(NUML)
      DO 312 J=1,2
      DO 312 K=1,3
      X=VOIC(20,J,K)
      Y=VOIC(19,J,K)
      VOIC(20,J,K)=SE(X,Y,Z)
      X=XNASAL(20,J,K)
      Y=XNASAL(19,J,K)
      XNASAL(20,J,K)=SE(X,Y,Z)
      X=SUST(20,J,K)
      Y=SUST(19,J,K)
      SUST(20,J,K)=SE(X,Y,Z)
      X=SIBIL(20,J,K)
      Y=SIBIL(19,J,K)
      SIBIL(20,J,K)=SE(X,Y,Z)
      X=GRAY(20,J,K)
      Y=GRAY(19,J,K)
      GRAY(20,J,K)=SE(X,Y,Z)
      X=COMP(20,J,K)
      Y=COMP(19,J,K)
      COMP(20,J,K)=SE(X,Y,Z)
312  CONTINUE
      Z=FLOAT(2*NUML)
      DO 313 J=1,3
      DO 313 L=1,NUML
      DO 313 K=1,2
      VOIC(10,1,J)=VOIC(10,1,J)+VOIC(L,K,J)/Z
      XNASAL(10,1,J)=XNASAL(10,1,J)+XNASAL(L,K,J)/Z
      SUST(10,1,J)=SUST(10,1,J)+SUST(L,K,J)/Z
      SIBIL(10,1,J)=SIBIL(10,1,J)+SIBIL(L,K,J)/Z
      GRAY(10,1,J)=GRAY(10,1,J)+GRAY(L,K,J)/Z
      COMP(10,1,J)=COMP(10,1,J)+COMP(L,K,J)/Z
313  CONTINUE
      DO 420 K=1,3
      DO 420 L=1,NUML
      VOIC(10,2,K)=VOIC(10,2,K)+(VOIC(L,1,K)+VOIC(L,2,K))**2/4,
      XNASAL(10,2,K)=XNASAL(10,2,K)+(XNASAL(L,1,K)+XNASAL(L,2,K))**2/4,
      SUST(10,2,K)=SUST(10,2,K)+(SUST(L,1,K)+SUST(L,2,K))**2/4,
      SIBIL(10,2,K)=SIBIL(10,2,K)+(SIBIL(L,1,K)+SIBIL(L,2,K))**2/4,
      GRAY(10,2,K)=GRAY(10,2,K)+(GRAY(L,1,K)+GRAY(L,2,K))**2/4,

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420  COMP(10,1,K)=COMP(10,2,K)+(COMP(L,1,K)+COMP(L,2,K))*2/4,
      Z=FLOAT(NUML)
      DO 311 K=1,3
      X=VOIC(10,2,K)
      Y=VOIC(10,1,K)
      VOIC(10,2,K)=SE(X,Y,Z)
      X=XNASAL(10,2,K)
      Y=XNASAL(10,1,K)
      XNASAL(10,2,K)=SE(X,Y,Z)
      X=SUST(10,2,K)
      Y=SUST(10,1,K)
      SUST(10,2,K)=SE(X,Y,Z)
      X=SIBIL(10,2,K)
      Y=SIBIL(10,1,K)
      SIBIL(10,2,K)=SE(X,Y,Z)
      X=GRAY(10,2,K)
      Y=GRAY(10,1,K)
      GRAY(10,2,K)=SE(X,Y,Z)
      X=COMP(10,2,K)
      Y=COMP(10,1,K)
      COMP(10,2,K)=SE(X,Y,Z)
311  CONTINUE
      DO 316 L=1,NUML
      DO 316 J=1,2
      DO 316 K=1,2
      Z=FLOAT(6*NUML)
      IF(K,EQ,2)Z=1,0
      SUM=VOIC(L,J,1)
      SUM=SUM+XNASAL(L,J,1)
      SUM=SUM+SUST(L,J,1)
      SUM=SUM+SIBIL(L,J,1)
      SUM=SUM+GRAY(L,J,1)
      SUM=SUM+COMP(L,J,1)
      IF(K,EQ,2)SUM=SUM/6,0
      TOT(J,K)=SUM+K/Z *TOT(J,K)
316  CONTINUE
      DO 800 III=1,2
      TOT(3,1)=0,0
      TOT(3,2)=0,0
      N2420,0116000,014
      WRITE(6,400)NUML
      WRITE(6,401)(ISYSTE(I),I=1,50)
      WRITE(6,402)NUMS
      WRITE(6,551)
800  FORMAT('LISTENER MEAN DRT')
      DO 401 L=1,NUML
      SUM=0,0
      DO 502 J=1,2
      SUM = SUM + VOIC(L,J,1)
      SUM = SUM + XNASAL(L,J,1)
      SUM = SUM + SUST(L,J,1)
      SUM = SUM + SIBIL(L,J,1)
      SUM = SUM + GRAY(L,J,1)
      SUM = SUM + COMP(L,J,1)
502  CONTINUE
      XSUM = SUM/12,0
      WRITE(6,550)L,XSUM,(NAME(L,J),J=1,24)
800  FORMAT(10,F11,2,3X,24A1)
      TOT(3,1) = TOT(3,1) + SUM/FLOAT(NUML)/12,0
      TOT(3,2) =TOT(3,2)+(SUM/12,0)**2
401  CONTINUE
      Z = FLOAT(NUML)
      X=TOT(3,2)

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```

Y = TOT(3,1)
TOT(3,2) = SE(X,Y,Z)
DO 317 J=1,2
Z=FLOAT(NUML)
X=TOT(J,2)
Y=TOT(J,1)
TOT(J,2)=SE(X,Y,Z)
317 CONTINUE
400 FORMAT('ORT MEANS AND STANDARD ERRORS FOR',I3,' LISTENERS')
401 FORMAT('SYSTEM UNDER TEST',I5,'/')
402 FORMAT('NUMBER OF SPEAKERS =',I2'/)
WRITE(6,403)
403 FORMAT('MAIN ATTRIBUTE',I2X,'PRESENT',I2X,'ABSENT',
1 I2X,'TOTAL')
WRITE(6,404)
404 FORMAT(20X,3(4X,'MEAN',I5,'E.',I5)'/)
WRITE(6,405)((VOIC(I,J,1),I=19,20),J=1,2),(VOIC(18,I,1),I=1,2)
405 FORMAT(3X,'VOICING',9X,3(3X,F6,2,2X,F6,2))
WRITE(6,406)((VOIC(I,J,2),I=19,20),J=1,2),(VOIC(18,I,2),I=1,2)
406 FORMAT(6X,'FRICTIONAL',4X,3(3X,F6,2,2X,F6,2))
WRITE(6,407)((VOIC(I,J,3),I=19,20),J=1,2),(VOIC(18,I,3),I=1,2)
407 FORMAT(6X,'NON-FRICTIONAL',3(3X,F6,2,2X,F6,2)'/)
WRITE(6,408)((XNASAL(I,J,1),I=19,20),J=1,2),
1 (XNASAL(18,I,1),I=1,2)
408 FORMAT(3X,'NASALITY',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,409)((XNASAL(I,J,2),I=19,20),J=1,2),
1 (XNASAL(18,I,2),I=1,2)
409 FORMAT(6X,'GRAVE',9X,3(3X,F6,2,2X,F6,2))
WRITE(6,410)((XNASAL(I,J,3),I=19,20),J=1,2),
1 (XNASAL(18,I,3),I=1,2)
410 FORMAT(6X,'ACUTE',9X,3(3X,F6,2,2X,F6,2)'/)
WRITE(6,411)((SUST(I,J,1),I=19,20),J=1,2),(SUST(18,I,1),I=1,2)
411 FORMAT(3X,'SUSTENTION',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,412)((SUST(I,J,2),I=19,20),J=1,2),(SUST(18,I,2),I=1,2)
412 FORMAT(6X,'VOICED',8X,3(3X,F6,2,2X,F6,2))
WRITE(6,413)((SUST(I,J,3),I=19,20),J=1,2),(SUST(18,I,3),I=1,2)
413 FORMAT(6X,'UNVOICED',6X,3(3X,F6,2,2X,F6,2)'/)
WRITE(6,414)((SIBIL(I,J,1),I=19,20),J=1,2),(SIBIL(18,I,1),I=1,2)
414 FORMAT(3X,'SIBILATION',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,415)((SIBIL(I,J,2),I=19,20),J=1,2),(SIBIL(18,I,2),I=1,2)
WRITE(6,416)((SIBIL(I,J,3),I=19,20),J=1,2),(SIBIL(18,I,3),I=1,2)
WRITE(6,417)((GRAY(I,J,1),I=19,20),J=1,2),(GRAY(18,I,1),I=1,2)
417 FORMAT(3X,'GRAVENESS',7X,3(3X,F6,2,2X,F6,2))
WRITE(6,418)((GRAY(I,J,2),I=19,20),J=1,2),(GRAY(18,I,2),I=1,2)
WRITE(6,419)((GRAY(I,J,3),I=19,20),J=1,2),(GRAY(18,I,3),I=1,2)
WRITE(6,420)((COMP(I,J,1),I=19,20),J=1,2),(COMP(18,I,1),I=1,2)
420 FORMAT(3X,'COMPACTNESS',6X,3(3X,F6,2,2X,F6,2))
WRITE(6,421)((COMP(I,J,2),I=19,20),J=1,2),(COMP(18,I,2),I=1,2)
WRITE(6,422)((COMP(I,J,3),I=19,20),J=1,2),(COMP(18,I,3),I=1,2)
WRITE(6,423)((TOT(I,J),J=1,2),I=1,3)
423 FORMAT(3X,'TOTALS',I2X,3(3X,F6,2,2X,F6,2))
WRITE(6,424)(TOT(3,J),J=1,2)
424 FORMAT('30X,1*****')
1 30X,' MEAN =',F6,2,' '
1 13X,'TOTAL DRT SCORE =',I2X,' '
1 30X,' SE =',F6,2,' '
1 30X,'*****')
NUMTOT = 192*NUML*NUMS
WRITE(6,555)NUMTOT
555 FORMAT('10X,TOTAL NUMBER OF TEST ITEMS =',I7)
600 CONTINUE
STOP
END

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14      IF (IROW,LE,15)GOTO 31  
        GOTO 29  
        IF (IPASS ,EQ,2)RETURN  
        IPASS = 2  
        GOTO 28  
        END
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WRITE(6,270)(NPAGE(1,J,3),J=1,2)
WRITE(6,280)(NPAGE(2,J,1),J=1,2)
WRITE(6,281)(NPAGE(2,J,2),J=1,2)
WRITE(6,282)(NPAGE(2,J,3),J=1,2)
WRITE(6,283)(NPAGE(3,J,1),J=1,2)
WRITE(6,284)(NPAGE(3,J,2),J=1,2)
WRITE(6,285)(NPAGE(3,J,3),J=1,2)
WRITE(6,286)(NPAGE(4,J,1),J=1,2)
WRITE(6,284)(NPAGE(4,J,2),J=1,2)
WRITE(6,285)(NPAGE(4,J,3),J=1,2)
WRITE(6,287)(NPAGE(5,J,1),J=1,2)
WRITE(6,284)(NPAGE(5,J,2),J=1,2)
WRITE(6,285)(NPAGE(5,J,3),J=1,2)
WRITE(6,288)(NPAGE(6,J,1),J=1,2)
WRITE(6,284)(NPAGE(6,J,2),J=1,2)
WRITE(6,285)(NPAGE(6,J,3),J=1,2)
02420,0110800,014
21  FORMAT(10X,15,5X,15)
4   CONTINUE
2   CONTINUE
DO 200 LIST=1,NUML
02420,0110800,014
WRITE(6,500)
WRITE(6,1)(ISYS(I),I=1,50),NUML,NUMS
WRITE(6,201)(NAME(LIST,I),I=1,24)
201  FORMAT(13X,27(' ')/'FOR LISTENER: ',24A1,' *1/
1   13X,27(' ')//
1   'SPKR SCORE'/)
DO 204 ISPKR=1,NUMS
SUM = 0.0
DO 202 I=1,31,6
J=I+1
202  SUM = SUM + DATA(LIST,ISPKR,I) + DATA(LIST,ISPKR,J)
SUM = SUM/12.0
WRITE(6,203)MSPK(LIST,ISPKR),SUM
203  FORMAT(1X,A2,1X,F7.2)
204  CONTINUE
WRITE(6,403)
WRITE(6,404)
DO 209 I=1,6
209  SEND(1)=0.0
DO 210 I=1,35,2
J=I+1
DO 211 K=1,NUMS
ARRAY(K)=DATA(LIST,K,I)
CALL STATS(NUMS,X,3)
SEND(1)=X
SEND(2)=S
DO 212 K=1,NUMS
212  ARRAY(K)=DATA(LIST,K,J)
CALL STATS(NUMS,X,3)
SEND(3)=X
SEND(4)=S
DO 213 K=1,NUMS
213  ARRAY(K)=(ARRAY(K)+DATA(LIST,K,I))/2.0
CALL STATS(NUMS,X,3)
SEND(5)=X
SEND(6)=S
CALL OUT(I,SEND)
210  CONTINUE
DO 215 K=1,NUMS
SUM = 0.0
DO 214 I=1,31,6
214  SUM = SUM + DATA(LIST,K,I)

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215  ARRAY(K) = SUM/6.0
    CALL STATS(NUMS,X,S)
    SEND(1)=X
    SEND(2)=S
    DO 216 K=1,NUMS
    SUM = 0.0
    DO 217 I=2,32,6
217  SUM = SUM + DATA(LIST,K,I)
218  ARRAY(K) = SUM/6.0
    CALL STATS(NUMS,X,S)
    SEND(3) = X
    SEND(4) = S
    DO 219 K=1,NUMS
    SUM = 0.0
    DO 218 I=1,31,6
    J = I+1
218  SUM = SUM + DATA(LIST,K,I) + DATA(LIST,K,J)
219  ARRAY(K) = SUM/12.0
    CALL STATS(NUMS,X,S)
    SEND(5) = X
    SEND(6) = S
    CALL OUT(36,SEND)
    WRITE(6,400)X,S
200  CONTINUE
    DO 300 ISPKR = 1,NUMS
    N2420,01160000,014
    WRITE(6,500)
    WRITE(6,1)(ISYS(I),I=1,50),NUML,NUMS
    WRITE(6,301)MSPK(1,ISPKR)
301  FORMAT(12X,'*****'/FOR SPEAKER: 'A2,' '*/
    1 12X,'*****'//LISTENER',10X,'SCORE'/)
    DO 304 LIST = 1,NUML
    SUM = 0.0
    DO 302 I=1,31,6
    J=I+1
302  SUM = SUM+DATA(LIST,ISPKR,I)+DATA(LIST,ISPKR,J)
    SUM = SUM/12.0
    WRITE(6,303)(NAME(LIST,L),L=1,24),SUM
303  FORMAT(24A1,F7,2)
304  CONTINUE
    WRITE(6,403)
    WRITE(6,404)
    DO 310 I=1,35,2
    J=I+1
    DO 311 K=1,NUML
311  ARRAY(K)=DATA(K,ISPKR,I)
    CALL STATS(NUML,X,S)
    SEND(1)=X
    SEND(2)=S
    DO 312 K=1,NUML
312  ARRAY(K)=DATA(K,ISPKR,J)
    CALL STATS(NUML,X,S)
    SEND(3)=X
    SEND(4)=S
    DO 313 K=1,NUML
313  ARRAY(K) = (ARRAY(K)+DATA(K,ISPKR,I))/2.0
    CALL STATS(NUML,X,S)
    SEND(5)=X
    SEND(6)=S
    CALL OUT(1,SEND)
310  CONTINUE
    DO 315 K=1,NUML
    SUM = 0.0
    DO 314 I=1,31,6

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```

314 SUM = SUM + DATA(K,ISPKR,I)
315 ARRAY(K) = SUM/6,0
CALL STATS(NUML,X,S)
SEND(1)=X
SEND(2)=S
DO 316 K=1,NUML
SUM = 0,0
DO 317 I=2,32,6
317 SUM = SUM+DATA(K,ISPKR,I)
318 ARRAY(K)=SUM/6,0
CALL STATS(NUML,X,S)
SEND(3)=X
SEND(4)=S
DO 319 K=1,NUML
SUM = 0,0
DO 318 I=1,31,6
J=I+1
319 SUM = SUM+DATA(K,ISPKR,I)+DATA(K,ISPKR,J)
319 ARRAY(K)=SUM/12,0
CALL STATS(NUML,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(36,SEND)
WRITE(6,490)X,S
300 CONTINUE
0242H,0110000,014
WRITE(6,500)
WRITE(6,1)(ISYS(I),I=1,50),NUML,NUMS
WRITE(6,320)
320 FORMAT('COMBINED RESULTS - STANDARD ERRORS ACROSS ',
1 'SPEAKERS AND LISTENERS *****'//)
WRITE(6,403)
WRITE(6,404)
NUMT = NUML*NUMS
DO 321 L=1,35,2
J=I+1
DO 322 K=1,NUML
DO 322 L=1,NUMS
M=NUMS*(K-1)+L
322 ARRAY(M)=DATA(K,L,I)
CALL STATS(NUMT,X,S)
SEND(1)=X
SEND(2)=S
DO 323 K=1,NUML
DO 323 L=1,NUMS
M=NUMS*(K-1)+L
323 ARRAY(M)=DATA(K,L,J)
CALL STATS(NUMT,X,S)
SEND(3)=X
SEND(4)=S
DO 324 K=1,NUML
DO 324 L=1,NUMS
M=NUMS*(K-1)+L
SUM = DATA(K,L,1)+DATA(K,L,J)
324 ARRAY(M)=SUM/2,0
CALL STATS(NUMT,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(1,SEND)
321 CONTINUE
DO 325 K=1,NUML
DO 325 L=1,NUMS
M=NUMS*(K-1)+L

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```

SUM = 0.0
DO 326 I=1,31,6
326 SUM = SUM+DATA(K,L,I)
325 ARRAY(M)=SUM/6.0
CALL STATS(NUMT,X,S)
SEND(1)=X
SEND(2)=S
DO 327 K=1,NUML
DO 327 L=1,NUMS
M=NUMS*(K-1)+L
SUM=0.0
DO 328 I=2,32,6
328 SUM = SUM + DATA(K,L,I)
327 ARRAY(M)=SUM/6.0
CALL STATS(NUMT,X,S)
SEND(J)=X
SEND(4)=S
DO 330 K=1,NUML
DO 330 L=1,NUMS
M=NUMS*(K-1)+L
SUM=0.0
DO 331 I=1,31,6
J=I+1
331 SUM = SUM+DATA(K,L,I)+DATA(K,L,J)
330 ARRAY(M)=SUM/12.0
CALL STATS(NUMT,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(36,SEND)
WRITE(6,490)X,S
02420,0110000,014
WRITE(6,500)
WRITE(6,1)(1SY8(I),I=1,50),NUML,NUMS
DO 70 I=1,NUML
DO 70 J=1,NUMS
WRITE(6,71)(DATA(I,J,K),K=1,36)
71 FORMAT(/(6(2X,F10.2)))
70 CONTINUE
STOP
276 FORMAT(10X,'MAIN ATTRIBUTE:',10X,'PRESENT',7X,'ABSENT'//)
277 FORMAT(15X,'VOICING',23X,12,11X,12)
278 FORMAT(20X,'FRICTIONAL',10X,12,11X,12)
279 FORMAT(20X,'NON-FRICTIONAL',12X,12,11X,12/)
280 FORMAT(15X,'NASALITY',22X,12,11X,12)
281 FORMAT(20X,'GRAVE',21X,12,11X,12)
282 FORMAT(20X,'ACUTE',21X,12,11X,12/)
283 FORMAT(15X,'SUSTENTION',20X,12,11X,12)
284 FORMAT(20X,'VOICED',20X,12,11X,12)
285 FORMAT(20X,'UNVOICED',10X,12,11X,12/)
286 FORMAT(15X,'SIBILATION',20X,12,11X,12)
287 FORMAT(15X,'GRAVENESS',21X,12,11X,12)
288 FORMAT(15X,'COMPACTNESS',19X,12,11X,12)
400 FORMAT('DRT MEANS AND STANDARD ERRORS FOR',13,' LISTENERS'//)
401 FORMAT('SYSTEM UNDER TEST: ',50A1/)
402 FORMAT('NUMBER OF SPEAKERS =',12/)
403 FORMAT(//'MAIN ATTRIBUTE:',12X,'PRESENT',10X,'ABSENT',
1 12X,'TOTAL'//)
404 FORMAT(20X,3(4X,'MEAN',8,E,' '))
405 FORMAT(/30X,'*****'/
1 30X,' MEAN = ',F6.2,' ' //
1 13X,'TOTAL DRT SCORE =',15X,' ' //
1 30X,' S.E. = ',F6.2,' ' //
1 30X,'*****')
END

```

C
C
C
C
C

SUBROUTINE STATS(N,XMEAN,STDERR)

C
C
C

```

COMMON ARRAY(60)
X=0.0
XN = FLOAT(N)
DO 1 I=1,N
  X = X + ARRAY(I)
1  CONTINUE
XMEAN = X/XN
STDERR = 0.0
DO 2 I=1,N
  STDERR = STDERR + (ARRAY(I)-XMEAN)*(ARRAY(I)-XMEAN)
2  STDERR = SQRT(STDERR/XN/XN)
RETURN
END

```

C
C
C
C
C
C
C

```

SUBROUTINE OUT(N,X)
DIMENSION X(6)
IF(N.EQ.30)GOTO 19
K=(N+1)/2
IF(K.EQ.11)K=8
IF(K.EQ.14)K=8
IF(K.EQ.17)K=8
IF(K.EQ.12)K=9
IF(K.EQ.15)K=9
IF(K.EQ.18)K=9
IF(K.EQ.13)K=11
IF(K.EQ.16)K=12
GOTO(1,2,3,4,5,6,7,8,9,10,13,16),K
1  WRITE(6,405)(X(I),I=1,6)
   RETURN
2  WRITE(6,406)(X(I),I=1,6)
   RETURN
3  WRITE(6,407)(X(I),I=1,6)
   RETURN
4  WRITE(6,408)(X(I),I=1,6)
   RETURN
5  WRITE(6,409)(X(I),I=1,6)
   RETURN
6  WRITE(6,410)(X(I),I=1,6)
   RETURN
7  WRITE(6,411)(X(I),I=1,6)
   RETURN
8  WRITE(6,412)(X(I),I=1,6)
   RETURN
9  WRITE(6,413)(X(I),I=1,6)
   RETURN
10 WRITE(6,414)(X(I),I=1,6)
   RETURN
13 WRITE(6,415)(X(I),I=1,6)

```

```

      RETURN
18  WRITE(6,416)(X(I),I=1,6)
      RETURN
19  WRITE(6,417)(X(I),I=1,6)
      RETURN
405  FORMAT(3X,'VOICING',9X,3(3X,F6.2,2X,F6.2))
406  FORMAT(6X,'FRICTIONAL',4X,3(3X,F6.2,2X,F6.2))
407  FORMAT(6X,'NON-FRICTIONAL',3(3X,F6.2,2X,F6.2)/)
408  FORMAT(3X,'NASALITY',8X,3(3X,F6.2,2X,F6.2))
409  FORMAT(6X,'GRAVE',9X,3(3X,F6.2,2X,F6.2))
410  FORMAT(6X,'ACUTE',9X,3(3X,F6.2,2X,F6.2)/)
411  FORMAT(3X,'SUSTENTION',6X,3(3X,F6.2,2X,F6.2))
412  FORMAT(6X,'VOICED',8X,3(3X,F6.2,2X,F6.2))
413  FORMAT(6X,'UNVOICED',6X,3(3X,F6.2,2X,F6.2)/)
414  FORMAT(3X,'SIBILATION',6X,3(3X,F6.2,2X,F6.2))
415  FORMAT(3X,'GRAVENESS',7X,3(3X,F6.2,2X,F6.2))
416  FORMAT(3X,'COMPACTNESS',5X,3(3X,F6.2,2X,F6.2))
417  FORMAT(3X,'TOTALS',10X,3(3X,F6.2,2X,F6.2))
      END

```

DIAGNOSTIC RHYME TEST

LISTENER SUMMARIES:

SAMPLE TEST RUN

LISTENER 1 SPEAKER KEY DOE, JOHN
 BV 1028
 JE 113A

NUMBER OF CORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	32,00	29,00
FRICTIONAL	16,00	13,00
NON-FRICTIONAL	16,00	16,00
NASALITY	31,00	30,00
GRAVE	16,00	13,00
ACUTE	15,00	15,00
SUSTENTION	24,00	25,00
VOICED	13,00	11,00
UNVOICED	11,00	14,00
SIBILATION	31,00	31,00
VOICED	15,00	16,00
UNVOICED	16,00	15,00
GRAVENESS	25,00	29,00
VOICED	15,00	16,00
UNVOICED	09,99	13,00
COMPACTNESS	32,00	29,00
VOICED	16,00	14,00
UNVOICED	16,00	15,00

SAMPLE TEST RUN

LISTENER	2	SPEAKER	KEY	JONES, ROBERT
		BV	1020	
		JE	113A	

NUMBER OF CORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	32.00	30.00
FRICTIONAL	16.00	16.00
NON-FRICTIONAL	16.00	14.00
NASALITY	32.00	31.00
GRAVE	16.00	15.00
ACUTE	16.00	16.00
SUSTENTION	25.00	26.00
VOICED	11.00	12.00
UNVOICED	14.00	14.00
SIBILATION	28.00	32.00
VOICED	14.00	16.00
UNVOICED	14.00	16.00
GRAVENESS	31.00	29.00
VOICED	16.00	16.00
UNVOICED	15.00	13.00
COMPACTNESS	32.00	32.00
VOICED	16.00	16.00
UNVOICED	16.00	16.00

SAMPLE TEST RUN
 LISTENER 1 PERCENT CORRECT WITH GUESSING TRANSFORMATION
 DUE, JOHN

MAIN ATTRIBUTE1	PRESENT	ABSENT
VOICING	000,00	01,25
FRICTIONAL	000,00	02,50
NON-FRICTIONAL	000,00	000,00
NASALITY	03,75	07,00
GRAVE	000,00	07,50
ACUTE	07,50	07,50
SUSTENTION	50,00	56,25
VOICED	02,50	37,00
UNVOICED	37,50	75,00
SIBILATION	03,75	03,75
VOICED	07,50	000,00
UNVOICED	000,00	07,50
GRAVENESS	56,25	01,25
VOICED	07,50	000,00
UNVOICED	25,00	02,50
COMPACTNESS	000,00	01,25
VOICED	000,00	75,00
UNVOICED	000,00	07,50

SAMPLE TEST RUN
 LISTENER 2 PERCENT CORRECT WITH GUESSING TRANSFORMATION
 JONES, ROBERT

MAIN ATTRIBUTE	PRESENT	ABSENT
VOICING	899,99	97,50
FRICTIONAL	899,99	899,99
NON-FRICTIONAL	899,99	75,00
NASALITY	899,99	93,75
GRAVE	899,99	87,00
ACUTE	899,99	899,99
SUSTENTION	88,25	82,50
VOICED	37,50	50,00
UNVOICED	75,00	75,00
SIBILATION	75,00	899,99
VOICED	75,00	899,99
UNVOICED	75,00	899,99
GRAVENESS	93,75	81,25
VOICED	899,99	899,99
UNVOICED	87,00	82,50
COMPACTNESS	899,99	899,99
VOICED	899,99	899,99
UNVOICED	899,99	899,99

DRT MEANS AND STANDARD ERRORS FOR 2 LISTENERS

SYSTEM UNDER TEST: SAMPLE TEST RUN

NUMBER OF SPEAKERS = 2

LISTENER MEAN DRT

1 81,25 DOE, JOHN
2 87,50 JONES, ROBERT

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899,99	0,00	84,37	2,21	92,19	1,10
FRICTIONAL	899,99	0,00	81,25	13,26	90,62	6,63
NON-FRICTIONAL	899,99	0,00	87,50	8,84	93,75	4,42
NASALITY	96,87	2,21	98,62	2,21	93,75	2,21
GRAVE	899,99	0,00	87,50	8,84	93,75	8,84
ACUTE	93,75	4,42	93,75	4,42	93,75	4,42
SUSTENTION	53,12	2,21	58,37	2,21	56,25	2,21
VOICED	50,00	8,84	43,75	4,42	46,87	2,21
UNVOICED	56,25	13,26	75,00	8,84	65,62	6,63
SIBILATION	84,37	6,63	96,87	2,21	90,62	2,21
VOICED	81,25	4,42	899,99	0,00	90,62	2,21
UNVOICED	87,50	8,84	93,75	4,42	90,62	2,21
GRAVENESS	75,00	13,26	81,25	8,84	78,12	6,63
VOICED	93,75	4,42	899,99	0,00	96,87	2,21
UNVOICED	56,25	22,10	62,50	8,84	59,37	11,05
COMPACTNESS	899,99	0,00	98,62	6,63	96,31	3,31
VOICED	899,99	0,00	87,50	8,84	93,75	4,42
UNVOICED	899,99	0,00	93,75	4,42	96,87	2,21
TOTALS	84,90	1,84	83,85	2,56	84,37	2,21

* MEAN = 84,37 *
TOTAL DRT SCORE: *
* S.E. = 2,21 *

TOTAL NUMBER OF TEST ITEMS = 760

DNT MEANS AND STANDARD ERRORS FOR 2 LISTENERS

SYSTEM UNDER TEST: SAMPLE TEST RUN

NUMBER OF SPEAKERS = 2

LISTENER MEAN DNT
 1 81.25 DOE, JOHN
 2 87.50 JONES, ROBERT

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899.99	0.00	84.37	2.21	92.19	1.10
FRICTIONAL	899.99	0.00	81.25	13.26	90.82	6.63
NON-FRICTIONAL	899.99	0.00	87.50	8.84	93.75	4.42
NASALITY	96.87	2.21	90.62	2.21	93.75	2.21
GRAVE	899.99	0.00	87.50	0.00	93.75	0.00
ACUTE	93.75	4.42	93.75	4.42	93.75	4.42
SUSTENTATION	53.12	2.21	59.37	2.21	56.25	2.21
VOICED	50.00	8.84	43.75	4.42	46.87	2.21
UNVOICED	56.25	13.26	75.00	0.00	65.62	6.63
SIBILATION	84.37	6.63	96.87	2.21	90.62	2.21
VOICED	81.25	4.42	899.99	0.00	90.62	2.21
UNVOICED	87.50	8.84	93.75	4.42	90.62	2.21
GRAVENESS	75.00	13.26	81.25	0.00	78.12	6.63
VOICED	93.75	4.42	899.99	0.00	96.87	2.21
UNVOICED	56.25	22.10	62.50	0.00	59.37	11.05
COMPACTNESS	899.99	0.00	90.62	6.63	95.31	3.31
VOICED	899.99	0.00	87.50	8.84	93.75	4.42
UNVOICED	899.99	0.00	93.75	4.42	96.87	2.21
TOTALS	84.90	0.00	83.85	0.00	84.37	2.21

 • MEAN = 84.37 •
 • S.E. = 2.21 •

TOTAL NUMBER OF TEST ITEMS = 768

SAMPLE TEST RUN

NUMBER LISTENERS • 2
NUMBER SPEAKERS • 2

LISTENER: DOE, JOHN • SPEAKER: • BV •

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	2
FRICTIONAL	0	2
NON-FRICTIONAL	0	0
NASALITY	1	2
GRAVE	0	1
ACUTE	1	1
SUSTENTION	5	3
VOICED	2	1
UNVOICED	3	2
SIBILATION	1	1
VOICED	1	0
UNVOICED	0	1
GRAVENESS	4	2
VOICED	1	0
UNVOICED	3	2
COMPACTNESS	0	3
VOICED	0	2
UNVOICED	0	1

SAMPLE TEST RUN

NUMBER LISTENERS • 2
NUMBER SPEAKERS • 2

LISTENER: DUE, JOHN • SPEAKER: • JE •

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	1
FRICTIONAL	0	1
NON-FRICTIONAL	0	0
NASALITY	0	0
GRAVE	0	0
ACUTE	0	0
SUSTENTION	3	4
VOICED	1	4
UNVOICED	2	0
SIBILATION	0	0
VOICED	0	0
UNVOICED	0	0
GRAVENESS	3	1
VOICED	0	0
UNVOICED	3	1
COMPACTNESS	0	0
VOICED	0	0
UNVOICED	0	0

SAMPLE TEST RUN

NUMBER LISTENERS : 2
NUMBER SPEAKERS : 2

LISTENER: JONES, ROBERT * SPEAKER: * BV *

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	0
FRICTIONAL	0	0
NON-FRICTIONAL	0	0
NASALITY	0	0
GRAVE	0	0
ACUTE	0	0
SUSTENTION	3	4
VOICED	3	2
UNVOICED	0	2
SIBILATION	2	0
VOICED	2	0
UNVOICED	0	0
GRAVENESS	0	2
VOICED	0	0
UNVOICED	0	2
COMPACTNESS	0	0
VOICED	0	0
UNVOICED	0	0

SAMPLE TEST RUN

NUMBER LISTENERS = 2
NUMBER SPEAKERS = 2

LISTENER: JONES, ROBERT * SPEAKER: * JE *

NUMBER OF INCORRECT RESPONSES:

MAIN ATTRIBUTE:	PRESENT	ABSENT
VOICING	0	2
FRICTIONAL	0	0
NON-FRICTIONAL	0	2
NASALITY	0	1
GRAVE	0	1
ACUTE	0	0
SUSTENTION	4	2
VOICED	2	2
UNVOICED	2	0
SIBILATION	2	0
VOICED	0	0
UNVOICED	2	0
GRAVENESS	1	1
VOICED	0	0
UNVOICED	1	1
COMPACTNESS	0	0
VOICED	0	0
UNVOICED	0	0

SAMPLE TEST RUN

NUMBER LISTENERS = 2
NUMBER SPEAKERS = 2

FOR LISTENER: DOE, JOHN

SPKR SCORE

GV 75.00
JE 87.50

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	009.99	0.00	81.25	4.42	90.62	2.21
FRICTIONAL	009.99	0.00	62.50	8.84	81.25	4.42
NON-FRICTIONAL	009.99	0.00	009.99	0.00	009.99	0.00
NASALITY	93.75	4.42	87.50	8.84	90.62	6.63
GRAVE	009.99	0.00	87.50	8.84	93.75	4.42
ACUTE	87.50	8.84	87.50	8.84	87.50	8.84
SUSTENTION	50.00	8.84	56.25	4.42	53.12	2.21
VOICED	62.50	8.84	37.50	26.52	50.00	8.84
UNVOICED	37.50	8.84	75.00	17.68	56.25	13.26
SIBILATION	93.75	4.42	93.75	4.42	93.75	4.42
VOICED	87.50	8.84	009.99	0.00	93.75	4.42
UNVOICED	009.99	0.00	87.50	8.84	93.75	4.42
GRAVENESS	56.25	4.42	81.25	4.42	68.75	4.42
VOICED	87.50	8.84	009.99	0.00	93.75	4.42
UNVOICED	25.00	0.00	62.50	8.84	43.75	4.42
COMPACTNESS	009.99	0.00	81.25	13.26	90.62	6.63
VOICED	009.99	0.00	75.00	17.68	87.50	8.84
UNVOICED	009.99	0.00	87.50	8.84	93.75	4.42
TOTALS	82.29	3.08	88.21	5.16	81.25	4.42

TOTAL DRT SCORE:

* MEAN * 81.25 *
*
* S.E. * 4.42 *

SAMPLE TEST RUN

NUMBER LISTENERS * 2
NUMBER SPEAKERS * 2

FOR LISTENER: JONES, ROBERT *

SPKM SCORE

BV 88.54
JE 86.46

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899.99	0.88	87.50	8.84	93.75	4.42
FRICTIONAL	899.99	0.00	899.99	0.00	899.99	0.00
NON-FRICTIONAL	899.99	0.00	75.00	17.68	87.50	8.84
NASALITY	899.99	0.00	93.75	4.42	96.87	2.21
GRAVE	899.99	0.00	87.50	8.84	93.75	4.42
ACUTE	899.99	0.00	899.99	0.00	899.99	0.00
SUSTENTATION	56.25	4.42	62.50	8.84	59.37	2.21
VOICED	37.50	8.84	50.00	0.00	43.75	4.42
UNVOICED	75.00	17.68	75.00	17.68	75.00	0.00
SIBILATION	75.00	0.00	899.99	0.00	87.50	8.84
VOICED	75.00	17.68	899.99	0.00	87.50	8.84
UNVOICED	75.00	17.68	899.99	0.00	87.50	8.84
GRAVENESS	93.75	4.42	81.25	4.42	87.50	0.00
VOICED	899.99	0.00	899.99	0.00	899.99	0.00
UNVOICED	87.50	8.84	82.50	8.84	75.00	0.00
COMPACTNESS	899.99	0.00	899.99	0.00	899.99	0.00
VOICED	899.99	0.00	899.99	0.00	899.99	0.00
UNVOICED	899.99	0.00	899.99	0.00	899.99	0.00
TOTALS	87.50	1.47	87.50	0.00	87.50	0.74

TOTAL DRI SCORE: * MEAN * 87.50 *
 * S.E. * 0.74 *

SAMPLE TEST RUN

NUMBER LISTENERS * 2
NUMBER SPEAKERS * 2

FOR SPEAKER: BV *

LISTENER	SCORE
ODE, JOHN	75.00
JONES, ROBERT	88.54

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899.99	0.00	87.50	0.84	93.75	4.42
FRICTIONAL	899.99	0.00	75.00	17.68	87.50	8.84
NON-FRICTIONAL	899.99	0.00	899.99	0.00	899.99	0.00
NASALITY	93.75	4.42	87.50	0.84	90.62	6.63
GRAVE	899.99	0.00	87.50	0.84	93.75	4.42
ACUTE	87.50	0.84	87.50	0.84	87.50	0.84
SUSTENTION	50.00	0.84	56.25	4.42	53.12	2.21
VOICED	37.50	0.84	62.50	0.84	50.00	0.84
UNVOICED	62.50	26.52	50.00	0.00	56.25	13.26
SIBILATION	81.25	4.42	83.75	4.42	87.50	0.80
VOICED	62.50	0.84	899.99	0.00	81.25	4.42
UNVOICED	899.99	0.00	87.50	0.84	93.75	4.42
GRAVENESS	75.00	17.68	75.00	0.00	75.00	0.84
VOICED	87.50	0.84	899.99	0.00	93.75	4.42
UNVOICED	62.50	26.52	50.00	0.00	56.25	13.26
COMPACTNESS	899.99	0.00	81.25	13.26	90.62	6.63
VOICED	899.99	0.00	75.00	17.68	87.50	0.84
UNVOICED	899.99	0.00	87.50	0.84	93.75	4.42
TOTALS	83.33	4.42	86.21	5.16	81.77	4.79

TOTAL DRY SCORE: * MEAN * 81.77 *
* S.E. * 4.79 *

SAMPLE TEST RUN

NUMBER LISTENERS • 2
NUMBER SPEAKERS • 2

FOR SPEAKER: JE •

LISTENER	SCORE
QUE, JOHN	87,50
JONES, ROBERT	86,46

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899,99	0,00	81,25	4,42	90,62	2,21
FRICTIONAL	899,99	0,00	87,50	0,84	93,75	4,42
NON-FRICTIONAL	899,99	0,00	75,00	17,68	87,50	0,84
NASALITY	899,99	0,00	93,75	4,42	96,87	2,21
GRAVE	899,99	0,00	87,50	0,84	93,75	4,42
ACUTE	899,99	0,00	899,99	0,00	899,99	0,00
SUSTENTION	56,25	4,42	62,50	0,84	59,37	2,21
VOICED	62,50	0,84	25,00	17,68	43,75	4,42
UNVOICED	50,00	0,00	899,99	0,00	75,00	0,00
SIBILATION	87,50	0,84	899,99	0,00	93,75	4,42
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	75,00	17,68	899,99	0,00	87,50	0,84
GRAVENESS	75,00	0,84	87,50	0,00	81,25	4,42
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	50,00	17,68	75,00	0,00	62,50	0,84
COMPACTNESS	899,99	0,00	899,99	0,00	899,99	0,00
VOICED	899,99	0,00	899,99	0,00	899,99	0,00
UNVOICED	899,99	0,00	899,99	0,00	899,99	0,00
TOTALS	86,46	0,74	87,50	0,00	86,98	0,37

• MEAN • 86,98 •
TOTAL DRT SCORE: •
• S.E. • 0,37 •

SAMPLE TEST RUN

NUMBER LISTENERS • 2
NUMBER SPEAKERS • 2

COMBINED RESULTS • STANDARD ERRORS ACROSS SPEAKERS AND LISTENERS *****

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	899.99	0.00	84.37	5.18	92.19	2.59
FRICTIONAL	899.99	0.00	81.25	10.36	98.62	5.18
NON-FRICTIONAL	899.99	0.00	87.50	10.83	93.75	5.41
NASALITY	98.87	2.71	98.62	5.18	93.75	3.83
GRAVE	899.99	0.00	87.50	6.25	93.75	5.18
ACUTE	93.75	5.41	93.75	5.41	93.75	5.41
SUSTENTION	53.12	5.18	59.37	5.18	56.25	2.21
VOICED	58.88	8.84	43.75	13.62	46.87	5.18
UNVOICED	56.25	13.62	75.00	12.50	65.62	8.12
SIBILATION	84.37	5.18	98.87	2.71	98.62	2.71
VOICED	81.25	10.36	899.99	0.00	98.62	5.18
UNVOICED	87.50	10.83	93.75	5.41	98.62	5.18
GRAVENESS	75.00	9.08	81.25	3.12	78.12	5.18
VOICED	93.75	5.41	899.99	0.00	98.87	2.71
UNVOICED	56.25	16.24	82.50	6.25	59.37	8.12
COMPACTNESS	899.99	0.00	98.62	8.12	98.31	4.00
VOICED	899.99	0.00	87.50	10.83	93.75	5.41
UNVOICED	899.99	0.00	93.75	5.41	98.87	2.71
TOTALS	84.98	2.37	83.85	3.16	84.37	2.73

TOTAL DRT SCORE:

• MEAN • 84.37 •
•
• S.E. • 2.73 •

Appendix C

Diagnostic Rhyme Test
Scoring Software
and
Sample Printout
PDP-11 Implementation

PRECEDING PAGE BLANK-NOT FILMED

** RSX-11M VMS **
 ** RSX-11M VMS **
 ** RSX-11M VMS **

21-MAR-78
 21-MAR-78
 21-MAR-78

13147159
 13147159
 13147159

DPAI (200,200)XXX,FTN,171
 DPAI (200,200)XXX,FTN,171
 DPAI (200,200)XXX,FTN,171

X X X X X
 X X X X X
 X X X X X
 X X X X X
 X X X X X
 X X X X X
 X X X X X
 X X X X X

::
 ::

FFFFF TTTTT N N 11 1 7777 1
 F T N N 11 11 7 11
 F T NN N 11 1 7 1
 FFFF T N N N 11 1 7 1
 F T N NN 11 1 7 1
 F T N N 1 1 7 1
 F T N N 1 111 7 111

** RSX-11M VMS **
 ** RSX-11M VMS **
 ** RSX-11M VMS **

21-MAR-78
 21-MAR-78
 21-MAR-78

13147159
 13147159
 13147159

DPAI (200,200)XXX,FTN,171
 DPAI (200,200)XXX,FTN,171
 DPAI (200,200)XXX,FTN,171

C

```

      DIMENSION IBITS(16),IPACK(4)
      DIMENSION ISYS(4),INDLST(4),ISPK(2),ILISTN(4),
XICOL1(20),ICOL2(20)
      DIMENSION IEQUIV(74)
      DIMENSION IALPH(26)
      DIMENSION NLTO(23),IERR(23),KEYN(12),KEYL(12),KSPK1(12)
      DIMENSION KSPK2(12),NAME(4),LSYS(2),IHEAD(30)
      EQUIVALENCE (IRECNO,IEQUIV(1)),(IPGNO,IEQUIV(2)),
X(ISYS(1),IEQUIV(3)),(INDLST(1),IEQUIV(7)),(ISPK(1),IEQUIV(11)),
X(ILISTN(1),IEQUIV(13)),(ICOL1(1),IEQUIV(17)),(ICOL2(1),IEQUIV(46))
      COMMON/PAGE/IPAGE(46,54)
      COMMON/ERRORS/IAWANT(54)
      DATA NMAX/74/
      DATA IBITS/'1','2','4','10','20','40','100','200','400','1000',
X'2000','4000','10000','20000','40000','100000'/
      DATA NAME(1),NAME(2),NAME(3),NAME(4)/'2HZ','R','R','R'/
      DATA NAMEC/'2HC'/
      DATA K114,K110,MASK,MASK1,IBLNK
X/'114','110','377','77','2H' /
      DATA IGNORE,ISTART,ISTOP,IOROP,IENDFL
X/'10000','100001','100002','100003','100010'/
      DATA IALPH(1),IALPH(2),IALPH(3),IALPH(4),IALPH(5),
X IALPH(6),IALPH(7),IALPH(8),IALPH(9),IALPH(10),
X IALPH(11),IALPH(12),IALPH(13),IALPH(14),IALPH(15),IALPH(16),
X IALPH(17),IALPH(18),IALPH(19),IALPH(20),IALPH(21),IALPH(22),
X IALPH(23),IALPH(24),IALPH(25),IALPH(26)
X /'1A','1B','1C','1D','1E','1F','1G','1H','1I','1J','1K','1L','1M','1N',
X '1O','1P','1Q','1R','1S','1T','1U','1V','1W','1X','1Y','1Z'/
      DATA NLTO
X/22,0150,0330,0023,1277,4006,6054,0067,3345,5154,1520,7121,3120,
X0000,7350,2250,5400,9403,9557,0170,3345,9049,0004/

```

C

```

      DO 50 KK=1,30
      IHEAD(KK)=IBLNK
50  IERR(KK)=0
      OU 40 KK=1,54
40  IAWANT(K)=0
      R0RSP=0.
      R0SPS=0.
      IRECNO=0
      IOPGNO=0
      IPTTF=1
      CALL ASSIGN(3,'OPR1')
      CALL ASSIGN(4,'LPH1')
      CALL ASSIGN(5,'TI1')
      CALL ASSIGN(6,'TI1')

```

C

```

      WRITE(6,107)
107  FORMAT(/1H0,'ENTER DATE OF TEST DD=MM=YY (15=NOV=77) 1')
      READ(5,571)(IHEAD(KK),KK=1,5)
571  FORMAT(4A2,A1)
      WRITE(6,572)(IHEAD(KK),KK=1,5)
572  FORMAT(1X,17H15 IS WHAT YOU SAID:.,. 1,4A2,A1)
      WRITE(6,100)
100  FORMAT(/1X,'ENTER HEADER INFO...A001')
      READ(5,100)(IHEAD(KK),KK=6,30)
100  FORMAT(20A2)
101  FORMAT(I1)
      WRITE(6,102)
102  FORMAT(/1X,100COPY TO DISK?,TYPE N FOR NO, 1 FOR YES)
      READ(5,101)IPOP11

```

```

WRITE(6,193)
193  FORMAT(//IX,'***COPY TO PRINTER?'.TYPE 6 FOR NO; 1 FOR YES')
      READ(5,195)IPOPLP
195  FORMAT(I2)
      IREPPOR
      IREST=0
      IREST=IREST
      WRITE(6,199)
199  FORMAT(//IX,'ENTER NLISTENERS,NSPEAKERS,NSYSTEM.,I2I2I4',
X/IX,'FOR EXAMPLE188881184 FOLLOWED BY CARRIAGE RETURN')
      READ(5,202)NL,NS,LSYS(1),LSYS(2)
202  FORMAT(I2,I2,A2,A2)
      NAME(2)=LSYS(2)
      DECODE(4,1999,LSYS)ISYS
1999  FORMAT(4I1)
      IF(IPOPLP.EQ.1)CALL ASSIGN(3,NAME)
      DO 318 K=1,NS
      WRITE(6,203)K
203  FORMAT(IX,'ENTER KEY AND SPEAKER (E,G,110288V) FOR SPEAKER',I2)
      READ(5,204)KEYN(K),KEYL(K),KSPK1(K),KSPK2(K)
204  FORMAT(I3,A1,A1,A1)
318  CONTINUE
      WRITE(6,205)(KEYN(K),KEYL(K),KSPK1(K),KSPK2(K),K=1,NS)
205  FORMAT(//IX,'CHECK THE KEYS...')(//IX,I3,A1,A1,A1)
      PAUSE '***** READY TO GO *****'
      KLCTR=0

C
1  CONTINUE
   CALL RDPAGE

C
1981  CONTINUE
      IRECNO=IRECNO+1

C
      IPGNO=0
      DO 2 K=1,4
      IF(IPAGE(1,K+50).EQ.1)IPGNO=IPGNO+K
2  CONTINUE
      IF(IPGNO.EQ.0)WRITE(6,206)
206  FORMAT(IX,'EOF. ENTER R TO GO OR 1 TO STOP')
      IF(IPGNO.EQ.0)READ(5,191)ISW
      IF(IPGNO.GT.4)PAUSE 'BAD PAGE#.FIX&RESUME'
      IF(IPGNO.GT.4)GO TO 1
      IF(((ISW.AND.1).EQ.1).AND.IPGNO.EQ.0)GO TO 9999
      IF(IPGNO.EQ.0)GO TO 1
      IF(IREST.EQ.1)GO TO 21
      IF(((IPGNO=IOPGNO).EQ.1).OR.((IPGNO=IOPGNO).EQ.-3))GO TO 21
      IF(IPGNO.EQ.1)GO TO 22
      WRITE(6,198)IOPGNO,IPGNO
198  FORMAT(//IX,'SEQUENCE ERROR PG ',I1,' TO ',I1)
      PAUSE 'LOAD RIGHT PAGE,RESUME'
      GO TO 7003
22  CONTINUE
471  FORMAT(IX,'DO YOU WANT TO END THE RUN? 0=N,1=Y')
      WRITE(6,194)
      WRITE(6,471)
      READ(5,191)IQFLO
      IF(IQFLO.EQ.1)GO TO 9999
194  FORMAT(IX,'REDUNDANT PAGE IGNORED..')
      GO TO 7003
21  CONTINUE
      IREST=0
      IOPGNO=IPGNO
      IF(IPGNO.NE.1)GO TO 41

```

```

C      KLCTR=KLCTR+1
C
C      IDSYS=1000+ISYS(1)+100+ISYS(2)+10+ISYS(3)+ISYS(4)
C
C      ITEMP=MOD(KLCTR-1,N8)+1
C      INDLST(1)=KEYN(ITEMP)/100
C      INDLST(2)=MOD((KEYN(ITEMP)/10),10)
C      INDLST(3)=MOD(KEYN(ITEMP),10)
C      INDLST(4)=KEYL(ITEMP).AND.MASK1
C
C      IDLIS=1000+INDLST(1)+10+INDLST(2)+INDLST(3)
C
C      DO 3002 KK=1,4
C      ILISTN(KK)=0
C      DO 3002 K=1,10
C      IF(IPAGE(KK+5,K+36),EQ,1) ILISTN(KK)=K+1
C      CONTINUE
3002  IDLIS=1000+ILISTN(1)+100+ILISTN(2)+10+ILISTN(3)+ILISTN(4)
C
C
C      ISPK(1)=KSPK1(ITEMP).AND.MASK1
C      ISPK(2)=KSPK2(ITEMP).AND.MASK1
C
C
C      9100  CONTINUE
C      ITEMP=NLID(1)+1
C      DO 9110 KK=2,ITEMP
C      IF(IDLIS,EQ,NLID(KK)) GO TO 9200
C      9110  CONTINUE
C      WRITE(6,9100) IDLIS
C      9100  FORMAT(/1X,'HEADER ERROR,BAD LISTENER ID ',I4/1X,
C      X'ENTER CORRECTED ID... EXAMPLE:56951)
C      READ(5,9093) (ILISTN(ITEMP),ITEMP=1,4)
C      9093  FORMAT(4I1)
C      IDLIS=1000+ILISTN(1)+100+ILISTN(2)+10+ILISTN(3)+ILISTN(4)
C      GO TO 9100
C      9200  CONTINUE
C      IF(IERR(KK),LT,0) IERR(KK)=0
C
C
C      41  CONTINUE
C
C      DO 5 KK=1,29
C      ISUM=0
C      IF(IPAGE(KK+14,8),EQ,1) ISUM=ISUM+4
C      IF(IPAGE(KK+14,9),EQ,1) ISUM=ISUM+3
C      IF(IPAGE(KK+14,10),EQ,1) ISUM=ISUM+2
C      IF(IPAGE(KK+14,11),EQ,1) ISUM=ISUM+1
C      IF(IPAGE(KK+14,13),EQ,1) ISUM=ISUM+1
C      IF(IPAGE(KK+14,14),EQ,1) ISUM=ISUM+2
C      IF(IPAGE(KK+14,15),EQ,1) ISUM=ISUM+3
C      IF(IPAGE(KK+14,16),EQ,1) ISUM=ISUM+4
C      IF(IPAGE(KK+14,3),EQ,1) ISUM=ISUM
C      ICOL1(KK)=MOD(KK,2)
C      IF(ISUM,LT,0) ICOL1(KK)=0
C      IF(ISUM,GT,0) ICOL1(KK)=1
C      RRSP=RRSP+1
C      IF(ISUM,NE,0) GO TO 501
C      RDRSP=RDRSP+1
C      ITEMP=NLID(1)+1
C      DO 51 K=2,ITEMP
C      IF(IDLIS,EQ,NLID(K)) IERR(K)=IERR(K)+1
C      51  CONTINUE

```

```

581 CONTINUE
6 CONTINUE
C
DO 6 KK=1,29
ISUM=0
IF(IPAGE(KK+14,39).EQ.1)ISUM=ISUM+4
IF(IPAGE(KK+14,40).EQ.1)ISUM=ISUM+3
IF(IPAGE(KK+14,41).EQ.1)ISUM=ISUM+2
IF(IPAGE(KK+14,42).EQ.1)ISUM=ISUM+1
IF(IPAGE(KK+14,43).EQ.1)ISUM=ISUM+1
IF(IPAGE(KK+14,44).EQ.1)ISUM=ISUM+2
IF(IPAGE(KK+14,45).EQ.1)ISUM=ISUM+3
IF(IPAGE(KK+14,46).EQ.1)ISUM=ISUM+4
IF(IPAGE(KK+14,47).EQ.1)ISUM=ISUM+4
IF(IPAGE(KK+14,48).EQ.1)ISUM=ISUM
ICOL2(KK)=MOD(KK,2)
IF(ISUM.LT.0)ICOL2(KK)=0
IF(ISUM.GT.0)ICOL2(KK)=1
RRSP8=RRSP8+1
IF(ISUM.NE.0)GO TO 601
RRORSP8=RRORSP8+1
ITEMP=NLID(1)+1
DO 62 K=2,ITEMP
IF(IDLIS.EQ.NLID(K))IERR(K)=IERR(K)+1
CONTINUE
52 CONTINUE
601 CONTINUE
6 CONTINUE
C
IF(IPOPLP.EQ.0)GO TO 7001
WRITE(4,90)IPGNO,IDSYS,IALPH(ISPK(1)),IALPH(ISPK(2)),
XIDLIS,IOWLIS,IALPH(IOWLST(4))
90 FORMAT(1H1/56X,5HPAGE ,11,5H OF 4/
X 1X,8HSYSTEM1 ,14/1X,8HSPEAKR1 ,2A1/1X,
X8MLISNR1 ,14/1X,8HMDLIST1 ,1S.A1////)
DO 7 K=1,29
IF((ICOL1(K).EQ.0).AND.(ICOL2(K).EQ.0))WRITE(4,91)K,K
IF((ICOL1(K).EQ.0).AND.(ICOL2(K).EQ.1))WRITE(4,92)K,K
IF((ICOL1(K).EQ.1).AND.(ICOL2(K).EQ.0))WRITE(4,93)K,K
IF((ICOL1(K).EQ.1).AND.(ICOL2(K).EQ.1))WRITE(4,94)K,K
91 FORMAT(5X,I2,3H...,10X,4HX ,16X,4HX ,10X,3H...,I2)
92 FORMAT(5X,I2,3H...,10X,4HX ,16X,4H X,10X,3H...,I2)
93 FORMAT(5X,I2,3H...,10X,4H X,16X,4HX ,10X,3H...,I2)
94 FORMAT(5X,I2,3H...,10X,4H X,16X,4H X,10X,3H...,I2)
7 CONTINUE
C
7001 CONTINUE
C
9 CONTINUE
IF(IPOP11.NE.1)GO TO 7003
IF(IPTTP1.EQ.0.OR.IIREBT.EQ.1)GO TO 910
IPTTP1=0
WRITE(3)NL,NS,(IHEAD(K),K=1,30)
WRITE(1)NL,NR,(IHEAD(K),K=1,30)
910 CONTINUE
WRITE(3)(IE JIV(K),K=1,NMAX)
DO 3701 K=1
IPACK(K)=0
DO 3702 K=1,3
DO 3702 NBIT=1,16
IF(IEQUIV(16*K+NBIT).NE.0)IPACK(K)=IPACK(K).OR.IBITS(NBIT)
3702 CONTINUE
DO 3703 K=4,4
DO 3703 NBIT=1,16
IF(IEQUIV(16*K+NBIT).NE.0)IPACK(K)=IPACK(K).OR.IBITS(NBIT)
3703 CONTINUE

```

```

3703  CONTINUE
      WRITE(1) (IEQUIV(K), K=1,10), (IPACK(K), K=1,4)
C
7003  CONTINUE
C
      GO TO 1
C
9999  CONTINUE
      RTEMP=(RBDOSP/RRSPS)+100
      WRITE(6,200)RBDOSP,RRSPS,RTEMP,INDSYS
200   FORMAT(/1X,' BAD MARKS, MARKS X ... ',F7.0,1X,F7.0,1X,F5.1,
X1X,'...SYSTEM # ',I4)
      ITEMP=NLID(1)+1
      DO 53 KK=2,ITEMP
      RTEMP=(IERR(KK)/RBDOSP)+100
      IF(IERR(KK).GE.0)WRITE(6,201)NLID(KK),IERR(KK),RTEMP
201   FORMAT(1X,'LISTENER ',I4.5X,I4.1' ERRORS',2X,' X',F5.1)
53    CONTINUE
      WRITE(6,9999)(MIN0(IAWANT(K),9), K=1,54)
9999  FORMAT(1X,10(5I1,1X),4I1)
      STOP '... FINISHED ...'
      END
      SUBROUTINE RDPAGE
C
      DIMENSION ICOM(3)
      COMMON/CHARB/ICHARB(500)
      COMMON/IOPAGE/IARRAY(4000)
      DATA ICOM/'001','005','021',ICR/'215',IEP/'012/
C
      IBASE=(((('170500'.AND.'77777')-'00000')/2)+1
C
      CALL WAIT(4,2,MOUMHY)
C
100   CONTINUE
      IARRAY(IBASE+2)='21
      IARRAY(IBASE+0)='21
      OLOTIM=SECND0(N.)
      DO 103 K=1,3
101   CONTINUE
      IF((IARRAY(IBASE+2).AND.'2001'.NE.'000')GO TO 102
      IF((SECND0(N.)=OLOTIM).LT.'.5')GO TO 101
      WRITE(6,1000)
1000  FORMAT(1X,'... OMR NOT RECEIVING. YOU MUST RESET OMR. ')
      PAUSE 'RES TO CONTINUE'
      GO TO 100
102   CONTINUE
      IARRAY(IBASE+3)=ICOM(K)
103   CONTINUE
C
      INX=1
      OLOTIM=SECND0(N.)
      CONTINUE
200   IF((IARRAY(IBASE+0).AND.'2001'.EQ.'000')GO TO 300
      ICHARB(INX)=IARRAY(IBASE+1).AND.'377
      TIME=SECND0(N.)
      OLOTIM=TIME
      IF((ICHARB(INX).EQ.ICR).AND.(INX.GT.1).AND.(ICHARB(INX-1)
X.EQ.IEP))GO TO 400
      INX=INX+1
      GO TO 200
200   CONTINUE
      IF((SECND0(N.)=OLOTIM).LE.11')GO TO 200
      WRITE(6,1001)

```

```

1001  FORMAT(1X,'*** OMR NOT SENDING EP/CR. YOU MUST RESET OMR AND RE
      XREAD THE PAGE!')
      PAUSE 'RES TO CONTINUE'
      GO TO 100
400   CONTINUE
      CALL SCAN(IERRFG,INX)
      IF(IERRFG.EQ.1)GO TO 100
      RETURN
      END
      SUBROUTINE SCAN(IERRFG,INX)
      DIMENSION IBITS(8)
      COMMON/CHARB/ICHARB(500)
      COMMON/PAGE/IPAGE(46,54)
      COMMON/ERRORS/IAWANT(54)
      DATA IBITS/'40','20','10','4','2','1'/
C
      IVAL(K)=ICHARB(K).AND,'77
C
      DO 99 K=1,46
      DO 99 KK=1,54
99     IPAGE(K,KK)=0
C
      IROW=1
      NPTR=0
100    CONTINUE
      NPTR=NPTR+1
      IF(ICHARB(NPTR).EQ.'215')GO TO 200
      IF(NPTR.LT.INX)GO TO 100
      STOP 'IMPOSSIBLE'
200    CONTINUE
      NPTR=NPTR
201    CONTINUE
      NPTR=NPTR+1
      IF(ICHARB(NPTR).EQ.'215')GO TO 300
      IF(NPTR.LT.INX)GO TO 201
      STOP 'IMPOSSIBLE'
300    CONTINUE
      N=((NPTR-NPTR)-1)/10
      NPTR=NPTR+1
      DO 301 KKK=1,N
      ITEMP=IVAL(NPTR+10*(KKK-1))
      IF(ITEMP.GT.IROW)GO TO 3001
      IAWANT(IROW+1)=IAWANT(IROW+1)+1
      GO TO 301
3001   CONTINUE
      IROW=ITEMP
      DO 301 K=1,9
      DO 301 KK=1,8
      IF((IBITS(KK).AND,ICHARB(NPTR+10*(KKK-1)+K)).NE.0)
XIPAGE(IROW+1,6*(K-1)+KK)=1
301    CONTINUE
      NPTR=NPTR+1
      IF(NPTR.LT.INX)GO TO 100
      IERRFG=0
      NROWER=0
      DO 401 K=15,43
      DO 400 KK=1,54
      IF(IPAGE(K,KK).EQ.1)GO TO 401
400    CONTINUE
      NROWER=NROWER+1
401    CONTINUE
      IF(NROWER.LE.1)RETURN
      WRITE(6,1000)NROWER

```

```

1000  FORMAT(1X,'... ',I2,' MISSED RESPONSE ROWS ON THIS PAGE, '/
      XIX, 'TYPE IN A 1 TO REREAD THE PA ... '/
      XIX, 'TYPE IN A 0 TO ACCEPT PAGE AS IS...')
      READ(5,1001)ITEMP
1001  FORMAT(I)
      IF(ITEMP.EQ.0)RETURN
      PAUSE 'RES TO CONTINUE'
      IERRFG=1
      RETURN
      END

```

** RSX=11M V03 **
 ** RSX=11M V03 **
 ** RSX=11M V03 **

21-MAR-78
 21-MAR-78
 21-MAR-78

13148154
 13148154
 13148154

OF01 (200,200) XFER,FTN1504
 OF01 (200,200) XFER,FTN1504
 OF01 (200,200) XFER,FTN1504

X X FFFFF EEEEE RRRR
 X X F E R R
 X X F E R R
 X FFFF EEEE RRRR
 X X F E R R
 X X F E R R
 X X F E R R
 X X F EEEE R R

FFFFF TTTT N N 11 5555 000 4 4
 F T N N 11 5 0 0 4 4
 F T N N 555 0 0 4 4
 FFFF T N N N 11 5 0 0 44444
 F T N N 11 5 0 0 4
 F T N N 1 5 5 0 4
 F T N N 1 555 000 4

** RSX=11M V03 **
 ** RSX=11M V03 **
 ** RSX=11M V03 **

21-MAR-78
 21-MAR-78
 21-MAR-78

13148154
 13148154
 13148154

OF01 (200,200) XFER,FTN1504
 OF01 (200,200) XFER,FTN1504
 OF01 (200,200) XFER,FTN1504

```

C
LOGICAL*1 KYRADL,KVGODL
DIMENSION IEQUIV(74)
DIMENSION NAME(4),LSYS(2),IMEAD(30),LDEL(20),LSDEL(6)
DIMENSION ISYS(4),IMDLST(4),ISPK(2),ILISTN(4),
X ICOL1(20),ICOL2(20)
EQUIVALENCE (IRECNO,IEQUIV(1)),(IPGNO,IEQUIV(2)),
X (ISYS(1),IEQUIV(3)),(IMDLST(1),IEQUIV(7)),
X (ISPK(1),IEQUIV(11)),(ILISTN(1),IEQUIV(13)),
X (ICOL1(1),IEQUIV(17)),(ICOL2(1),IEQUIV(45))
DATA MASK/"377",M100/"100"/
DATA IGNORE,ISTART,ISTOP,IOROP,IFNDEL
X /"100000","100001","100002","100003","100010"/
DATA NAME(1),NAME(2),NAME(3),NAME(4)/2HZ,,P,B,B/

```

```

C
CALL ASSIGN(3,'DF1')
CALL ASSIGN(4,'DF1')
CALL ASSIGN(5,'TI1')
CALL ASSIGN(6,'TI1')

```

```

KEYBADM=0
IOLIO=0
ICSP=0
IOSIO1=0
IOSIO2=0
DO 101 K=1,6
101 LSDEL(K)=0
DO 100 K=1,20
100 LDEL(K)=0

```

```

C
WRITE(6,100)
100 FORMAT(/1X,/
X1X,'ENTER SYSTEM ID ...I4')
READ(5,101)LSYS(1),LSYS(2)
101 FORMAT(A2,A2)
NAME(2)=LSYS(2)
DECODE(4,1000,LSYS)ISYSIN
1000 FORMAT(I4)
CALL ASSIGN(3,NAME)
READ(3)NL,NS,(IMEAD(K),K=1,30)
WRITE(6,1004)(IMEAD(K),K=1,30)
1004 FORMAT(/1X,30A2/)
WRITE(6,102)
102 FORMAT(/1X,'HOW MANY LISTENERS TO DELETE?..I2')
READ(5,103)NDEL
103 FORMAT(I2)
WRITE(6,100)
100 WRITE(6,100)
100 FORMAT(/1X,'HOW MANY SPEAKERS TO DELETE?..I2')
READ(5,103)NSDEL
IF(NSDEL.LE.0)GO TO 300
DO 300 K=1,NDEL
100 WRITE(6,104)
104 FORMAT(/1X,'ENTER LISTENER ID TO DELETE...I4')
READ(5,105)LDEL(K)
105 FORMAT(I4)
300 CONTINUE
300 CONTINUE
IF(NSDEL.LE.0)GO TO 310
DO 301 K=1,NSDEL
100 WRITE(6,100)
100 FORMAT(/1X,'ENTER SPEAKER TO DELETE...A2')
READ(5,109)LSDEL(K)
109 FORMAT(A2)

```

```

3001 CONTINUE
310 CONTINUE
WRITE(6,196)
196 FORMAT(/IX,'ENTER ANY INCORRECT-CORRECTED KEY PAIR (0 IF OK)')
READ(5,197)KYRAD,KYBADL,KYGOOD,KYGOODL
197 FORMAT(I3,A1,I3,A1)
NL=NL-NDEL
NS=NS-NSDEL
C
IF(ICSP.EQ.1)CALL CSPID(1,ISTART)
IDATA=ISYSID.AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=ISHFT(ISYSID,-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=NL.AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=ISHFT(NL,-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=NS.AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=ISHFT(NS,-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
DO 80 K=1,30
IDATA=ISHFT(IMEAD(K),-8)
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
IDATA=IMEAD(K).AND.MASK
IF(ICSP.EQ.1)CALL CSPID(1,IDATA)
80 CONTINUE
IF(ICSP.EQ.1)CALL CSPID(1,ISTOP)
IF(ICSP.EQ.0)WRITE(4,0000)ISYSID,NL,NS,(IMEAD(K),K=1,30)
0000 FORMAT(I4,I3,I3,30A2)
C
1 CONTINUE
READ(3,END=999)(IEQUIV(K),K=1,74)
IF(IPGND.NE.1)GO TO 2
ITLIO=1000+ILISTN(1)+100+ILISTN(2)+10+ILISTN(3)+ILISTN(4)
IDATA=ISHFT(((IEQUIV(12).AND.MASK)+M100),8)+
X(((IEQUIV(11).AND.MASK)+M100)
IF(NSDEL.LE.0)GO TO 100
DO 1001 K=1,NSDEL
IF(IDATA.EQ.LSDEL(K))GO TO 1
1001 CONTINUE
100 CONTINUE
IF(NDEL.LE.0)GO TO 110
DO 11 K=1,NDEL
IF(ITLIO.EQ.LDEL(K))GO TO 1
11 CONTINUE
110 CONTINUE
IF(ITLIO.NE.IOLIO)GO TO 31
21 CONTINUE
GO TO 32
22 CONTINUE
2 CONTINUE
IF(NSDEL.LE.0)GO TO 211
DO 2110 K=1,NSDEL
IF(IDATA.EQ.LSDEL(K))GO TO 1
2110 CONTINUE
211 CONTINUE
IF(NDEL.LE.0)GO TO 210
DO 12 K=1,NDEL
IF(ITLIO.EQ.LDEL(K))GO TO 1
12 CONTINUE
210 CONTINUE

```

```

      IF(ICSP,EQ,1)CALL CSPIO(1,1START)
      DO 3 K=17,74
      IDATA=IEQUIV(K),AND,MASK
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IDATA=ISHFT(IEQUIV(K),-8)
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
3    CONTINUE
      IF(ICSP,EQ,1)CALL CSPIO(1,1STOP)
      IF(ICSP,EQ,4)WRITE(4,8001)(IEQUIV(K),K=17,74)
8001  FORMAT(5R11)
      GO TO 1

C
31   CONTINUE
      IF(ICSP,EQ,1)CALL CSPIO(1,1STAR)
      IDATA=1TLID,AND,MASK
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IDATA=ISHFT(1TLID,-8)
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IF(ICSP,EQ,1)CALL CSPIO(1,1STOP)
      IF(ICSP,EQ,4)WRITE(4,8002)1TLID
8002  FORMAT(I4)
      1OLID=1TLID
      GO TO 21

C
32   CONTINUE
      IF(ICSP,EQ,1)CALL CSPIO(1,1START)
      IDATA=(IEQUIV(12),AND,MASK)+M100
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IDATA=(IEQUIV(11),AND,MASK)+M100
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IDATA=ISHFT(((IEQUIV(12),AND,MASK)+M100),8)+
X((IEQUIV(11),AND,MASK)+M100)
      IKEYN=100+IEQUIV(7)+1+IEQUIV(8)+IEQUIV(9)
      IF(IKEYN,EQ,KYBAD)KEYBAD=1
      IF(IKEYN,EQ,KYRAD)IKEYN=KYGOOD
      IDATA=IKEYN,AND,MASK
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IDATA=ISHFT(IKEYN,-8)
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IDATA=(IEQUIV(10),AND,MASK)+M100
      IKEYL=ISHFT(((IEQUIV(10),AND,MASK)+M100),-8)+
X((IEQUIV(10),AND,MASK)+M100)
      IF(KEYRAD,EQ,1)IKEYL=KYGOOD
      KEYBAD=0
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IF(ICSP,EQ,1)CALL CSPIO(1,IDATA)
      IF(ICSP,EQ,1)CALL CSPIO(1,1STOP)

C
C
8010  IF(ICSP,EQ,8)WRITE(4,8010)IDATA,IKEYN,IKEYL,IKEYL
      FORMAT(A2,I3,A1,A1)
      IOSID1=ISPK(1)
      IOSID2=ISPK(2)
      GO TO 22

C
900  CONTINUE
      IF(ICSP,EQ,1)CALL CSPIO(1,IENDFL)
      IF(ICSP,EQ,1)CALL CSPIO(1,IENDFL)
      IF(ICSP,EQ,8)ENDFILE 4
      IF(ICSP,EQ,8)ENDFILE 4
      STOP
      END

```

```

** RSX=11M VR3 **      21-MAR-78      13149129      DF01 (200,200) SCORE,FTN;7
** RSX=11M VR3 **      21-MAR-78      13149129      DF01 (200,200) SCORE,FTN;7
** RSX=11M VR3 **      21-MAR-78      13149129      DF01 (200,200) SCORE,FTN;7

```

```

SSSSSSSS      CCCCCCCC      OOOOOO      WRRRRRRR      EEEEEEEEE
SSSSSSSS      CCCCCCCC      OOOOOO      WRRRRRRR      EEEEEEEEE
SS          CC          OO          OO      RR      RR      EE
SS          CC          OO          OO      RR      RR      EE
SS          CC          OO          OO      RR      RR      EE
SS          CC          OO          OO      RR      RR      EE
SSSSSS      CC          OO          OO      WRRRRRRR      EEEEEEE
SSSSSS      CC          OO          OO      WRRRRRRR      EEEEEEE
          SS      CC          OO          OO      RR      RR      EE
          SS      CC          OO          OO      RR      RR      EE
          SS      CC          OO          OO      RR      RR      EE
          SS      CC          OO          OO      RR      RR      EE
SSSSSSSS      CCCCCCCC      OOOOOO      RR      RR      EEEEEEEEE
SSSSSSSS      CCCCCCCC      OOOOOO      RR      RR      EEEEEEEEE

```

```

FFFFFFFF      TTTTTTTTTT      NN      NN      1111      77777777
FFFFFFFF      TTTTTTTTTT      NN      NN      1111      77777777
FF          TT          NN      NN      1111      77
FF          TT          NN      NN      1111      77
FF          TT          NNNN      NN      1111      77
FF          TT          NNNN      NN      1111      77
FFFFFFFF      TT          NN      NN      1111      77
FFFFFFFF      TT          NN      NN      1111      77
FF          TT          NN      NNNN      1111      77
FF          TT          NN      NNNN      1111      77
FF          TT          NN      NN      11      77
FF          TT          NN      NN      11      77
FF          TT          NN      NN      11      77
FF          TT          NN      NN      11      77

```

```

** RSX=11M VR3 **      21-MAR-78      13149129      DF01 (200,200) SCORE,FTN;7
** RSX=11M VR3 **      21-MAR-78      13149129      DF01 (200,200) SCORE,FTN;7
** RSX=11M VR3 **      21-MAR-78      13149129      DF01 (200,200) SCORE,FTN;7

```

```

COMMON/4/IDSYS,ISYS(50),NAME(15),NPAGE(7,2,3),
X MSPK(15,9),MKEY,LETTER,LIST,ISPK,NUML,NUMS,ARRAY(84),IRESP(2,29),
XDATA(12,6,36)

```

```

CALL ASSIGN(3,IDEFINKEY,MKEY)
CALL ASSIGN(4,IDEF0,1)
TCOM=0
CONTINUE
CALL CTL(ITCOM)
CALL SCORE(ITCOM)
IF(ITCOM.EQ.0)CALL MATR
GO TO 1
END
SUBROUTINE CTL(ITCOM)

```

DIAGNOSTIC WHYPE TEST SCORING PROGRAM

3 DEC 76

STEVEN HEISTER, FSD/MCEL, HANSCOM AFB, MA 01731

```

NUMSUN = NUMBER OF SUBFEATURES CORRECT EACH LISTENER
NUMT = NUMBER OF MAIN FEATURES CORRECT EACH LISTENER
NUML = NUMBER OF LISTENERS
NUMS = NUMBER OF SPEAKERS
LIST = CURRENT LISTENER
ISPKR = CURRENT SPEAKER
IKEY = CURRENT KEY NUMBER
NKEY = CURRENT KEY INDEX NUMBER FOR KEY ARRAY
IPAGE = PAGE BEING SCORED
IFEAT = INDEX FOR MAIN FEATURES
1 = VOICING
2 = NASALITY
3 = SUSTENTION
4 = SIRILATION
5 = GRAVENESS
6 = COMPACTNESS
7 = EXPERIMENTAL

```

FEATURE ARRAY KEY:

	PRESENT	ABSENT	
MAIN FEATURE	(L,1,1)	(L,2,1)	L = LISTENER NUMBER
SUB FEAT PRES	(L,1,2)	(L,2,2)	
SUB FEAT ABS	(L,1,3)	(L,2,3)	

FEAT(10,N,M) = MEAN FOR N,M
FEAT(20,N,M) = STANDARD ERROR FOR N,M
FEAT(10,1,M) = MEAN FOR PRESENT + ABSENT STATE OF M
FEAT(10,2,M) = S.E. FOR PRESENT + ABSENT STATE OF M


```

807 IF(NKEY,NE,111)GO TO 808
    NKEY=15
    GO TO 150
808 IF(NKEY,NE,112)GO TO 809
    NKEY=17
    GO TO 150
809 IF(NKEY,NE,113)GO TO 810
    NKEY=19
    GO TO 150
810 IF(NKEY,NE,115)GO TO 811
    NKEY=21
    GO TO 150
811 IF(NKEY,NE,116)GO TO 812
    NKEY=23
    GO TO 150
812 IF(NKEY,GT,310)GO TO 151
    IF(NKEY,LE,300)GO TO 151
    NKEY=25+2*(NKEY-301)
    GO TO 150
150 IF(LETTER,NE,ALPHA)GO TO 1501
    NKEY=NKEY+1
    GO TO 152
1501 IF(LETTER,FO,ALPHA)GO TO 152
151 WRITE(5,300)NKEY,LETTER
300 FORMAT(///' ***** NO KEY ',I3,A1,' *****'///)
    STOP
152 CONTINUE

C
C
C
DO 1527 K=1,58
1527 KEY(K)=NFWKEY(K,NKEY)

C
C
C
DO 114 IPAGE = 1,4
C
C
C
READ CURRENT PAGE
106 READ(4,107)((IRESP(ICOL,INOW),IROW=1,29),ICOL=1,2)
C
C
C
C
C
107 FORMAT(58I1)
DO 203 ICOL=1,2
DO 204 IROW =2,29
C
ESTABLISH FEATURE BEING SCORED
IF(IROW,LE,4)IFEAT=IROW-1
ITEMP =IROW-1
IFEAT=MOD(ITEMP,7)
IF(IFEAT,EQ,0)IFEAT=7
C
ESTABLISH WHICH COLUMN PRESENT STATE OF FEATURE IS IN,
IPRES=1
IF(IPAGE,LE,2)IPRES=0
C
FIND KEY ELEMENT
KEYEL=IROW
IF(ICOL,EQ,2)KEYEL=IROW+29
INDEX = 2
IF(IPAGE,EQ,1)GOTO 208
IF(IPAGE,EQ,3)GOTO 208

```

```

IF (KEY (KEYFL), NE, IPRES) INDEX=1
GOTO 299
298 IF (KEY (KEYFL), EQ, IPRES) INDEX=1
C INDEX =1 IMPLIES MAIN FEATURE PRESENT; 2 IMPLIES ABSENT.
C SCORE THE RESPONSE
299 ANSWER = 0
IF (IPAGE, EQ, 1) GOTO 295
IF (IPAGE, EQ, 3) GOTO 295
IF (KEY (KEYFL), NE, IRESP (ICOL, IROW)) ANSWER=1
GOTO 298
295 IF (KEY (KEYFL), EQ, IRESP (ICOL, IROW)) ANSWER=1
296 CONTINUE
IF (IFEAT, EQ, 7) GOTO 257
ISUBP=2
NSUBP=2
IF (IPAGE, EQ, 1) ISUBP=1
IF (IPAGE, EQ, 3) ISUBP=1
IF (KEYSUB (KEYFL, ISUBP), EQ, 0) NSUBP=3
GOTO (251, 252, 253, 254, 255, 256), IFEAT
251 NPAGE (1, INDEX, 1) = NPAGE (1, INDEX, 1) + ANSWER
NPAGE (1, INDEX, NSUBP) = NPAGE (1, INDEX, NSUBP) + ANSWER
GOTO 260
252 NPAGE (2, INDEX, 1) = NPAGE (2, INDEX, 1) + ANSWER
NPAGE (2, INDEX, NSUBP) = NPAGE (2, INDEX, NSUBP) + ANSWER
GOTO 260
253 NPAGE (3, INDEX, 1) = NPAGE (3, INDEX, 1) + ANSWER
NPAGE (3, INDEX, NSUBP) = NPAGE (3, INDEX, NSUBP) + ANSWER
GOTO 260
254 NPAGE (4, INDEX, 1) = NPAGE (4, INDEX, 1) + ANSWER
NPAGE (4, INDEX, NSUBP) = NPAGE (4, INDEX, NSUBP) + ANSWER
GOTO 260
255 NPAGE (5, INDEX, 1) = NPAGE (5, INDEX, 1) + ANSWER
NPAGE (5, INDEX, NSUBP) = NPAGE (5, INDEX, NSUBP) + ANSWER
GOTO 260
256 NPAGE (6, INDEX, 1) = NPAGE (6, INDEX, 1) + ANSWER
NPAGE (6, INDEX, NSUBP) = NPAGE (6, INDEX, NSUBP) + ANSWER
GOTO 260
257 NPAGE (7, INDEX, 1) = NPAGE (7, INDEX, 1) + ANSWER
260 CONTINUE
261 CONTINUE
262 CONTINUE
C
C
C
C
110 CONTINUE
C
C
C
ICOM=1
RETURN
C
C
C
261 CONTINUE
C
C
262 CONTINUE
ICOM=2
RETURN
END
SUBROUTINE SCORE (PLACE)

```

```

C
C
COMMON/4/IDSYS,ISYS(50),NAME(15),NPAGE(7,2,3),
1MSPK(15,9),MKEY,LETTER,LIST,ISPK,NUMI,NUMS,ARRAY(60),IRESP(2,29),
XDATA(12,6,36)
DIMENSION SEND(6),TEMP(2,9)
IF(NPLACE,NE,1)GOTO 2
1 FORMAT(' SYSTEM TESTED: ',I4,3X,30A2//5X,'NUMBER LISTENERS =',I3//
500 1 5X,'NUMBER SPEAKERS =',I3//)
5000 FORMAT(1H1)
5000 CONTINUE
DO 20 I=1,6
DO 20 K=1,3
DO 41 J=1,2
L = 6*I+J+2*K-8
NTOT = 16
IF(K,NE,1)NTOT=8

C
C
C
C
61 TOT = FLOAT(NTOT)
DATA(LIST,ISPK,1)=(2.0+FLOAT(NPAGE(I,J,K))-TOT)*100./TOT
NPAGE(I,J,K) = NTOT-NPAGE(I,J,K)
41 CONTINUE
22 CONTINUE
20 CONTINUE
IF((ISW,AND,1).EQ.0)RETURN
0 WRITE(6,276)
0 WRITE(6,277)(NPAGE(1,J,1),J=1,2)
0 WRITE(6,278)(NPAGE(1,J,2),J=1,2)
0 WRITE(6,279)(NPAGE(1,J,3),J=1,2)
0 WRITE(6,280)(NPAGE(2,J,1),J=1,2)
0 WRITE(6,281)(NPAGE(2,J,2),J=1,2)
0 WRITE(6,282)(NPAGE(2,J,3),J=1,2)
0 WRITE(6,283)(NPAGE(3,J,1),J=1,2)
0 WRITE(6,284)(NPAGE(3,J,2),J=1,2)
0 WRITE(6,285)(NPAGE(3,J,3),J=1,2)
0 WRITE(6,286)(NPAGE(4,J,1),J=1,2)
0 WRITE(6,287)(NPAGE(4,J,2),J=1,2)
0 WRITE(6,288)(NPAGE(4,J,3),J=1,2)
0 WRITE(6,289)(NPAGE(5,J,1),J=1,2)
0 WRITE(6,290)(NPAGE(5,J,2),J=1,2)
0 WRITE(6,291)(NPAGE(5,J,3),J=1,2)
0 WRITE(6,292)(NPAGE(6,J,1),J=1,2)
0 WRITE(6,293)(NPAGE(6,J,2),J=1,2)
0 WRITE(6,294)(NPAGE(6,J,3),J=1,2)
021 FORMAT(10X,I5,5X,I5)

C
C
C
C
0 RETURN
2 CONTINUE
DO 204 LIST=1,NUMI
WRITE(6,500)
WRITE(6,1)IDSYS,(ISYS(I),I=1,30),NUMI,NUMS
WRITE(6,201)NAME(LIST)
201 FORMAT(13X,7(' '),1 FOR LISTENER: ',I4,' =')
1 13X,7(' '),1
1 1 SPKW SCORE//)
DO 204 ISPK=1,NUMS
SUM = 0.0

```

```

DO 202 I=1,31,6
J=I+1
202 SUM = SUM + DATA(LIST,ISPKR,I) + DATA(LIST,ISPKR,J)
SUM = SUM/12.0
WRITE(6,203)MSPK(LIST,ISPKR),SUM
203 FORMAT(1X,A2,1X,F7.2)
204 CONTINUE
WRITE(6,403)
WRITE(6,404)
DO 209 I=1,6
SEND(1)=0.0
209 DO 210 I=1,35,2
J=I+1
DO 211 K=1,NIMS
ARRAY(K)=DATA(LIST,K,I)
CALL STATS(NIMS,X,S)
SEND(1)=X
SEND(2)=S
DO 212 K=1,NIMS
212 ARRAY(K)=DATA(LIST,K,J)
CALL STATS(NIMS,X,S)
SEND(3)=X
SEND(4)=S
DO 213 K=1,NIMS
213 ARRAY(K)=(ARRAY(K)+DATA(LIST,K,I))/2.0
CALL STATS(NIMS,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(I,SEND)
210 CONTINUE
DO 215 K=1,NIMS
SUM = 0.0
DO 214 I=1,31,6
214 SUM = SUM + DATA(LIST,K,I)
215 ARRAY(K) = SUM/6.0
CALL STATS(NIMS,X,S)
SEND(1)=X
SEND(2)=S
DO 216 K=1,NIMS
SUM = 0.0
DO 217 I=2,32,6
217 SUM = SUM + DATA(LIST,K,I)
216 ARRAY(K) = SUM/6.0
CALL STATS(NIMS,X,S)
SEND(3)=X
SEND(4)=S
DO 219 K=1,NIMS
SUM = 0.0
DO 218 I=1,31,6
J = I+1
218 SUM = SUM + DATA(LIST,K,I) + DATA(LIST,K,J)
219 ARRAY(K) = SUM/12.0
CALL STATS(NIMS,X,S)
SEND(5)=X
SEND(6)=S
CALL OUT(36,SEND)
WRITE(6,400)X,S
200 CONTINUE
DO 300 ISPKR = 1,NIMS
WRITE(6,500)
WRITE(6,110)IDSYS,(ISYS(I),I=1,30),NIMS,NIMS
WRITE(6,301)MSPK(1,ISPKN)
301 FORMAT(12X,'*****'/ ' FOR SPEAKER1 ',A2,' *'/

```

```

1 12X, '*****'// 'LISTENER', 4X, ' SCORF'//
DO 304 LIST = 1, NIHL
SUM = 0.0
DO 302 I=1, 31.6
J=I+1
302 SUM = SUM+DATA(LIST, ISPKR, I)+DATA(LIST, ISPKR, J)
SUM = SUM/12.0
WRITE(6, 303) NAME(LIST), SUM
303 FORMAT(1X, I4, 6X, F7.2)
304 CONTINUE
WRITE(6, 403)
WRITE(6, 404)
DO 310 I=1, 35.2
J=I+1
DO 311 K=1, NIHL
311 ARRAY(K)=DATA(K, ISPKR, I)
CALL STATS(NIHL, X, S)
SEND(1)=X
SEND(2)=S
DO 312 K=1, NIHL
312 ARRAY(K)=DATA(K, ISPKR, J)
CALL STATS(NIHL, X, S)
SEND(3)=X
SEND(4)=S
DO 313 K=1, NIHL
313 ARRAY(K) = (ARRAY(K)+DATA(K, ISPKR, I))/2.0
CALL STATS(NIHL, X, S)
SEND(5)=X
SEND(6)=S
CALL OUT(I, SEND)
310 CONTINUE
DO 315 K=1, NIHL
SUM = 0.0
DO 314 I=1, 31.6
314 SUM = SUM + DATA(K, ISPKR, I)
315 ARRAY(K) = SUM/6.0
CALL STATS(NIHL, X, S)
SEND(1)=X
SEND(2)=S
DO 316 K=1, NIHL
SUM = 0.0
DO 317 I=2, 32.6
317 SUM = SUM+DATA(K, ISPKR, I)
318 ARRAY(K)=SUM/6.0
CALL STATS(NIHL, X, S)
SEND(3)=X
SEND(4)=S
DO 319 K=1, NIHL
SUM = 0.0
DO 318 I=1, 31.6
J=I+1
318 SUM = SUM+DATA(K, ISPKR, I)+DATA(K, ISPKR, J)
319 ARRAY(K)=SUM/12.0
CALL STATS(NIHL, X, S)
SEND(5)=X
SEND(6)=S
CALL OUT(30, SEND)
WRITE(6, 400) X, S
TEMP(1, ISPKR)=X
TEMP(2, ISPKR)=S
300 CONTINUE
WRITE(6, 500)
WRITE(6, 1) IDSYS, (ISYS(I), I=1, 30), NIHL, NUMS

```

```

      WRITE(6,320)
320  FORMAT(' COMBINED RESULTS - STANDARD ERRORS ACROSS 1,
1  'SPEAKERS AND 11STENERS *****'//)
      WRITE(6,403)
      WRITE(6,404)
      NIIMT = NIIML*NUMS
      DO 321 I=1,35,2
      J=I+1
      DO 322 K=1,NIIML
      DO 322 L=1,NUMS
      M=NUMS*(K-1)+L
322  ARRAY(M)=DATA(K,I,J)
      CALL STATS(NIIMT,X,S)
      SEND(1)=X
      SEND(2)=S
      DO 323 K=1,NIIML
      DO 323 L=1,NUMS
      M=NUMS*(K-1)+L
323  ARRAY(M)=DATA(K,I,J)
      CALL STATS(NIIMT,X,S)
      SEND(3)=X
      SEND(4)=S
      DO 324 K=1,NIIML
      DO 324 L=1,NUMS
      M=NUMS*(K-1)+L
      SUM = DATA(K,L,I)+DATA(K,L,J)
324  ARRAY(M)=SUM/2.0
      CALL STATS(NIIMT,X,S)
      SEND(5)=X
      SEND(6)=S
      CALL OUT(I,SEND)
321  CONTINUE
      DO 325 K=1,NIIML
      DO 325 L=1,NUMS
      M=NUMS*(K-1)+L
      SUM = 0.0
      DO 326 I=1,31,6
326  SUM = SUM+DATA(K,L,I)
325  ARRAY(M)=SUM/6.0
      CALL STATS(NIIMT,X,S)
      SEND(1)=X
      SEND(2)=S
      DO 327 K=1,NIIML
      DO 327 L=1,NUMS
      M=NUMS*(K-1)+L
      SUM=0.0
      DO 328 I=2,32,6
328  SUM = SUM + DATA(K,L,I)
327  ARRAY(M)=SUM/6.0
      CALL STATS(NIIMT,X,S)
      SEND(3)=X
      SEND(4)=S
      DO 329 K=1,NIIML
      DO 329 L=1,NUMS
      M=NUMS*(K-1)+L
      SUM=0.0
      DO 331 I=1,31,6
      J=I+1
331  SUM = SUM+DATA(K,L,I)+DATA(K,L,J)
330  ARRAY(M)=SUM/12.0
      CALL STATS(NIIMT,X,S)
      SEND(5)=X
      SEND(6)=S

```



```

      IF(K.EQ.11)K=8
      IF(K.EQ.14)K=8
      IF(K.EQ.17)K=8
      IF(K.EQ.12)K=9
      IF(K.EQ.15)K=9
      IF(K.EQ.18)K=9
      IF(K.EQ.13)K=11
      IF(K.EQ.16)K=12
      GOTO(1,2,3,4,5,6,7,8,9,10,13,16),K
1     WRITE(6,405)(X(I),I=1,6)
      RETURN
2     WRITE(6,406)(X(I),I=1,6)
      RETURN
3     WRITE(6,407)(X(I),I=1,6)
      RETURN
4     WRITE(6,408)(X(I),I=1,6)
      RETURN
5     WRITE(6,409)(X(I),I=1,6)
      RETURN
6     WRITE(6,410)(X(I),I=1,6)
      RETURN
7     WRITE(6,411)(X(I),I=1,6)
      RETURN
8     WRITE(6,412)(X(I),I=1,6)
      RETURN
9     WRITE(6,413)(X(I),I=1,6)
      RETURN
10    WRITE(6,414)(X(I),I=1,6)
      RETURN
13    WRITE(6,415)(X(I),I=1,6)
      RETURN
16    WRITE(6,416)(X(I),I=1,6)
      RETURN
19    WRITE(6,417)(X(I),I=1,6)
      RETURN
405   FORMAT(3X,'VOICING',9X,3(3X,F6.2,2X,F6.2))
406   FORMAT(6X,'FRICTIONAL',4X,3(3X,F6.2,2X,F6.2))
407   FORMAT(6X,'NON-FRICTIONAL',3(3X,F6.2,2X,F6.2)/)
408   FORMAT(3X,'NASALITY',8X,3(3X,F6.2,2X,F6.2))
409   FORMAT(6X,'GRAVE',9X,3(3X,F6.2,2X,F6.2))
410   FORMAT(6X,'ACUTE',9X,3(3X,F6.2,2X,F6.2)/)
411   FORMAT(3X,'SUSTENTION',6X,3(3X,F6.2,2X,F6.2))
412   FORMAT(6X,'VOICED',8X,3(3X,F6.2,2X,F6.2))
413   FORMAT(6X,'UNVOICED',6X,3(3X,F6.2,2X,F6.2)/)
414   FORMAT(3X,'SIMILATION',6X,3(3X,F6.2,2X,F6.2))
415   FORMAT(3X,'GRAVENESS',7X,3(3X,F6.2,2X,F6.2))
416   FORMAT(3X,'COMPACTNESS',5X,3(3X,F6.2,2X,F6.2))
417   FORMAT(3X,'TOTALS',10X,3(3X,F6.2,2X,F6.2))
      END
      SUBROUTINE MATR
      COMMON/4/IDSYS,ISYS(50),NAME(15),NPAGE(7,2,3),
      X4SPK(15,9),MKEY,LETTER,LIST,ISPK,NUML,NUMS,ARRAY(60),IRESP(2,29),
      XDATA(12,6,36)
      DIMENSION XMATR(15,6),ITALK(9),ANS(2,6)
      DIMENSION DEV(15,6),VAR(15),YLM(15),SM(6),FSTAT(15)
      DIMENSION NMEL(6)
      DATA TBLNK/24 /
C
      KKK=4
      NUMF=0
C
      DO 200 I=1,NUML
      DO 200 K=1,NUMS

```

```

      SUM=0.
      DO 202 II=1,31.4
      JJ=II+1
202   SUM=SUM+DATA(I,K,II)+DATA(I,K,JJ)
      SUM=SUM/12.
200   XMATR(I,K)=SUM
C
312   CONTINUE
      DO 2002 JJJ=1,KKK
      DO 203 I=1,9
203   ITALK(I)=IBLNK
      DO 204 I=1,NUMS
204   ITALK(I)=MSPK(1,I)
C
      WRITE(6,100)
      WRITE(6,107)IDSYS,(ISYS(I),I=1,30),NUML,NUMS
      WRITE(6,103)
      WRITE(6,100)(ITALK(I),I=1,9)
      IF(NUMS.EQ.6)WRITE(6,1001)
      IF(NUMS.EQ.3)WRITE(6,1002)
1001  FORMAT(1H+,40X,4HMFAN,4X,4HS'E.')
1002  FORMAT(1H+,20X,4HMFAN,4X,4HS'E.')
      WRITE(6,102)
C
C
      DO 201 LIST=1,NUML
      DO 205 ISPK=1,NUMS
205   ARRAY(ISPK)=XMATR(LIST,ISPK)
      CALL STATS(NUMS,X,S)
201   WRITE(6,101)NAME(LIST),(XMATR(LIST,ISPK),ISPK=1,NUMS),X,S
      DO 206 ISPK=1,NUMS
      DO 207 LIST=1,NUML
207   ARRAY(LIST)=XMATR(LIST,ISPK)
      CALL STATS(NUML,X,S)
      ANS(1,ISPK)=X
      ANS(2,ISPK)=S
206   CONTINUE
      WRITE(6,104)(ANS(1,I),I=1,NUMS)
      WRITE(6,105)(ANS(2,I),I=1,NUMS)
      DO 208 ISPK=1,NUMS
      DO 208 LIST=1,NUML
      K=NUMS+(LIST-1)+ISPK
208   ARRAY(K)=XMATR(LIST,ISPK)
      NUMT=NUMS+NUML
      CALL STATS(NUMT,X,S)
      WRITE(6,106)X,S
2002  CONTINUE
      VHTG=0.
      WRITE(6,100)
      WRITE(6,107)IDSYS,(ISYS(I),I=1,30),NUML,NUMS
      WRITE(6,300)
300   FORMAT(//2X,'LISTENER DEVIATIONS FROM SPEAKER MEANS'//)
      WRITE(6,103)
      WRITE(6,100)(ITALK(I),I=1,9)
      IF(NUMS.EQ.6)WRITE(6,1003)
      IF(NUMS.EQ.3)WRITE(6,1004)
1003  FORMAT(1H+,51X,3HVAR)
1004  FORMAT(1H+,30X,3HVAR)
      WRITE(6,102)
      XNUMS=NUMS
      XNUML=NUML
      TOTAL=XNUMS+XNUML
      DO 301 J=1,NUMS

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```

      SUM=0.
      DO 302 I=1,NUML
302    SUM=SUM+XMATR(I,J)
303    SM(J)=SUM/XNUML
      DO 303 I=1,NUML
      SUM=0.
      DO 304 J=1,NUMS
304    SUM=SUM+XMATR(I,J)
305    XLM(I)=SUM/XNUMS
      SUM=0.
      DO 305 I=1,NUML
305    SUM=SUM+YLM(I)
      GM=SUM/XNUML
C
      DO 306 I=1,NUML
      DO 307 J=1,NUMS
307    DEV(I,J)=XMATR(I,J)-SM(J)
      SS=0.
      DO 308 J=1,NUMS
308    SS=SS+DEV(I,J)*DEV(I,J)
      VAR(I)=SS/XNUMS
      IF(VAR(I).LE.VRIG)GO TO 330
      VHTG=VAR(I)
      LRIG=1
330    WRITE(6,101)NAME(I),(DEV(I,J),J=1,NUMS),VAR(I)
C
      CALL OUTIR(XMATW,NUML,NUMS,I,F,ESTAT)
C
306    CONTINUE
C
      KMP=NUML-NUMS+1
      WRITE(6,400)NUMS,KMP
400    FORMAT(// ' F STATISTIC FOR TESTING EACH LISTENER
X AS AN OUT-LYER'// ' COMPARE WITH F PERCENTAGE POINT
X WITH DF=1,13,1 AND 1,12//
      WRITE(6,401)
401    FORMAT(' LIST.    F1//
      DO 402 I=1,NUML
      WRITE(6,403)NAME(I),ESTAT(I)
403    FORMAT(15,F8.3)
402    CONTINUE
      IF(NUML.LE.8)STOP
      NUMF=NUMF+1
      NMFL(NUMF)=NAME(LRIG)
      WRITE(6,5001)(NMFL(I),I=1,NUMF)
500    FORMAT(/1X,'WILL ELIM',4I6)
      IF(LRIG.EQ.NUML)GO TO 310
      DO 311 I=LRIG,NUML
      IP1=I+1
      NAME(I)=NAME(IP1)
      DO 311 J=1,NUMS
311    XMATR(I,J)=XMATR(IP1,J)
310    NUML=NUML-1
      KKK=1
      GO TO 312
CCCCCCCCCCCC
CCCCCCCCCCCC
CCCCCCCC
100    FORMAT(5X,9(XX,A2,2X))
101    FORMAT(/1X,I4,1X,11(2X,F5.2)/)
102    FORMAT(' LIST. ')
103    FORMAT(8X,'SPEAKERS'/)
104    FORMAT(/1 MEAN',1X,11(2X,F5.2)/)

```

```

105     FORMAT(/' S.F.1,1X,11(2X,F8.2)/)
106     FORMAT(/30X,17(' ')/
X30X,10 MEAN = 1,F8.2,1 //
X13X,10 TOTAL DWT SCORE: = 1,15X,10 //
X30X,10 S.E. = 1,F8.2,1 //
X30X,17(' '))
107     FORMAT(' SYSTEM 1,14,3X,30A2//
X5X,10NUMBER LISTENERS = 1,13/
X5X,10NUMBER SPEAKERS = 1,13//)
108     FORMAT(1H1,1 ' )
C
C
      END
      SUBROUTINE STATS(N,XMEAN,STDERR)
      COMMON/A/IDSYS,IRYS(50),NAME(15),NPAGE(7,2,3),
XMSPK(15,9),MKEY,LETTER,LIST,ISPK,NIMI,NIMS,ARRAY(60),TRESP(2,20),
XDATA(12,6,36)
C
      Y=0.
      XN=FLOAT(N)
      DO 1 I=1,N
      X=X+ARRAY(I)
1     CONTINUE
      XMEAN=X/XN
      STDERR=0.
      DO 2 I=1,N
2      STDERR=STDERR+(ARRAY(I)-XMEAN)*(ARRAY(I)-XMEAN)
      STDERR=SQRT(STDERR/XN/XN)
      RETURN
      END
C
C
      SUBROUTINE OUTLR(DATA,N,IP,IOUT,F,FSTAT)
      DIMENSION S(6,6),DATA(15,6),XMEAN(6),TEMP(6),SINV(6,6)
      DIMENSION FSTAT(15)
C
      P=IP
      K=N-1
      XK=K
      KMP=K*(K-IP)
      KSO=IP*(K+K-1)
      XKMP=XKMP
      XKSO=XKSO
      RATIO=XKMP/XKSO
      DO 100 I=1,IP
100     XMEAN(I)=0.
C
      DO 101 J=1,IP
      DO 101 I=1,N
      IF(I.EQ.,IOUT)GO TO 101
      XMEAN(I)=XMEAN(J)+DATA(I,J)
101     CONTINUE
      DO 102 J=1,IP
102     XMEAN(J)=XMEAN(J)/XK
C
      XKM=K-1
C
      DO 103 I=1,IP
      TEMP(I)=0.
      DO 103 J=1,IP
103     S(I,J)=0.
      II=0
      DO 104 I=1,N

```

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      IF(I.EQ.IOUT)GO TO 104
      DO 105 J=1,IP
105    TEMP(J)=DATA(I,J)-XMEAN(J)
      DO 106 J=1,IP
      DO 106 JJ=1,IP
106    S(J,JJ)=S(J,JJ)+TEMP(J)*TEMP(JJ)
104    CONTINUE
      DO 107 I=1,IP
      DO 107 J=1,IP
107    S(I,J)=S(I,J)/XKM
C
      CALL INVERS(S,SINV,IP)
C
      DO 111 J=1,IP
111    TEMP(J)=DATA(IOUT,J)-XMEAN(J)
C
C
      D=0.
      DO 112 I=1,IP
      DO 112 J=1,IP
112    D=D+TEMP(I)*SINV(I,J)*TEMP(J)
      KMP=K+IP
      FSTAT(IOUT)=RATIO*D
      RETURN
      END
C
C
C ***** SUBROUTINE INVERSE *****
C
C
      SUBROUTINE INVERS(A,B,N)
      DIMENSION A(6,6),B(6,6)
      EPS=.0001
      DO 6 I=1,N
      DO 5 J=1,N
      IF(I=J)4,3,4
3      B(I,J)=1.0
      GOTO 5
4      B(I,J)=0.0
5      CONTINUE
6      CONTINUE
      DEL=1.0
      DO 15 K=1,N
      IF(K=N)12,30,30
12      IMAX=K
      AMAX=ABS(A(K,K))
      KP1=K+1
      DO 20 I=KP1,N
      DIFF=AMAX-ABS(A(I,K))
      IF(DIFF)15,20,20
15      IMAX=I
      AMAX=ABS(A(I,K))
20      CONTINUE
      IF(IMAX=K)25,30,25
25      DO 29 J=1,N
      ATMP=A(IMAX,J)
      A(IMAX,J)=A(K,J)
      A(K,J)=ATMP
      RTMP=B(IMAX,J)
      B(IMAX,J)=B(K,J)
29      B(K,J)=RTMP
      DEL=D*DEL
30      CONTINUE

```

```

      DIFF=ABS(A(K,K)-EPS)
      IF(DIFF)93,93,35
35    DEL=A(K,K)*DEL
      DIV=A(K,K)
      DO 38 J=1,N
      A(K,J)=A(K,J)/DIV
38    R(K,J)=R(K,J)/DIV
      DO 43 I=1,N
      AMULT=A(I,K)
      IF(I=K)39,43,39
39    DO 42 J=1,N
      A(I,J)=A(I,J)-AMULT*A(K,J)
42    B(I,J)=B(I,J)-AMULT*B(K,J)
43    CONTINUE
45    CONTINUE
90    RETURN
93    WRITE(9,113)
113   FORMAT(/'SINGULAR MATRIX.'/)
      END

```

SYSTEM TESTED: 1104 16-DEC-77 PHORE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 1277 *

SPKR SCORE

RV 80.54
LE 89.58
RD 93.75

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	87.50	5.89	93.75	2.95
FRICTIONAL	100.00	0.00	83.33	6.80	91.67	3.40
NON-FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NASALITY	95.83	3.40	100.00	0.00	97.92	1.70
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	91.67	6.80	100.00	0.00	95.83	3.40
SUSTENTION	83.33	6.80	58.33	3.40	70.83	4.50
VOICED	75.00	11.79	50.00	20.41	62.50	11.79
UNVOICED	91.67	6.80	66.67	13.61	79.17	3.40
SIRILATION	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
GRAVENESS	91.67	3.40	79.17	9.00	85.42	3.40
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	83.33	6.80	58.33	16.00	70.83	6.80
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	94.44	2.27	87.50	0.00	90.97	1.13

+ MEAN = 90.97 +
TOTAL DRY SCORE: +
+ S.E. = 1.13 +

SYSTEM TESTED: 1104 16-DEC-77 PRORF 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 3345

SPKR SCORE

RV 88.54
JE 82.29
RD 83.75

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	95.83	3.40	91.67	6.80	93.75	5.10
FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NON-FRICTIONAL	91.67	6.80	83.33	13.61	87.50	10.21
NASALITY	100.00	0.00	95.83	3.40	97.92	1.70
GRAVE	100.00	0.00	91.67	6.80	95.83	3.40
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	58.33	12.27	75.00	5.89	66.67	8.51
VOICED	50.00	11.79	75.00	11.79	62.50	10.21
UNVOICED	66.67	18.00	75.00	11.79	70.83	6.80
SIBILATION	70.17	9.00	100.00	0.00	89.58	4.50
VOICED	75.00	11.79	100.00	0.00	87.50	5.89
UNVOICED	83.33	13.61	100.00	0.00	91.67	6.80
GRAVENESS	91.67	3.40	70.83	3.40	81.25	2.05
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	83.33	6.80	41.67	6.80	62.50	5.89
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	87.50	3.93	88.89	1.90	88.19	2.70

TOTAL ORT SCORE: * MEAN = 88.19 *
* S.E. = 2.70 *

SYSTEM TESTED: 1124 16-DEC-77 FROM: 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 4025

SPKR SCORE

BV 88.54
JE 88.21
RD 92.71

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	91.67	6.80	95.83	3.40
FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NON-FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	58.33	9.00	62.50	5.80	60.42	7.41
VOICED	50.00	20.41	41.67	18.00	45.83	14.83
UNVOICED	66.67	13.61	83.33	13.61	75.00	0.00
SIBILATION	66.67	12.27	100.00	0.00	83.33	6.13
VOICED	83.33	6.80	100.00	0.00	91.67	3.40
UNVOICED	50.00	20.41	100.00	0.00	75.00	10.21
GRAVENESS	91.67	6.80	70.17	3.40	85.42	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	83.33	13.61	58.33	6.80	70.83	3.40
COMPACTNESS	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
TOTALS	85.42	4.50	88.89	1.50	87.15	3.00

TOTAL DRT SCORE: * MEAN = 87.15 *
* S.E. = 3.00 *

SYSTEM TESTED: 1144 16-DEC-77 PROHE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 4345

SPKR SCORE

AV 87.50
JE 84.37
RU 84.70

MAIN ATTRIBUTE:

	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	91.67	6.00	95.83	3.40
FRICTIONAL	100.00	0.00	91.67	6.00	95.83	3.40
NON-FRICTIONAL	100.00	0.00	91.67	6.00	95.83	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
DRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	75.00	5.80	66.67	9.00	70.83	6.80
VOICED	86.67	13.61	58.33	18.00	82.50	15.50
UNVOICED	83.33	6.00	75.00	11.79	79.17	3.40
SIMILATION	87.50	0.00	100.00	0.00	93.75	0.00
VOICED	83.33	6.00	100.00	0.00	91.67	3.40
UNVOICED	91.67	6.00	100.00	0.00	95.83	3.40
GRAVNESS	66.67	9.00	70.17	3.40	72.92	6.13
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	33.33	18.00	58.33	6.80	45.83	12.27
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	88.10	2.47	89.58	2.60	88.89	2.52

TOTAL CRT SCORE:
* MEAN = 88.89 *
* S.E. = 2.52 *

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 5406 *

SPKR SCORE

RV 86.46
JE 88.54
RD 92.62

UNRELIABLE
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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	83.33	0.00	91.67	4.50
FRICTIONAL	100.00	0.00	83.33	6.80	91.67	3.40
NON-FRICTIONAL	100.00	0.00	83.33	13.61	91.67	6.80
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	79.17	9.00	58.33	6.80	68.75	2.95
VOICED	66.67	13.61	50.00	0.00	58.33	6.80
UNVOICED	91.67	6.80	66.67	13.61	79.17	3.40
SIBILATION	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
GRAVENESS	66.67	3.40	79.17	9.00	72.92	6.13
VOICED	91.67	6.80	100.00	0.00	95.83	3.40
UNVOICED	41.67	6.80	58.33	18.00	50.00	11.79
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	91.28	1.50	86.81	1.50	88.54	0.98

TOTAL DRT SCORE: * MEAN = 88.54 *
* S.E. = 0.98 *

SYSTEM TESTED: 1124 16-DEC-77 PROF 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: R004

SPKR SCORE

RV 89.58
JE 87.52
RD 85.83

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	95.83	3.40	97.92	1.70
FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NON-FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NASALITY	100.00	0.00	95.83	3.40	97.92	1.70
GRAVE	100.00	0.00	91.67	6.80	95.83	3.40
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	70.17	0.00	70.83	3.40	75.00	5.80
VOICED	48.33	18.00	75.00	11.79	66.67	13.61
UNVOICED	100.00	0.00	66.67	13.61	83.33	6.80
SIBILATION	87.50	5.80	100.00	0.00	93.75	2.95
VOICED	91.67	6.80	100.00	0.00	95.83	3.40
UNVOICED	93.33	13.61	100.00	0.00	91.67	6.80
GRAVENESS	91.67	6.80	70.83	3.40	81.25	2.95
VOICED	91.67	6.80	100.00	0.00	95.83	3.40
UNVOICED	91.67	6.80	41.67	6.80	66.67	3.40
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	93.86	3.40	88.80	1.13	90.97	2.04

TOTAL DPT SCORE: * MEAN = 90.97 *
* S.E. = 2.04 *

SYSTEM TESTED: 1104 16-DEC-77 PRORF 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: AH54 *

SPKR SCORE

AV 88.54
JE 82.21
RD 92.71

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	91.67	6.88	83.33	6.88	87.50	6.88
FRICTIONAL	91.67	6.88	86.67	13.61	79.17	3.40
NON-FRICTIONAL	91.67	6.88	100.00	0.00	95.83	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTATION	75.00	15.59	54.17	14.83	64.58	14.83
VOICED	75.00	11.79	33.33	24.53	54.17	18.88
UNVOICED	75.00	20.41	75.00	11.79	75.00	11.79
SIBILATION	91.67	3.40	100.00	0.00	95.83	1.70
VOICED	91.67	6.88	100.00	0.00	95.83	3.40
UNVOICED	91.67	6.88	100.00	0.00	95.83	3.40
GRAVITY	75.00	5.80	79.17	6.88	77.08	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	50.00	11.79	58.33	13.61	54.17	3.40
CONTACTNESS	100.00	0.00	95.83	3.40	97.92	1.70
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	91.67	6.88	95.83	3.40
TOTALS	88.80	5.04	85.42	0.00	87.15	3.00

TOTAL DRT SCORE: * MEAN = 87.15 *
* S.F. = 3.00 *

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: RRRR *

SPKH SCORE

RV 91.67
JE 92.62
RD 91.67

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.F.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	95.83	3.40	97.92	1.70
FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NON-FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NASALITY	100.00	0.00	95.83	3.40	97.92	1.70
GRAVE	100.00	0.00	91.67	6.80	95.83	3.40
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTATION	91.67	3.40	75.00	0.00	83.33	1.70
VOICED	83.33	6.80	83.33	13.61	83.33	9.80
UNVOICED	100.00	0.00	66.67	13.61	83.33	6.80
SIBILATION	79.17	3.40	95.83	3.40	87.50	2.95
VOICED	83.33	6.80	100.00	0.00	91.67	3.40
UNVOICED	75.00	11.70	91.67	6.80	83.33	6.80
GRAVENESS	87.50	5.80	75.00	10.21	81.25	2.95
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	75.00	11.70	50.00	20.41	62.50	5.80
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	93.06	1.50	89.58	0.00	91.32	0.28

TOTAL DRT SCORE: * MEAN = 91.32 *
* S.E. = 0.28 *

SYSTEM TESTED: 11M4 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: Q330 *

SPKR SCORE

RV R4.37
JE R7.50
RU Q7.42

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	91.67	6.80	95.83	3.40
FRICTIONAL	100.00	0.00	100.00	0.00	100.00	0.00
NON-FRICTIONAL	100.00	0.00	83.33	13.61	91.67	6.80
NASALITY	95.83	3.40	100.00	0.00	97.92	1.70
GRAVE	91.67	6.80	100.00	0.00	95.83	3.40
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	75.00	11.70	66.67	13.61	70.83	12.27
VOICED	75.00	11.70	50.00	23.57	62.50	15.59
UNVOICED	75.00	11.70	83.33	13.61	79.17	12.27
SIRILATION	95.83	3.40	100.00	0.00	97.92	1.70
VOICED	91.67	6.80	100.00	0.00	95.83	3.40
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
GRAVENESS	70.17	9.00	75.00	5.80	77.00	4.50
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	50.33	18.00	50.00	11.70	54.17	9.00
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	90.97	3.07	88.80	2.84	89.93	3.34

* MEAN = 89.93 *
TOTAL DRY SCORE: *
* S.E. = 3.34 *

SYSTEM TESTED: 1104 18-DEC-77 PROBF 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 0463 *

SPKR SCORE

RV 91.67
JE 90.62
RU 92.62

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	95.83	3.40	95.83	3.40	95.83	1.70
FRICTIONAL	100.00	0.00	91.67	6.80	95.83	3.40
NON-FRICTIONAL	91.67	6.80	100.00	0.00	95.83	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	75.00	13.21	75.17	3.40	77.08	4.50
VOICED	66.67	18.00	75.00	11.79	70.83	6.80
UNVOICED	83.33	13.61	83.33	6.80	83.33	3.40
SIBILATION	95.83	3.40	95.83	3.40	95.83	1.70
VOICED	100.00	0.00	91.67	6.80	95.83	3.40
UNVOICED	91.67	6.80	100.00	0.00	95.83	3.40
GRAVENESS	75.17	3.40	75.00	5.80	77.08	4.50
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	58.33	6.80	50.00	11.79	54.17	9.00
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	90.97	2.04	90.97	2.27	90.97	0.28

* MEAN = 90.97 *
TOTAL DRT SCORE: *
* S.E. = 0.28 *

SYSTEM TESTED: 1104 16-DEC-77 PHOEF 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR LISTENER: 9557 *

SPKR SCORE

HV 89.58
JE 89.58
RD 92.71

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	83.33	3.40	91.67	1.70
FRICTIONAL	100.00	0.00	83.33	6.00	91.67	3.40
NON-FRICTIONAL	100.00	0.00	83.33	6.00	91.67	3.40
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	79.17	9.00	66.67	3.40	72.92	6.13
VOICED	58.33	14.00	58.33	13.61	58.33	14.83
UNVOICED	100.00	0.00	75.00	11.70	87.50	5.89
SIBILATION	91.67	3.40	100.00	0.00	95.83	1.70
VOICED	91.67	6.00	100.00	0.00	95.83	3.40
UNVOICED	91.67	6.00	100.00	0.00	95.83	3.40
GRAVENESS	79.17	3.40	87.50	5.89	83.33	1.70
VOICED	91.67	6.00	100.00	0.00	95.83	3.40
UNVOICED	66.67	13.61	75.00	11.70	70.83	3.40
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	91.67	2.60	89.58	0.00	90.62	0.85

TOTAL DRT SCORE: * MEAN = 90.62 *
* S.E. = 0.85 *

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR SPEAKER: JE *

LISTENER	SCORE
1277	89.58
3345	82.20
4026	84.21
4345	84.37
5426	88.54
6004	87.50
6854	80.21
8056	90.62
9319	87.50
9463	92.62
9557	80.58

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	45.45	2.42	81.82	3.76	88.64	1.35
FRICTIONAL	97.73	2.17	88.64	3.75	93.18	1.88
NON-FRICTIONAL	93.18	3.36	75.00	5.57	84.89	2.83
NASALITY	100.00	0.00	96.59	1.88	98.30	0.84
GRAVE	100.00	0.00	93.18	3.36	96.59	1.68
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTION	61.36	4.94	61.36	4.67	61.36	4.00
VOICED	54.55	5.40	25.00	7.87	39.77	5.04
UNVOICED	68.18	7.93	97.73	2.17	82.05	4.62
SIBILATION	79.55	4.80	100.00	0.00	89.77	2.45
VOICED	93.18	3.36	100.00	0.00	96.59	1.68
UNVOICED	65.91	8.05	100.00	0.00	82.05	4.02
GRAVENESS	73.86	3.30	88.64	2.09	81.25	2.54
VOICED	97.73	2.17	100.00	0.00	98.86	1.08
UNVOICED	50.00	7.10	77.27	5.97	63.64	4.94
COMPACTNESS	100.00	0.00	98.86	1.08	99.43	0.54
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	97.73	2.17	98.86	1.08
TOTALS	85.24	1.60	87.88	0.96	86.46	1.15

TOTAL DRT SCORE:

* MEAN = 86.46 *
* *
* S.E. = 1.15 *

SYSTEM TESTED: 1144 14-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR SPEAKER: BV *

LISTENER	SCORE
1277	89.58
3345	88.54
4026	88.54
5345	87.50
5406	86.46
6004	89.58
8854	88.54
8866	91.67
9339	84.37
9463	91.67
9557	89.58

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.F.	MEAN	S.E.
VOICING	100.00	0.00	94.32	2.47	97.16	1.24
	100.00	0.00	88.64	4.94	94.32	2.47
	100.00	0.00	100.00	0.00	100.00	0.00
NASALITY	97.73	1.45	100.00	0.00	98.86	0.73
	97.73	2.17	100.00	0.00	98.86	1.00
	97.73	2.17	100.00	0.00	98.86	1.00
SUSTENTION	69.32	3.72	61.36	3.39	65.34	2.46
	45.45	5.40	70.45	5.40	57.95	3.32
	93.18	4.65	52.27	2.17	72.73	2.70
SIBILATION	88.64	2.52	100.00	0.00	94.32	1.26
	79.55	4.33	100.00	0.00	89.77	2.17
	97.73	2.17	100.00	0.00	98.86	1.00
GRAVNESS	81.82	4.05	72.73	2.70	77.27	2.31
	100.00	0.00	100.00	0.00	100.00	0.00
	83.64	0.11	25.45	5.40	54.55	4.62
COMPACTNESS	88.66	1.00	100.00	0.00	94.43	0.54
	100.00	0.00	100.00	0.00	100.00	0.00
	97.73	2.17	100.00	0.00	98.86	1.00
TOTALS	89.39	0.82	88.07	0.81	88.73	0.61

* MEAN = 88.73 *
* S.E. = 0.61 *

TOTAL CRT SCORE:

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

FOR SPEAKER: RD *

LISTENER	SCORE
1277	93.75
3345	93.75
4025	92.71
5345	94.79
5406	90.62
6004	95.83
6854	92.71
8066	91.67
9039	97.92
9463	90.62
9557	92.71

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MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	100.00	0.00	94.32	2.95	97.16	1.47
FRICTIONAL	100.00	0.00	90.91	4.85	95.45	2.42
NON-FRICTIONAL	100.00	0.00	97.73	2.17	98.86	1.08
NASALITY	100.00	0.00	100.00	0.00	100.00	0.00
GRAVE	100.00	0.00	100.00	0.00	100.00	0.00
ACUTE	100.00	0.00	100.00	0.00	100.00	0.00
SUSTENTATION	95.45	2.42	77.27	3.88	86.36	2.10
VOICED	97.73	2.17	81.82	5.65	89.77	2.70
UNVOICED	93.18	4.65	72.73	5.97	82.95	2.91
SIBILATION	95.45	2.42	97.73	1.45	96.59	1.68
VOICED	97.73	2.17	97.73	2.17	97.73	1.45
UNVOICED	93.18	3.36	97.73	2.17	95.45	2.42
GRAVENESS	89.77	3.53	70.45	2.42	80.11	2.10
VOICED	95.45	2.01	100.00	0.00	97.73	1.45
UNVOICED	84.09	5.81	40.91	4.85	62.50	3.94
COMPACTNESS	100.00	0.00	100.00	0.00	100.00	0.00
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	100.00	0.00	100.00	0.00	100.00	0.00
TOTALS	96.78	0.73	89.98	1.03	93.37	0.63

* MEAN = 93.37 *
*
* S.E. = 0.63 *

TOTAL CRT SCORE:

SYSTEM TESTED: 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

COMBINED RESULTS - STANDARD ERRORS ACROSS SPEAKERS AND LISTENERS *****

MAIN ATTRIBUTE:	PRESENT		ABSENT		TOTAL	
	MEAN	S.E.	MEAN	S.E.	MEAN	S.E.
VOICING	98.48	0.80	98.15	1.09	94.32	1.05
FRICTIONAL	98.24	0.75	89.30	2.63	94.32	1.32
NON-FRICTIONAL	97.73	1.25	98.91	2.80	94.32	1.62
NASALITY	99.24	0.52	98.88	0.63	99.05	0.39
GRAVE	99.24	0.75	97.73	1.25	98.48	0.71
ACUTE	99.24	0.75	100.00	0.00	99.62	0.37
SUSTENTION	75.38	3.37	66.47	2.66	71.02	2.57
VOICED	65.91	4.77	59.00	5.65	62.50	4.22
UNVOICED	84.85	4.00	74.24	3.93	79.55	2.20
SIBILATION	87.88	2.30	90.24	0.52	89.56	1.18
VOICED	90.15	0.38	99.24	0.75	94.70	1.20
UNVOICED	85.61	3.87	99.24	0.75	92.42	2.00
GRAVENESS	81.82	2.40	77.27	2.11	79.55	1.37
VOICED	97.73	1.25	100.00	0.00	98.95	0.63
UNVOICED	65.91	4.77	54.55	4.21	60.23	2.70
COMPACTNESS	99.62	0.37	99.62	0.37	99.62	0.25
VOICED	100.00	0.00	100.00	0.00	100.00	0.00
UNVOICED	99.24	0.75	99.24	0.75	99.24	0.52
TOTALS	90.40	1.06	88.64	0.57	89.52	0.70

TOTAL DRT SCORE:

* MEAN = 89.52 *
* *
* S.E. = 0.70 *

	BV	JF	RD
MEAN	88.73	86.46	93.37
S.E.	0.61	1.15	0.63

SYSTEM 1104 16-DEC-77 PROBE 1

NUMBER LISTENERS = 11
NUMBER SPEAKERS = 3

LIST.	SPEAKERS			MEAN	S.E.
	BV	JE	RD		
1277	89.58	89.58	93.75	90.97	1.13
3345	88.54	82.29	93.75	88.19	2.70
4026	88.54	80.21	92.71	87.15	3.00
5345	87.50	84.37	94.79	88.80	2.52
5406	86.46	88.54	90.62	88.54	0.98
6004	89.58	87.50	95.83	90.97	2.04
5854	88.54	80.21	92.71	87.15	3.00
8066	91.67	90.62	91.67	91.32	0.28
9339	84.37	87.50	97.92	89.93	3.34
9463	91.67	90.62	90.62	90.97	0.28
9557	89.58	89.58	92.71	90.62	0.85
MEAN	88.73	86.46	93.37		
S.E.	0.61	1.15	0.63		

TOTAL DRT SCORE:

* MEAN = 89.52 *
*
* S.E. = 0.70 *

Appendix D

Use of Listeners and Behavioral Controls in the In-House Diagnostic Rhyme Test Evaluation

Lt. John J. Bowen
Speech Processing Lab
Hanscom AFB, Massachusetts
5 November 1976

D1. INTRODUCTION

The purpose of this report is to review the behavioral aspects of handling listeners for an in-house evaluation capability of the Diagnostic Rhyme Test.

The Diagnostic Rhyme Test (DRT) uses a group of trained listeners involved in a speech discrimination task. The test is designed to compare speech intelligibility between voice communication systems; digital voice processors in this case. The comparison is based upon the listeners' reception, recognition, association, and response of the processed stimulus. Since the validity of the DRT depends on human behavioral processes, which are variable from one listener subject to the next, the use of test controls to minimize these individual variables should improve the consistency and reliability of test results.

The test controls covered in this report will include the experimental effects of the test situation. Experimental effects are the sum of variables introduced into

the test situation by the test administrator, the test subjects, and the test environment itself. A brief section on listener selection and preparation will be included also. Continued research is needed in the areas of listener training and performance tracking to improve the control of consistent results. The report will close with conclusions and recommendations on the handling of listeners for in-house DRT evaluations.

D2. EXPERIMENTAL EFFECTS

As mentioned previously, experimental effects are the summation of all the outside variables contributed by the test administrator, subjects, and environment which contribute to the biasing of the test results. Ideally, a test should measure only those characteristics intended to be measured. Differences among individuals and environments however, can influence and alter test results. If controls can be placed upon the test situation, experimental or test effects can be minimized.

D2.1 Administrator Effects

From research in experimental design and testing, Rosenthal¹ concludes that a variety of biosocial, psychosocial and social psychological factors which interact between the test administrator and his subjects can effect the subjects' behavior and response. Physical characteristics such as age, sex, race, etc. and personality characteristics such as anxiety, hostility, warmth, dominance, etc. can alter the way a subject responds to the administrator and the test itself. The nature of the DRT however, tends to minimize administrator effects. After the initial training period, the listener subjects know how the test is administered and what the administrator expects of them. When a series of DRTs are being conducted, only one administrator should give the test. It is possible that listener responses could be influenced by a change of test administrators in a test.

The test administrator can influence subjects very easily in the instructions he gives them, according to Rosenthal¹. He also points out that a test of simple data collection can be biased by the experimenter or administrator.¹ The administrator must be careful not to tell the listeners anything which could influence their responses. Voiers said that the listeners should not be told their test scores or should never be told to try harder on one test than others.² Listeners should not be told how many tests are left in a series or how much longer they have until the end of a test. The administrator should never give a subject any doubt that he may fail to be a good listener or that he will be removed from the program if he cannot

1. Rosenthal, R. (1966) Experimental Effects in Behavioral Research, Appleton-Century-Crofts, New York.

2. Interview with W. D. Voiers on 28 Sept 1976 at Dynastat, Austin, Texas.

perform adequately. Any such instructions could influence a listener's motivation or attention and cause inconsistent, and thus, unreliable performance.

The best method to control administrator effects is to develop and use standardized procedures for the administration of the DRT.

D2.2 Environmental Effects

Environmental effects are all physical variables present in the test situation which can affect a subject's response. Environmental effects include the comfortability of the test room, temperature, lighting, quietness distractions, etc. A change in one of these variables can decrease a subject's attention to the task and affect the subject's response.

If the environment is kept constant, the listener will know what to expect and will be able to keep his attention focused on listening. Before the test starts, the administrator should insure that the shades are down in the test room, the partitions between the booths are drawn, distractions are removed from the room, headphones work properly, volume is adjusted comfortably, room temperature is comfortable, and that listeners are supplied with the necessary pens and answer sheets. Voiers³ says the DRT is insensitive to volume level but he uses an average vowel peak level of 80 db SPL in his tests. Comfortable room temperature for working is between 70 and 74 degrees. Precautions should be taken to insure that all test booklets are complete. Speaker tapes should be introduced and started the same way so the listeners are not taken by surprise when the tape begins. With the presentation of all the tests standardized, the listeners will not have to worry about distractions which would influence their attention and response.

D2.3 Subject/Listener Effects

Subject effects can be the most variable of the three effects in a test situation. Personality differences among individuals cause them to respond differently in the test situation. The number of speakers and listeners in the DRT tend to minimize listener effects. Controls on listeners' motivation, attention, and expectancies should increase test reliability although studies have not been performed to support this hypothesis.

Listeners' motivation and attention will be discussed as part of listener effects. Rosenthal¹ proposes that individuals who volunteer for studies have three aims or motives which vary among individuals. These aims will also be discussed in this section regarding their impact on listener effects.

3. Voiers, W. D. (1967) Performance Evaluation of Speech Processing Devices, III. Diagnostic Evaluation of Speech Intelligibility, Final Report, Contract No. AF19(628)4987.

D2.4 Motivation

Individuals must be properly motivated to do a task or they will not do it well. Subjects can find both extrinsic and intrinsic motivation in a task like the DRT listener program. Extrinsic motivation includes pay or recognition. For example, letters of appreciation can be sent to the listeners' supervisors. Intrinsic rewards derive from a personal sense of satisfaction, accomplishment, or providing a useful service. Past volunteer listeners have expressed a feeling of high self-satisfaction in participating in the program. Motivation should not be a problem in the in-house DRT program.

D2.5 Attention

Span of attention can vary from one listener to the next. Listeners should understand that they should try to pay an equal amount of attention throughout tests. Listeners who try harder on some tests than others will yield inconsistent results.

Attention is largely a variable of time. Swets and Kristofferson⁴ point out that there are conflicting opinions as to the decrement of word identification performance vs time. Baker says that the "auditory sense is relatively slow to fatigue".⁵

Woodworth and Schlosberg⁶ found that subjects may experience "blocks" in a mental task. Blocks are defined as a person's momentary inability to focus attention. They are involuntary rest periods which delay the onset of fatigue. Rest periods should be used in a test to prevent blocks from occurring since they could cause unwanted variations in test performance.

Voiers uses two groups of listeners and alternates the groups in 20-min work/20 min rest periods for his DRT listeners. He uses 3 to 4-hr sessions.

In-house studies have shown that sets of 20 min work/10 min rest/20 min work periods are most efficient for test with one group of listeners. A minimum of at least 15 min break should be given between these sets.

D2.6 Three Aims of Test Subjects

As was mentioned in the introduction of this section of the report, Rosenthal suggests that there are three reasons or aims of people who volunteer for studies or tests.¹ These three aims are related to subject effects upon a test. These aims should be satisfied to minimize the individuals' effects upon the test.

4. Swets, J. A., and Kristofferson, A. B. (1970) Attention, Annual Review of Psychology, 21:339-366.

5. Baker, L. M. (1960) General Experimental Psychology, Oxford University Press, New York.

6. Woodworth, R. J., and Schlosberg, H. (1965) Experimental Psychology revised, Holt, Rinehart and Winston, Inc., New York.

First, test subjects expect to receive a reward for participating in the study. The different types of extrinsic and intrinsic rewards and their effects have been discussed previously under the topic of subject motivation.

Second, test subjects are usually interested in discovering the rationale behind the test. In some studies, the administrator does not want the subjects to know what they are being tested on, so he uses a blind; a false front for the test. Voiers³ says that familiarity with the DRT does not affect the test. To satisfy the listeners' interest in discovering the rationale of the test, give them a brief explanation of the purpose of the DRT. A summary of voice processors and how the DRT is used to evaluate intelligibility should satisfy the listeners' curiosity and may even develop in them more interest in the program.

The third aim of a subject in a test is to represent himself in a favorable light to the administrator. Subjects are usually curious about their performance. Voiers does not give the test results to his listeners since it could bias later responses. Subjects also try to conform to the expectations of the experimenter, which could lead to biasing through experimenter effects if the administrator is not careful. To solve this problem for the listeners, the administrator should encourage the listeners by recognizing their efforts. He can assure them and show appreciation without giving them the test results. Rosenthal¹ says that a "self-fulfilling prophecy" works on test subjects. If the administrator does not give the listeners any reasons why they would fail as good listeners, and assures them that they are performing well, they should not worry about how they are performing. This, in turn, should minimize any effects due to the listeners doubting their performance.

D3. LISTENER PREPARATION

This section will briefly discuss some aspects of listener selection and use of listeners in the DRT.

Since the DRT is a speech discrimination task, subjects must pass certain hearing tests before they can become listeners in the program. First, the subject must have normal hearing as determined by an audiometer test. Voiers uses a range of 250 to 8000 Hz.⁷ Second, the subject must be able to discriminate between the present and absent states of all six voice attributes. Voiers et al found that hearing impairment is not unidimensional⁸ and may go beyond simple tone reception. Different aspects of speech discrimination performance are affected depending on

7. Voiers, W. D. (1969) The Effects of Masking Voices on the Apprehensibility of Six Consonant Attributes, Scientific Report No. 1, AFCRL Contract No. AF19(628)-5883.

8. Voiers, W. D., Sharples, A. D., and Hehmsoth, C. J. (1973) Research on Diagnostic Evaluation of Speech Intelligibility, Final Report, AFCRL Contract No. FI9628-70-C-0182.

the degree and nature of the hearing impairment.⁸ This aspect of hearing impairment can be determined by checking the performance of trainee listeners over a control DRT tape. Performance in each voice attribute should level out after a period of practice. Erratic performance on any attribute would indicate a hearing impairment in that individual and he should not be used as a listener. Further tests need to be performed in this area however, since it is unknown how long it takes the average listener to find a consistent level of performance in all attributes. Answers to this question would define the training period for new listeners and would discriminate between good and bad listeners.

After a pool of listeners is established and you are ready to test, trained listeners need a warm-up test before each session of DRTs. Voiers says two speaker lists prove enough warm-up to get the listeners reaccustomed to the DRT.³ In-house tests have supported this finding. The warm-up lists should not be the same lists which are to be evaluated in the test.

During each DRT session, each listener should be tested to make sure he is performing satisfactorily. Responses from a listener who is under emotional stress, tired, etc. during one session will differ from his normal performance. If this occurs, the listeners' results should not be used in that evaluation. Since eight listeners are used in the DRT, ten listeners should be tested to allow for two sets of results to be discarded for the preceding reason. A control tape, played once each session, can be used to track the listeners' performance for that day and compare it to their standard performance. Research is necessary in this area to establish criteria on acceptable performance limits for listeners.

D4. CONCLUSIONS AND RECOMMENDATIONS

The DRT is designed so as to minimize experimental effects. The precautions suggested previously in this report, are an aid to insure experimental effects are minimized. The test administrator should be aware of the influence he has on a test, even the DRT. The environment should be kept comfortable and free of changes. After the training period, the listeners should settle into a comfortable understanding and consistency in taking the DRT. Therefore, very little in the way of recommendations on a standard set of instructions can be given to the listeners every time they come to take the test. They will know what their job is. All the administrator need do is remind them to pay consistent attention and how to score the answer sheet. They should become familiarized enough not to require detailed instructions for every session.

There are only two major areas that need refining to better implement the in-house DRT evaluation. The first area involves the discrimination between good

and bad listeners. A good listener is a consistent scorer. An inconsistent listener can not be used in the DRT program. A statistical test to define the limits of consistency has not been developed as of yet. Once criteria have been developed, the bad listeners can be identified and a pool of good listeners can be established for use in the in-house program.

The second area of research involves the tracking of listener performance. Once again, statistical tests have yet to be developed to record the on-going performance of the established listener pool. A statistical test to establish confidence intervals for each individual's performance must be developed to validate each listeners' performance during each DRT.

Once statistical tests to discriminate between consistent and inconsistent listeners and statistical tests to track each individual's performance are developed, the in-house capabilities for the DRT should be sufficient to conduct reliable testing.

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1. Rosenthal, R. (1966) Experimental Effects in Behavioral Research, Appleton-Century-Crofts, New York.
2. Interview with W. D. Voiers on 28 Sept 1976 at Dynastat, Austin, Texas
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