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PSYCHOACOUSTIC SPEECH TESTS: A MODIFIED RHYME TEST

ABSTRACT

A multiple choice, easily scored speech test has been developed and evaluated. It was found that the speech intelligibility scores obtained with this test remain consistent for a given communication system when tested nearly daily for a period of one month using enlisted personnel as test listeners.

This TDR has been reviewed and is approved.

ANTHONY DEBONS Colonel, USAF Director, Decision Sciences Laboratory Deputy for Engineering and Technology

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SECTION 1

INTRODUCTION

There is a pressing need in some branches of the military services to routinely evaluate the ability of voice communication systems to transmit intelligible speech. Ideally this "evaluation" should be done in a manner that provides a direct quantitative measure of the ability of operational personnel to understand spoken messages over any system. The testing procedures should require but a few minutes, little or no equipment, and untrained listeners. This method or technique should, of course, be reliable and should supplement the less direct pure-tone "calibration" and other electronic test procedures typically used to check the electronic functioning of a speech system.

The most obvious methods to use are the so-called speech "articulation" or speech "intelligibility" tests. Such tests have been used for many years in the laboratory for the evaluation of the performance of speech communication systems.

Unfortunately, the literature dealing with speech intelligibility and articulation testing gives ample evidence of the tedious and timeconsuming nature of these methods. Testing methods that are convenient to administer and score, and, at the same time, are short and reliable do not appear to be available. The present investigation represents an attempt to develop and evaluate an instrument that can be used routinely by relatively naive talkers and listeners, that is, operational personnel, to evaluate the condition of communication systems.

The format used is similar in general respects to that described by Fairbanks as a rhyme test.¹ It differs somewhat in its composition,

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^{1.} G. Fairbanks, Test of phonemic differentiation: The rhyme test. J. Acoust. Soc. Am. 30, 596-600 (1958).

consisting of six alternate word lists in which no account is taken of word familiarity, nor of the relative frequency of occurrence of sounds in the language, nor of the orthographic constraints imposed on the Fairbanks' materials. In addition, the present materials use variable phonemic elements in word-final as well as word-initial position.

The major innovation in the present investigation has to do with the task required of the listener. The listener has available to him a closed set of six alternatives from which he is required to select his identification of the message. The response sets are generated automatically by the structure of the six forms of the articulation In actuality the listener has available a complete description test. of the overall message set and he is asked to select from it the word being transmitted. This technique has the advantage of eliminating the learning time required in the usual speech intelligibility tests where the listeners must be trained for a number of days before they become thoroughly familiar with all the words used in the speech tests. Since little or no learning is required it should be possible to make use of relatively naive listeners. In addition, it is believed that the test, with suitable "scramblings" or re-arrangements of the test items, can be administered over and over again to the same listeners without the scores changing as a result of the listeners finding the test "easier" with practice. This, of course, is an important problem for the repeated, periodic testing of speech systems in the field.

The materials to be described retain a high degree of phonemic balance from test form to test form, and, therefore, lend themselves to analytic appraisals of transmission in terms of speech sound elements. The identification of sound confusions in a speech link constitutes valuable diagnostic information that can lead to the identification of specific malfunction.

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SECTION 2

THE TESTS AND ANSWERS SHEETS

Six lists of American English words were used as test materials, each list consisting of 50 monosyllabic words. As a rule the words are of the form consonant-vowel-consonant (CVC); some few words take the form CV or VC. The lists were constructed in such a way as to form 50 ensembles, each composed of six related words. Any given ensemble is characterized by one vowel that is the nucleus of each word; all of the words in a given ensemble either are initiated or terminated by the same consonantal phoneme or phoneme cluster.

An example of an ensemble in which each word contains the vowel /1/ and ends with the consonant /t/ is

meat, feat, heat, seat, beat, neat.

Each word in this ensemble appears in a different test list, while the ensemble itself is presented to the listener as a finite, response set.

The ensembles used in this study include 25 in which the final consonant is constant and 25 in which the initial consonant is constant. Elements that were varied in initial position in words number 20 (including the absence of a consonant, indicated by #), but six of these did not appear in all test forms. Similarly, 20 consonantal elements were used as variables in final position, but only 10 appear in all test forms. In all, 23 variable elements are used in the test material, 13 occurring in initial position in every test form, 10 occurring finally in every form, and nine occurring both initially and finally in every test form. The number of times variable elements occur is given in Table 1.

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Table 1. Frequency of occurrence of variable consonantal elements. The symbol # indicates the absence of a consonant. Items marked * occur in all six test forms in word initial position; items marked * appear in all test forms in word final position. 2

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| t*+ | 29 | r* | 12 |
|-------------|----|-----|----|
| k *+ | 27 | w* | 9 |
| s*+ | 26 | v | 6 |
| n+ | 24 | ŋ | 5 |
| p*+ | 23 | # | 5 |
| b *+ | 20 | θ | 5 |
| d*+ | 19 | Z | 4 |
| l*+ | 17 | ſ | 3 |
| m*+ | 16 | t∫ | 3 |
| f* | 16 | Ċy. | 3 |
| g*+ | 14 | อ้ | 2 |
| h * | 12 | | |

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The nonvarying consonantal elements used in the word lists are shown in Table 2; Table 3 shows the distribution of vowel sounds according to ensemble structure.

| | Initial | Final | | Initial | Final |
|---|---------|-------|----|---------|-------|
| p | 5 | 2 | f | l | Ŭ |
| ď | 3 | 0 | В | 5 | 0 |
| t | 2 | 3 | L | l | 4 |
| d | 2 | 2 | r | l | 0 |
| k | 3 | 2 | h | 1 | 0 |
| g | 0 | 1 | | | |
| | | | st | 0 | 2 |
| m | 1 | l | nt | 0 | 1 |
| n | 0 | 3 | rk | 0 | l |
| ŋ | 0 | l | | | |
| - | | | # | 0 | 2 |

Table 2. Frequency of occurrence of constant nonvocalic elements in ensembles, according to position in word.

Table 3. Frequency of occurrence of vowel sounds, according to consonantal structure of ensemble.

| Variable | | | | | | | | | | | | |
|----------------------|---|---|---|---|---|---|---|---|---|----|---|--|
| | i | I | 3 | e | æ | a | 0 | ۸ | С | IC | U | |
| Initial Consonant | 2 | 6 | 4 | 3 | 1 | 3 | 1 | 2 | 1 | 1 | 1 | |
| Final Consonant | 5 | 5 | 0 | 5 | 5 | 0 | 0 | 5 | 0 | 0 | 0 | |

The spoken lists. Since the individual words were to be identified by the listeners as a particular item in a known response set, that is, as one of six words, the order of the items in each of the six test lists is best considered as an order of ensembles. The 50 ensembles, therefore, were arranged arbitrarily in three orders, providing three forms of each of the six test lists (see Appendix I). These 18 word lists were read by two adult male talkers with experience in the recording of materials for use in listening tasks. Between each word approximately 5 sec was provided for the listener's response. The words were spoken without instrumental monitoring, the talkers attempting to maintain a constant level of vocal effort throughout each list.

The lists were recorded on magnetic tape on a high-quality system arranged in a two-room sound-treated recording facility. The major components of the system were an Altec 21-D microphone system and an Ampex 351-2 tape recorder operating at 15 ips. The talkers were seated comfortably and the microphone was positioned 12 in from their lips. The recorder gain was adjusted so that talker levels were approximately equal.

The response forms. The listener always was provided with a response form that contained the 50 word ensembles in the proper order of the presentation. Each ensemble was enclosed in a rectangular box with its six words on two lines, as for example,

| meat | feat | heat |
|------|------|------|
| seat | beat | neat |

Listeners were instructed to draw a line through the item heard. A copy of the written instructions presented to the listeners is included in Appendix \square .

In addition to varying the order of ensembles on the response form to correspond to the order of word presentation in the three lists recorded by the talkers, the arrangement of items in each response ensemble was permuted systematically so that each word appeared once in every location. (This concern with possible spatial biases was motivated by considerations relevant to eventual mechanization of tests of this type, since button-pressing activities may be biased by spatial location.) In other words, six different response sheets were available for each form of the test; only three orders of ensembles occurred on the response sheets, but similar ensemble orders differed in the arrangement of the words within ensembles. Samples of the six response sheets are included in Appendix II.

SECTION 3

EXPERIMENTAL EVALUATION OF TEST

An experiment was performed to determine the general reliability and acceptability of this new test when administered under a wide variety of voice conditions to Air Force enlisted personnel. In this experiment we wished to determine whether: (a) the different forms of the tests differed in terms of difficulty under different testing conditions; (b) the listeners required any special training in order to use the tests; (c) the scores of a group of listeners changed significantly with repeated exposure to the same test forms; and (d) there were nonfunctional or "dead wood" items present in the tests.

The word lists were presented to listeners at six ratios of signal and noise. The master recordings of the lists were played on a high-quality tape system and mixed appropriately with speechshaped noise before presentation to the listeners under an earphone. The arrangement of the stimulus presentation equipment is shown in block diagram form in Fig. 1. All listening was done monaurally with TDH-39 (10-ohm impedance) earphones; a dummy earphone was on the opposite ear. Subjects were seated comfortably in armdesk chairs located in a relatively quiet classroom at an Air Force Base.

The speech output of an Ampex 601 playback was constant at a level of approximately 80 db SPL, and the noise level was manipulated to provide signal-to-noise ratios of +4, 0, -4, -8, -12, and -16 db. These levels were arrived at during preliminary training sessions.

The listeners were 18 enlisted men on active duty in the U.S. Air Force. The ages of the listeners ranged from 18 to 28 years with a mean of 23.8 years. The hearing of all listeners was tested with a standard clinical audiometer. Two subjects had slight deviations of acuity from normal threshold for pure tones at 4 and 6 kcps, but not sufficient for rejection as subjects; no other abnormalities were noted.

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POWER ATTENUATOR AMPLIFIER JACK-BOX POWER ADDER VTVM 6 TDH - 39 Monaural (Headsets AMPLIFIER SPEECH SHAPING FILTER ATTENUATOR ATTENUATOR NOISE GENERATOR RECORDER TAPE



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In order to cancel out various biasing effects on the listeners' responses, the order of presentation of the test materials was regulated by a schedule based on a quasi-symmetrical, 12 x 12 latin square. In this schedule each row of the matrix contained each of the six test lists produced by each of the two talkers; such a sequence of lists, that is, one row of the matrix, was equivalent to two listening sessions. Within each row, however, the signal-to-noise ratio at which lists were presented was varied, as was the (ensemble) order within lists and the arrangement of response ensembles, that is, response sheets, in the hands of the listeners. The arrangement was not completely counterbalanced, and the listeners did not have an opportunity to hear both talkers' versions of every list at each signal-to-noise level. All lists were presented at every level, however, and each talker was heard at every level.

In practice, the 18 listeners were divided into four groups, two groups consisting of four men and two consisting of five men. The listening schedule of each group of subjects was started on a different row of the matrix, and progressed thereafter from row to row until all of the conditions of the entire schedule had been experienced. The testing procedures were accomplished over a period of approximately 30 days. The listeners did not score their own response sheets after each test was administered, and, hence, were not aware of their successes and failures as the experiment progressed.

Results

The general results of the testing procedures are displayed in Fig. 2. Responses are averaged over 18 listeners and the percent correct is plotted versus the six presentation levels. The average responses to the various test forms, A-F, are identified for each of the two talkers versions of these materials. Solid

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lines connect the level of average response to each talkers' materials at the various levels.

This presentation indicates clearly that, on the average, the listeners found the tests recorded by one talker more intelligible than those recorded by the other talker. This disparity is consistent from level to level; although at high levels of correct response the difference between the two sets of materials is reduced, the recording of the two talkers elicit responses at different levels of success even in the most favorable signal-tonoise condition.

The progression from poor response at unfavorable S/N levels to increasingly better levels of success as the S/N conditions are improved is approximately as expected. The response improvement over the linear portion of the curves, however, is about 5% for every 1 db of improvement in S/N level. This increase in successful response is at a faster rate than reported by Fairbanks with comparable materials in a different test format. The six nominal S/N levels, selected on the basis of pilot data runs, can also be seen to be inefficient; perhaps smaller separations between levels and a general shift toward larger negative ratios would have been more suitable.

The average responses to the six test forms at various levels are tabulated in Table 4, part A. The average levels of response to the six forms of the test, the column means, are seen to be highly similar, as suggested by the lack of correlation between various tests from level to level in Fig. 2. A statistical test of significance, of course, cannot reject the hypothesis of no difference between test form means.

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FIG. 2 CORRECT RESPONSES AVERAGED FOR 18 LISTENERS

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Table 4. Average percent correct response for 18 listeners arranged according to test form and signal-to-noise level of presentation. Part A: actual data. Part B: average 'corrected' to account for talker differences.

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| S/N Levels | | | ŗ | Test 1 | Forms | | | |
|-----------------|----|----|----|--------|-------|------------|----|-----|
| (dB) | A | В | С | D | E | цŗ | Mn | SD |
| -16 | 32 | 43 | 33 | 34 | 33 | 38 | 35 | 4.0 |
| -12 | 53 | 51 | 50 | 57 | 55 | 60 | 54 | 3.4 |
| -8 | 74 | 81 | 69 | 83 | 66 | 79 | 75 | 6.1 |
| -4 | 90 | 86 | 90 | 84 | 93 | 85 | 88 | 3.1 |
| 0 | 96 | 95 | 94 | 90 | 93 | 92 | 93 | 2.2 |
| .1 1 | 98 | 98 | 97 | 92 | 98 | 95 | 96 | 2.2 |
| Mn | 74 | 76 | 72 | 73 | 73 | 75 | 74 | |
| | | | | | B | | | |
| -16 | 31 | 38 | 36 | 32 | 34 | 40 | 35 | 3.5 |
| -12 | 54 | 56 | 52 | 54 | 56 | 58 | 55 | 2.1 |
| -8 | 78 | 75 | 76 | 76 | 75 | 7 7 | 76 | 1.2 |
| -4 | 90 | 86 | 90 | 88 | 88 | 86 | 88 | 1.8 |
| 0 | 96 | 96 | 94 | 93 | 95 | 93 | 94 | 1.4 |
| +4 | 98 | 98 | 97 | 96 | 97 | 97 | 97 | 0.8 |

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The row (that is, level) means in this table are essentially as forecast by Fig. 2, but the magnitude of the standard deviations may be surprising. These SD's reflect the variation seen in the form scores at a given level; this variation is attributable to the incomplete balance in the test administration. The entry 81% for Form B at level -8, for example, is based only on responses to talker CW, and, therefore, is an inflated estimate. The lower portion of the table, part B, is an estimation of the scores that would have resulted if complete balancing had been achieved. Missing entries have been estimated by averaging other forms. This reconstruction emphasizes the stability of responses from level to level, and would result in smaller values of SD.

A test of the row means in Table 4, part A, indicates, as expected that statistically significant differences do exist between these values. For these data, a difference of about 10% is required at the 5% level of confidence. In Fig. 3 the form-to-form variation suggested by Table 4, part B, is displayed graphically for the four most unfavorable S/N ratios. The average correct response for the 18 subjects over six S/N levels is included.

Table 5. Average percent correct responses for 18 listeners arranged according to listening groups. Data arranged over levels, test forms, and talkers.

| Group | Individuals | | | | | | | | | | |
|-------|-------------|----|----|----|----|----|--|--|--|--|--|
| 1 | 71 | 74 | 72 | 73 | 76 | 73 | | | | | |
| 2 | 73 | 72 | 73 | 75 | - | 73 | | | | | |
| 3 | 77 | 72 | 74 | 76 | 75 | 75 | | | | | |
| 4 | 7 3 | 73 | 76 | 75 | - | 74 | | | | | |

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FIG. 3 AVERAGED RESPONSES SHOWING TEST FORM CHARACTERISTICS

The behavior of the listeners follows patterns commonly found in behavioral experiments. The average percent correct response for each of the 18 listeners was close to the grand average of 74%. The standard deviation of individual averages was 1.7; the range was 6, varying from 71% to 77%. The 18 listeners whose data are analyzed were rotated through the listening schedule in four groups. The group averages and individual averages are reported in Table 5.

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A rapid indication of the differences, albeit small, that exist amongst the listeners is afforded by examining the mean performance level of each subject on each row of the schedule matrix. Each matrix row included two talkers versions of the six test forms, and included tests at all six S/N ratios. The Friedman² nonparametric test of significance was applied to the ranks of the matrix means for each listener and indicated that the differences among the listeners' averages would occur by chance with a probability less than 0.01. The test indicates essentially that substantially high correlation exists between the performance of the individuals in the listening group from row to row in the listening schedule. Rank-difference correlation coefficients for the 18 listeners calculated between individual rows of the schedule matrix and the grand average for each listener ranged for 0.40 to 0.85 (with 7 out of the 12 coefficients exceeding 0.75).

These findings suggest that a high degree of temporal stability exists in the materials. Figure 4 shows the average response of the 18 listeners at the various S/N levels on their 'nominal' first and last testing days. Repeated exposure to the materials did not change the average response levels in any appreciable way.

^{2.} S. Siegel, <u>Nonparametric Statistics for the Behavioral Scientist</u> (New York: McGraw Hill, 1956).

Some additional insight into the variability of the responses of individual listeners was sought by examining the scores of individual tests. For example, the 18 listeners heard talker AH in 12 tests administered at a S/N ratio of -8db. (The forms included in these 12 tests were A, C, E and F.) The standard deviation of the 12 scores provided by each listener was computed and these were found to range from 5.6 (4 listeners!) to 10.7%; the average of the 12 SD's was 7.8.

Table 6. Average percent correct responses arranged according to test forms and position of phonetic variable.

| | A | в | С | D | E | F |
|---------|----|----|----|----|----|----|
| Initial | 78 | 81 | 79 | 79 | 78 | 81 |
| Final | 68 | 71 | 66 | 67 | 68 | 67 |



FIG, 4 AVERAGE RESPONSES SHOWING TEMPORAL STABILITY

Tests of Initial and Final Consonants

Since each of the six alternate forms consists of 25 items in which word-initial consonant sounds are under test and 25 items in which word-final sounds are under test, it may be of interest to examine these two halves separately. In general the distribution of sounds under test is similar in these two halves, the major exceptions being consonants that occur in English only in one or the other position. The sound <u>h</u>, for example, does not occur in word-final position in the language; similarly for the sound <u>w</u>. A few sounds are used in only one half of the test to provide a needed ensemble, <u>z</u> in final position, for example.

The average percent of correct response for the two halves of the various forms of the test is given in Table 6. The tabulated data indicate that the halves of each form behave very similarly, the variation in average correct response from form to form being very low. The data demonstrate the generally known fact that initial consonants are more recognizable than final consonants, the average correct response to the latter being 68% and to the former, 80%. The question of whether either half of the test would be sufficient for testing purposes seems worthy of investigation.

The responses of the listeners can be analyzed to reveal the degree of success with which various consonantal elements were identified. In Table 7 are tabulated the average percent of correct responses associated with various consonantal elements, as indicated. The results are shown separately for consonants in initial and final positions. These data indicate that while the superiority of initial consonants over final consonants is generally maintained, there are instances where no appreciable difference is found. They also show a tendency for the voiceless form of cognate sounds to be heard more correctly than the voiced form, as for example, $\underline{p} > \underline{b}$, $\underline{f} > \underline{v}$, $\underline{t} > \underline{d}$.

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This last finding is of particular interest since it is at variance with classical descriptions of speech sound discrimination results. The data reported by Fletcher³, for example, indicate that, on the average, the voiced forms are perceived more readily than unvoiced forms. The Fairbanks' (1) rhyme test data support this general observation (but there are some inversions in his Table VI, notably $\underline{s} > \underline{z}$ and $\underline{f} > \underline{v}$).

The data on Table 7 are also at variance with the descending order of percent correct identification of sounds reported by Fairbanks (1). He found, for example, that when the general level of identification for his materials as a whole was 50%, the nasal consonants m and n were correctly identified at the highest rate while s, p and t were poorly identified. Examination of Table 7 reveals that these sounds in initial position (Fairbanks' materials were all in this position) rank inversely to the Fairbanks data. The data in Table 7, of course, are averaged over six signal-to-noise ratios but examination of the data in detail reveals that the general order is maintained from level to level. When the 14 sounds in Fairbanks' Table VI that appear in Table 7 are compared a rank-difference correlation coefficient of -0.53 results, indicating a general inversion in order. It is possible that disagreements between our results and those reported by Fairbanks and others may be at least partially due to differences in the characteristics of the masking noises used in the various experiments. In contrast to the earlier studies which used noise of equal intensity at all frequencies, the present study used a masking noise that was shaped to approximate the long-time speech spectrum envelope.

Confusion Matrices

A detailed analysis of the confusions manifested by the listeners' responses is not undertaken here. In general, it can be said that these confusions follow theoretical expectations and previous results to a marked degree.

^{3.} H. Fletcher, <u>Speech and Hearing in Communication</u> (New York: D. Van Nostrand Co. Inc., 1953).

Table 7. Average percent correct responses arranged according to phonetic elements. Initial (I) and final (F) occurrences of phonetic elements are tabulated separately. The symbol * indicates that a sound in a given position is not in all six forms of the test; the symbol ** indicates that the sound occurs in but one form of the test in the position indicated.

| | ī | <u>F</u> | | Ī | F |
|---|------|--------------|----|-----------------|-----------------|
| p | 82 | 56 | tj | - | 83* |
| t | 91 | 79 | | | |
| k | 83 | 65 | ኇ | 85 ** | 69** |
| ъ | 72 | 57 | m | 67 | 38 |
| đ | 75 | 64 | n | 66 ** | 64 |
| g | 77 | 70* | ŋ | - | 57* |
| f | 86 | 74* | W | 79 | _ |
| θ | 81** | 56* | r | 69 | 68 |
| s | 98 | 96 | L | 71 | 74* |
| ſ | 61* | - | | | |
| h | 70 | - | # | 70 [*] | 79 [*] |
| v | 61** | 65 * | | | |
| ð | 66** | 44 ** | | | |
| z | _ | 91 | | | |

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Confusion matrices for the 50 ensembles averaged over talkers, listeners, test forms and six signal-to-noise ratios make up the body of Appendix III. These matrices reproduce the number of responses made to each word in every ensemble. The arrangement of words is arbitrary and the rows do not correspond to test forms. Since there was an imbalance in the original schedule for administering the tests the row totals are not the same, but vary between 432 and 437; the total number of responses in each matrix is 2604.

The average correct response to each word has been derived from the matrices in Appendix III and is reported as a percentage in Appendix I.

Appendix I

The test materials are presented as a list of ensembles, arranged in two parts. Ensembles are read across the rows. The first 25 ensembles are formed by variation of final (phonetic) elements, and are tabulated alphabetically by initial letter. The second 25 ensembles are formed by variation of initial elements and are ordered alphabetically by final letter.

The columns headed by letters A-F represent forms of the test. The right hand columns headed by the numbers 1-3 indicate the ensemble (and test) orders used in the three versions (scrambles) of each test form as used in the present experiment.

The number in parentheses that follows each word is the percent of correct responses averaged over 18 subjects, 6 levels and 2 talkers. The numbers in parentheses following form headings are averages of correct responses over 25 words; the numbers in parentheses following each ensemble number are averages of correct responses for each ensemble.

Section 1: Variations of Final Element

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| | | | | Forms | | | |)rde | rs |
|-----------------|-------------------|-------------------|-----------------|-----------|-------------------|---------------------|----|------|----|
| | A(68) | B(71) | C(66) | D(67) | E(68) | F(67) | 1 | 2 | 3 |
| 1(77) | bat (7 0) | bad (68) | back (55) | bass(98) | ban(70) | bath(60) | 43 | 17 | 36 |
| 2(56) | bean(47) | beach(83) | beat(76) | beam(14) | bead (55) | beak(59) | 35 | 34 | 50 |
| 3(73) | bun(72) | bus(99) | but(63) | buff(71) | buck (56) | bug(75) | 27 | 48 | 17 |
| 4 (64) | came(38) | cape(55) | cane (50) | cake(72) | cave(69) | case(97) | 41 | 21 | 40 |
| 5(74) | cut (80) | cub(63) | cuff(70) | cup(66) | cud (70) | cuss (98) | 37 | 30 | 44 |
| 6(70) | dig(71) | dip(80) | d1d(62) | dim(65) | dill(67) | din(74) | 4 | 8 | 22 |
| 7 (61) | duck(76) | du d (68) | dung(63) | dub(2E) | dug(64) | dun (68) | 46 | 11 | 30 |
| 8(76) | fill(73) | fig(81) | fin(71) | fizz(94) | fib(54) | fit(82) | 39 | 25 | 43 |
| 9(63) | hear(73) | heath(54) | heal(62) | heave(71) | heat(86) | heap(30) | 14 | 29 | 47 |
| 10(73) | kick(62) | king(83) | kid(71) | kit(82) | kin(63) | kill(75) | 18 | 37 | 13 |
| 11 (67) | late (79) | lake(65) | lay(80) | lace(96) | lane (59) | lame(21) | 2 | 4 | 18 |
| 12(67) | map(50) | mat(76) | math(57) | man(67) | mass(97) | mad(54) | 32 | 40 | 9 |
| 13(73) | page(69) | pane(73) | pace(96) | pay(78) | pale(61) | pave(63) | 10 | 20 | 35 |
| 14(71) | pass(97) | pat(83) | pack(52) | pad(69) | path(54) | pan(69) | 50 | 3 | 21 |
| 15 (79) | peace(87) | peas(88) | peak(63) | peal(70) | peat(81) | peach(86) | 24 | 47 | 12 |
| 16(67) | pill(71) | pick(64) | pip(46) | pig(78) | pin(66) | pit(80) | 8 | 16 | 31 |
| 17(68) | pun(65) | puff(70) | pup(53) | puck(54) | pus(98) | pub (69) | 16 | 33 | 3 |
| 18(79) | rave(60) | rake(63) | race(96) | rate(87) | raze(89) | ray(79) | 20 | 41 | б |
| 19(61) | sake(72) | sale(64) | save(64) | sane(58) | safe(77) | same(32) | 31 | 42 | 11 |
| 20(70) | sad(64) | sass(99) | sag(63) | sack(65) | sap(55) | sat(73) | 22 | 49 | 14 |
| 21(49) | seep(48) | seen(52) | seethe(44) |)seed(45) | se em(26) | seek(80) | 45 | 13 | 32 |
| 22(67) | sing(76) | sit(72) | sin(65) | sip(46) | sick(72) | si ll(70) | 29 | 44 | 15 |
| 23(64) | sud(72) | sum(43) | sub(71) | sun(72) | sup(72) | <pre>sung(54)</pre> | 6 | 12 | 27 |
| 24(64) | tab(57) | tan(54) | tam(61) | tang(81) | tack(63) | tap(70) | 12 | 24 | 39 |
| 25(75) | teach(81) | tear(74) | tease(92) | tea1(65) | team(70) | teak(68) | 48 | 7 | 25 |

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Section 2: Variation of Initial Element

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| | | | 1 | forms | | and the second second second | | rde | rs |
|-----------------|-------------------|-------------------|------------------|------------------|--------------------|------------------------------|----|-----|----|
| | A(78) | B(81) | C(79) | D(79) | E(78) | F(81) | 1 | 2 | 3 |
| 1(78) | led(67) | shed(98) | red(66) | bed (74) | fed(82) | wed(78) | 47 | 9 | 28 |
| 2(85) | sold(97) | told(99) | hold(60) | fold(89) | gold(78) | cold(85) | 1 | 2 | 16 |
| 3(72) | dig(67) | wig(77) | big(66) | rig(54) | pig(79) | fig(90) | 42 | 19 | 38 |
| 4(86) | kick(79) | lick(73) | sick(98) | pick(88) | wick(82) | tick(94) | 28 | 46 | 1 |
| 5(79) | book(62) | took(97) | shook(95) | cook(82) | hook(65) | look(75) | 19 | 39 | 4 |
| 6(67) | ha r k(63) | dark(73) | mark(60) | lark(54) | park(78) | bark(73) | 38 | 28 | 46 |
| 7 (82) | gale(79) | male(66) | tale(86) | bale(74) | sale(100) | pale(84) | 23 | 45 | 10 |
| 8(77) | peel(81) | reel(76) | feel(85) | heel(74) | keel(81) | eel(63) | 13 | 27 | 45 |
| 9 (78) | will(76) | hill (61) | kill(86) | till(93) | fill(88) | bill(66) | 21 | 43 | 8 |
| 10 (83) | foil(80) | coil(84) | boil(76) | oil(76) | toil(83) | soil(98) | 40 | 23 | 42 |
| 11(86) | fame(80) | same(99) | came(85) | name(74) | t ame(90) | game(86) | 30 | 37 | 41 |
| 12(73) | ten(93) | pen (86) | den(65) | hen(61) | the n (66) | men(68) | 36 | 32 | 48 |
| 13(88) | pin(85) | sin(98) | tin(92) | win(84) | din(79) | fin(90) | 5 | 10 | 24 |
| 14(80) | sun(99) | nun (70) | gun (75) | fun(87) | bun(65) | run(82) | 26 | 50 | 19 |
| 15 (82) | rang(79) | fang(89) | gang(74) | bang(76) | sang(99) | hang(78) | 33 | 38 | 7 |
| 16(84) | tent(92) | bent(81) | went(80) | dent(76) | rent(73) | sent(99) | 25 | 1 | 26 |
| 17(83) | sip(98) | rip(75) | tip(92) | dip(81) | hip(79) | lip(72) | 34 | 36 | 5 |
| 18(81) | top(76) | hop(79) | pop(79) | cop(80) | mop(73) | shop(96) | 11 | 22 | 37 |
| 19(72) | meat(58) | feat(89) | heat(69) | seat(99) | beat(68) | neat(51) | 17 | 35 | 2 |
| 20(82) | kit(84) | bit(74) | fit(84) | sit(98) | wit(75) | hit(77) | 49 | 5 | 23 |
| 21 (77) | hot(75) | got(78) | not(72) | pot(75) | lot(69) | tot(93) | 7 | 14 | 29 |
| 22(72) | nest(64) | vest(61) | west(75) | test(94) | best(71) | rest(66) | 44 | 15 | 34 |
| 23(78) | bust(78) | just(90) | rust(76) | must(71) | gust(73) | dust(80) | 3 | 6 | 20 |
| 24(80) | raw(63) | paw(82) | law(70) | jaw(85) | thaw(81) | saw(97) | 15 | 31 | 49 |
| 25(83) | way(81) | may(72) | say(9 8) | gay(83) | day(75) | pay(89) | 9 | 18 | 33 |

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Appendix II

The materials presented to the listeners included standard instructions and various response forms. The instructions were given in the written form shown here and were also presented orally with the listeners following along on their own copies.

The six response forms are labeled 1X, 1Y, 2X, 2Y, 3X, and 3Y. Forms with the same number have the same order of ensembles. Each order (i.e., form number) has two word arrangements within ensembles, an X and Y designation. In addition, the arrangement of words within ensembles is never the same for any two X or Y forms, that is, the spatial arrangement of words within ensembles is different for each of the six forms.

INSTRUCTIONS

You are going to hear some one syllable words presented with different loudness levels of noise. Each word will be presented in a carrier phrase giving its particular item number. For example:

Number one is <u>tree</u>. Number two is <u>mile</u>.

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The word presented will be one of the six words which are printed on your answer sheet for that particular item. Your task is to identify the word presented by drawing a line through the word <u>you</u> hear. For example:

Number three is tow.

row tow low mow sow bow

Some words will be easier to hear than others. If you are not sure what the word is -- guess. <u>Always</u> draw a line through one of the six words for each item number.

Are there any questions?

The above instructions were presented orally, the subjects following along on their own copy of the instructions.

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| N | AME_ | ······ | | | | | DA | TE | | | TE | EST I | NO | | |
|-----|--------------|--------------|----------------|----|-------------------|---------------|--------------|-----|--------------|---------------|----------------|-------|------------------------|---------------------|---------------|
| | | | | | | | FO | RM_ | 1X | | sc | ORE | | | |
| ۱ [| lick wick | pick sick | tick kick | 14 | sad sat | sass sap | sag sack | 27 | sung sud | sup sum | sun sub | 40 | cave cape | cane cake | came case |
| 2 | seat heat | neat neat | beat feat | 15 | sip sin | sing sill | sick sit | 28 | red bed | wed led | shed fed | 41 | game fame | tame same | name came |
| 3 | pus puff | pup puck | pun pub | 16 | sold cold | told gold | hold fold | 29 | hot tot | got lot | not pot | 42 | oil boil | foil soil | toil coil |
| 4 | look book | hook took | cook shook | 17 | buck bus | but buff | bun bug | 30 | dud dug | dub dung | dun duck | 43 | fin fizz | fit fill | tig fib |
| 5 | tip dip | lip sip | rip hip | 18 | lake lane | lace lay | lame late | 31 | pip pig | pit pill | pick pin | 44 | cut cuss | cub cud | cuff cup |
| 6 | rate race | rave ray | raze rake | 19 | gun fun | run sun | nun bun | 32 | seem seen | seeth seed | e seep seek | 45 | f ee l hee l | eel peel | reel keel |
| 7 | bang gang | rang hang | sang fang | 20 | rust must | dust bust | just gust | 33 | day may | say gay | way pay | 46 | dark park | lark mark | bark hark |
| 8 | hill fill | till kill | bill will | 21 | pan pass | path pat | pad pack | 34 | rest nest | best vest | test west | 47 | heap hear | heat heath | heave heal |
| 9 | mat mass | man math | mad map | 22 | dim did | dig din | dill dip | 35 | pane pale | pay pace | pave page | 48 | men ten | then pen | hen den |
| 10 | tale bale | pale gale | male sale | 23 | wit bit | fit sit | kit hit | 36 | bat bath | bad ban | back bass | 49 | taw Saw | p aw thaw | law jaw |
| 11 | sake same | sale safe | save sane | 24 | din sin | tin win | pin fin | 37 | сор рор | top shop | mop hop | 50 | bead beach | beat beam | bean beak |
| :2 | peat peas | peak peal | peace peach | 25 | leal tease | teach teak | team tear | 38 | fig dig | pig wig | rig big | | | | |
| 13 | king kin | kit kid | kill kick | 26 | tent sent | bent rent | went dent | 39 | tap tab | tack tan | tang tam | | | | |

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| | NAME | | | | | | D4 | ATE_ | | | T | EST | NO | · · · | · |
|----|--------------|----------------|--------------|------|--------------|---------------|---------------|------|---------------|----------------|----------------------|------|---------------|---------------|---------------|
| | | | | | | | F | DRM_ | <u>1</u> Y | | S | CORE | <u> </u> | | |
| 1 | kick tick | lick wick | sick pick | 14 | sack sag | sad sat | sap sass | 27 | sup sum | sub sun | sud sung | 40 | cake cane | came case | cave cape |
| 2 | neat meat | beat feat | seat heat | 15 | sit sick | sip sin | sill sing | 28 | wed led | fed shed | bed red | 41 | tame same | came name | fame game |
| 3 | puñ pub | puff pus | pup puck | 16 | fold hold | sold cold | gold told | 29 | pot not | hot tot | lot got | 42 | toil coil | boil oil | foil soil |
| 4 | hook took | shook cook | book 1ook | 17 | but buff | bug bun | bus buck | 30 | duck dun | dud dug | dung dub | 43 | fig fib | fizz fin | fit fill |
| 5 | lip sip | hip rip | dip tip | 18 | late lame | lake lane | lay lace | 31 | pit pill | pin pick | pig pip | 44 | cuss cut | cud cub | cup cuff |
| 6 | rake raze | rate race | ray rave |] 19 | run sun | bun nun | fun gun | 32 | seeth seed | e seek seep | seen seem | 45 | heel feel | peel eel | keel reel |
| 7 | fang sang | bang gang | hang rang | 20 | dust bust | gust just | must rust | 33 | say gay | pay way | may day | 46 | mark lark | bark hark | dark park |
| 8 | wi11 bi11 | hill fill | kill till | 21 | path pat | pack pad | pass pan | 34 | best vest | rest test | nest rest | 47 | heath heat | heave heal | heap hear |
| 9 | map mad | mat mass | math man | 22 | dip dill | dim did | din dig | 35 | page pave | pane pale | p ac e pay | 48 | then pen | den hen | ten men |
| 10 | pale gale | sale male | bale tale | 23 | fit sit | hit kit | bit wit | 36 | bass back | bat bath | ban bad | 49 | law jaw | saw raw | paw thaw |
| 11 | sane save | sake same | safe sale | 24 | tin win | fin pin | sin din | 37 | hop mop | c op pop | shop top | 50 | beat beam | beak bean | beach bead |
| 12 | peak peal | peach peace | peas peat | 25 | tear team | teal tease | teak teach | 38 | dig fig | wig pig | big rig | | | | |
| 13 | kin king | kid kit | kick kill | 26 | dent went | tent sent | rent bent | 39 | tack tan | tam tang | tab tap | | | | |

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| | ΝΑΜΕ | | | <u> </u> | <u> </u> | | | DATE | | | T | EST | NO | | _ |
|----|---------------|--------------|----------------|----------|--------------|--------------|--------------|------|---------------|----------------|---------------|-----|----------------|--------------|--------------|
| | | | | | | | F | ORM | 2X | <u>د</u> | s | COR | E | | |
| I | went dent | sent tent | bent rent | 14 | not pot | tot hot | got lot | 2 | 7 peel eel | reel keel | feel heel | 40 | mass mat | math man | map mad |
| 2 | hold fold | cold sold | told gold |] 15 | vest best | test West | rest nest | 28 | hark bark | dark park | mark lark | 41 | ray rave | raze rake | rate race |
| 3 | pat path | pad pack | pan pass | 6 | pig pip | pill pit | pin pick | 29 | heave heal | e hear heap | heat heath | 42 | save sane | same sake | sale safe |
| 4 | lane lake | lay lace | late lame | 17 | back bass | bath bat | bad ban | 30 | cup cuff | cut cuss | cud cub | 43 | fill hill | kill till | will bill |
| 5 | kit hit | bit wit | fit sit | 81 | way pay | may day | say gay | 31 | thaw paw | law jaw | raw saw | 44 | sill sing | sick sit | sip sin |
| 6 | must rust | bust dust | gust just | 19 | pig wig | big rig | dig fig | 32 | pen then | hen den | men ten | 45 | bale tale | gale pale | sale male |
| 7 | teak teach | team tear | teal tease | 20 | pale pane | pace pay | page pave | 33 | puff pus | puck pup | pub pun | 46 | wick lick | sick pick | kick tick |
| 8 | din dig | dill dip | dim did | 21 | cane cake | case came | cape cave | 34 | bean beak | beach bead | beat beam | 47 | peace peach | peas peat | peak peal |
| 9 | bed red | led wed | fed shed | 22 | shop top | mop hop | сор рор | 35 | heat seat | neat meat | feat beat | 48 | bun bug | bus buck | but buff |
| 10 | pin fin | sin din | tin win | 23 | coil toil | oil boil | soil foil | 36 | dip tip | sip lip | hip rip | 49 | sag sack | sat sad | sass sap |
| 11 | dug dud | dung dub | duck dun | 24 | tan tack | tang tam | tap tab | 37 | kill kick | kin king | kit kid | 50 | fun gun | sun run | bun nun |
| 12 | sum sup | sun sub | sung sud | 25 | fit fill | fib fig | fizz fin | 38 | hang rang | sang fang | bang gang | | | | |
| 13 | seep seek | seen seem | seethe seed | 26 | same tame | name came | game fame | 39 | took hook | cook shook | look book | | | | |

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| - | ١ | NAME_ | | <u></u> , | | | | D4 | ATE_ | | | T | EST | NO | | <u></u> |
|--------|----|----------------|---------------|---------------|----|--------------|--------------|--------------|------|---------------|---------------|---------------|------|----------------|--------------|--------------|
| 9) | _ | | | | | | | F | DRM_ | <u>2</u> Y | | S(| CORE | | | |
| | ١ | sent tent | rent bent | dent went | 14 | tot not | lot got | pot not | 27 | reel keel | heel feel | eel peel | 40 | man math | map mad | mass mat |
| | 2 | told gold | fold hold | cold sold | 15 | nest rest | vest best | west test | 28 | bark hark | park dark | lark mark | 41 | rave ray | rake raze | race rate |
| ĺ | 3 | pass pan | pat path | pack pad | 16 | pick pin | pig pip | pit pill | 29 | hear heap | heath heat | heal heave | 42 | sale safe | sane save | same sake |
| | 4 | lay lace | lame late | lake lane | 17 | bath bat | ban bad | bass back | 30 | cud cub | cuff cup | cut cuss | 43 | til1 kil1 | will bill | fill hill |
| | 5 | sit fit | kit hit | wit bit | 18 | gay say | way pay | day may | 31 | saw Taw | thaw paw | jaw law | 44 | sick sit | sin sip | sing sill |
| | 6 | just gust | must rust | dust bust | 19 | rig big | jig fig | pig wig | 32 | den hen | men ten | pen then | 45 | sale male | tale bale | gale pale |
| 「見た」 | 7 | team tear | tease teal | teach teak | 20 | pace pay | pave page | pane pale | 33 | puck pup | pun pub | pus puff | 46 | sick pick | tick kick | lick wick |
| | 8 | dill dip | did dim | dig din | 2 | cape cave | cake cane | case came | 34 | beak bean | bead beach | beam beat | 47 | peach peace | peat peas | peal peak |
| | 9 | shed fed | bed red | wed led | 22 | mop hop | pop cop | top shop | 35 | beat feat | heat seat | meat neat | 48 | buff but | bun bug | buck bus |
| | 10 | win tin | pin fin | din sin | 23 | boil oil | soil foil | coil toil | 36 | hip rip | tip dip | sip lip | 49 | sass sap | sack sag | sat sad |
| | u | dung dub | dun duck | dud dug | 24 | tab tap | tan tack | tam tang | 37 | kid kit | kill kick | king kin | 50 | nun bun | fun gun | run sun |
| | 12 | sud sung | sum sup | sub sun | 25 | fill fit | fig fib | fin fizz | 38 | rang hang | fang sang | gang bang | | | | |
| | 13 | seed seethe | seep seek | seem seen | 26 | fame game | same tame | came name | 39 | shook cook | look book | took hook | | | | |

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| | NAME. | · | | | | | D. | AT E | | | TI | EST | NO | | |
|----|--------------|--------------|--------------|----|---------------|--------------|----------------|------|---------------|--------------|--------------|------|---------------|----------------|----------------|
| | | | | | | • | F | ORM_ | <u>3X</u> | | S | CORE | | | |
| I | gold told | hold fold | sold cold | 14 | heal heave | heap hear | heath heat | 27 | bus buck | buff but | bug bun | 40 | soil foil | toil coil | oil boil |
| 2 | lame late | lane lake | lace lay | 15 | paw thaw | jaw law | saw Taw | 28 | tick kick | wick lick | pick sick | 41 | came case | cape cave | cane cake |
| 3 | bust dust | just gust | rust must | 16 | pub pun | pus puff | puck pup | 29 | sin sip | sill sing | sit sick | 42 | wig pig | rig big | fig dig |
| 4 | did dim | din dig | dip dill | 17 | meat neat | feat beat | heat seat | 30 | name came | fame game | tame same | 43 | ban bad | back bass | bat bath |
| 5 | sin din | win tin | fin pin | 18 | kit kid | kick kill | kin king | 31 | safe sale | save sane | sake same | 44 | test west | nest rest | best vest |
| 6 | sun sub | sud sung | sup sum | 19 | cook shook | book 1ook | hook took | 32 | map mad | mat mass | math man | 45 | seen seem | seed seethe | seek e seep |
| 7 | lot got | not pot | hot tot | 20 | race rate | ray rave | rake raze | 33 | gang bang | hang rang | fang sang | 46 | dun duck | dug dud | dub dung |
| 8 | pill pit | pick pin | pip pig | 21 | bill will | fill hill | till kill | 34 | sip lip | rip hip | tip dip | 47 | led wed | shed fed | red bed |
| 9 | may day | gay say | pay way | 22 | sap sass | sag sack | sad sat | 35 | beach bead | beam beat | beak bean | 48 | tease teal | teak teach | tear team |
| 10 | pave page | pale pane | pay pace | 23 | gale pale | male sale | tale bale | 36 | hen den | ten men | then pen | 49 | bit wit | sit fit | hit kit |
| 11 | рор сор | shop top | hop mop | 24 | peas peat | peal peak | peach peace | 37 | cuff cup | cuss cut | cub cud | 50 | pad pack | pass pan | path pat |
| 12 | tang tam | tab tap | tack tan | 25 | rent bent | went dent | tent sent | 38 | park dark | mark lark | hark bark | | | | |
| 13 | keel reel | feel heel | peel eel | 26 | sun run | nun bun | gun fun | 39 | fizz fin | fill fit | fib fig | | | | |

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| 1 | N | IAME_ | | | | | | DA | ΤΕ | | | TE | ST | NO | | |
|----|-----|--------------|--------------|--------------|-----|---------------|----------------|------------------|-----|--------------|--------------|---------------|------|---------------|--------------|----------------|
| } | | | | | | | | FO | RM_ | _3Y | | s | CORE | . <u></u> | | |
| | · [| cold sold | gold told | fold hold | 4 | heat heath | heal heave | hear heap | 27 | bug bun | buck bus | buff but | 40 | foil soil | coil toil | boil oil |
| | 2 | lace lay | late lame | lane lake | 5 ا | jaw law | raw Saw | thaw paw | 28 | pick sick | kick tick | wick lick | 41 | case came | cave cape | cake cane |
| 1 | 3 | gust just | rust must | bust dust | 16 | pup puck | pub pun | puff pus | 29 | sing sill | sit sick | sin sip | 42 | big rig | fig dig | wig pig |
| ļ | 4 | dig din | dip dill | did dim | 17 | feat beat | seat heat | neat meat | 30 | came name | game fame | same tame | 43 | bad ban | bass back | bath bat |
| Ì | 5 | fin pin | din sin | win tin | 18 | kick kill | king kin | kid kit | 31 | sake same | sale safe | save sane | 44 | west test | rest nest | vest best |
| | 6 | sub sun | sung sud | sum sup | 19 | book 1ook | took hook | shook cook | 32 | math man | mad map | mat mass | 45 | seek seep | seem seen | seed seethe |
| | 7 | got lot | pot not | tot hot | 20 | raze rake | race rate | rave ray | 33 | sang fang | gang bang | rang hang | 46 | dub dung | duck dun | dug dud |
| 2 | 8 | pin pick | pip pig | pill pit | 21 | ki11 ti11 | bill will | hill fill | 34 | rip hip | dip tip | lip sip | 47 | fed shed | red bed | led wed |
| | 9 | pay way | day may | gay say | 22 | sat sad | sap sass | sack sag | 35 | beam beat | bean beak | bead beach | 48 | teach teak | tear team | tease teal |
| | 0 | pay pace | page pave | pale pane | 23 | male sale | bale tale | pale gale | 36 | ten men | pen then | den hen | 49 | hit kit | wit bit | sit fit |
| l, | 11 | top shop | hop mop | pop cop | 24 | peal peak | peace peach | e peat n peas | 37 | cub cud | cup cuff | cuss cut | 50 | pack pad | pan pass | pat path |
| Î | 12 | tam tang | tap tab | tan tack | 25 | bent rent | dent went | sent tent | 38 | lark mark | hark bark | park dark | | | | |
| | 3 | eel peel | keel reel | heel feel | 26 | bun nun | gun fun | sun run | 39 | fib fig | fin fizz | fill fit | | | | |

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Appendix III

The word ensembles are arranged in matrix form and responses are tabulated for each stimulus, providing a display of confusions as well as correct responses. The stimulus words identify the rows at the left side of the matrix and the response words (provided by the subject's response forms) are the column headings in the matrix.

The entries in each matrix represent number of responses. Row totals are not equal but vary systematically between 432 and 437; matrix totals are 2604 in all cases.

The data are pooled over talkers, listeners, and levels; (each word, of course, is drawn from a different form of the test, but the test forms are not derivable from these matrices in terms of row placement). The same number of tests were presented at each level and the contribution of talkers to the various levels is approximately equal. Each form is represented equally in the data.

The ensemble numbers refer to the materials of Appendix I.

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| <u>No. Fl</u> | bat | bad | back | bath | ban | bass |
|---------------|------|------|------|-------|------|------|
| bat | 305 | 15 | 49 | 40 | 17 | 11 |
| bad | 38 | 295 | 18 | 45 | 39 | 0 |
| back | 112 | 21 | 236 | 31 | 20 | 13 |
| bath | 94 | 31 | 31 | 259 | 8 | 11 |
| ban | 23 | 52 | 12 | 28 | 302 | 16 |
| bass | 1 | 1 | 2 | 4 | 1 | 423 |
| <u>No. F2</u> | bead | beat | bean | beach | beam | beak |
| bead | 236 | 45 | 95 | 11 | 15 | 31 |
| beat | 14 | 329 | 24 | 24 | 8 | 34 |
| bean | 108 | 43 | 206 | 12 | 47 | 51 |
| beach | 10 | 32 | 14 | 360 | 7 | 12 |
| beam | 80 | 19 | 245 | 14 | 59 | 15 |
| beak | 15 | 120 | 26 | 6 | 11 | 256 |
| <u>No. F3</u> | buck | but | bun | bus | buff | bug |
| buck | 243 | 58 | 17 | 2 | 94 | 19 |
| but | 71 | 273 | 21 | 6 | 36 | 26 |
| bun | 24 | 38 | 316 | 12 | 22 | 25 |
| bus | 2 | 0 | l | 431 | 1 | 0 |
| buff | 48 | 41 | 16 | 6 | 307 | 14 |
| bug | 22 | 25 | 34 | 4 | 22 | 327 |
| <u>No. F4</u> | CBVG | cane | came | cape | cake | case |
| cave | 298 | 27 | 28 | 31 | 39 | 10 |
| cane | 32 | 216 | 102 | 33 | 39 | 11 |
| came | 34 | 170 | 167 | 30 | 26 | 10 |
| cape | 21 | 13 | 15 | 238 | 145 | 3 |
| cake | 16 | 6 | 4 | 86 | 312 | 8 |
| case | 2 | 2 | 1 | 4 | 3 | 422 |

| <u>No. F5</u> | cut | cub | cuff | cuss | cuđ | cup |
|---------------|-----|-----|------|------|--------------|----------------|
| cut | 350 | 9 | 25 | 10 | 19 | 24 |
| cub | 40 | 276 | 44 | 6 | 36 | 33 |
| cuff | 31 | 9 | 301 | 11 | 6 | 55 74 |
| cuss | 3 | 0 | 2 | 422 | ь | ד, פ |
| cuđ | 46 | 34 | 31 | 4 | 303 | <u>ב</u> זב |
| cup | 47 | 30 | 50 | 11 | 11 | 283 |
| <u>No. F6</u> | dim | dig | dill | did | din | đin |
| dim | 279 | 21 | 17 | 21 | 80 | атр 14 |
| dig | 22 | 310 | 17 | 33 | 43 | 12 |
| d ill | 25 | 27 | 291 | 47 | 25 | 18 |
| did | 21 | 61 | 24 | 268 | 51 | -0 |
| din | 39 | 20 | 18 | 24 | 320 | 13 |
| đip | 21 | 18 | 10 | 19 | 20 | 347 |
| <u>No. F7</u> | dud | dub | đun | dug | dung | đuck |
| duđ | 295 | 9 | 23 | 70 | 10 | 10 |
| đub | 39 | 111 | 29 | 197 | 36 | 21 01 |
| đun | 24 | 9 | 297 | 24 | 50 61 | 10 |
| dug | 46 | 24 | 31 | 275 | 37 | 10 |
| dung | 16 | 14 | 77 | 34 | 272 | 19 |
| duck | 16 | 19 | 17 | 29 | 25 | 331 |
| No.F8 | fin | fit | fig | fizz | fi 11 | ftb |
| fin | 307 | 40 | 35 | 18 | 14 | 10 |
| fit | 15 | 355 | 20 | 13 | 11 | 20 |
| fig | 26 | 23 | 350 | 10 | 11 | 15 |
| fizz | 6 | 5 | 12 | 404 | 1 | 4 |
| fill | 22 | 37 | 18 | 9 | 319 | 32 |
| fib | 56 | 68 | 31 | 18 | 26 | 234 |

| <u>No. F9</u> | heap | heat | heave | hear | heath | heal |
|----------------|------|-------------|----------|------------|-------------|------------|
| heap | 132 | 200 | 14 | 11 | 65 | 12 |
| heat | 16 | 374 | 4 | 8 | 21 | 10 |
| heave | 12 | 36 | 306 | 13 | 43 | 24 |
| hear | 19 | 40 | 9 | 319 | 20 | 30 |
| heath | 36 | 120 | 18 | 14 | 236 | 11 |
| heal | 27 | 50 | 28 | 32 | 27 | 269 |
| <u>No. F10</u> | king | kit | kill | kin | kid | ki ek |
| king | 359 | 9 | 9 | 29 | 25 | ᄮ |
| kit | 8 | 355 | 17 | 12 | 13 | т 27 |
| kill | 16 | 32 | 324 | 20 | 20 | - í 1 2 |
| kin | 63 | 32 | 8 | 273 | -2 35 | 22 |
| kid | 35 | 26 | 18 | 21 | 308 | 25 |
| kick | 38 | 82 | 15 | 14 | 17 | 271 |
| <u>No. F11</u> | lake | lace | lame | lane | laır | 1940 |
| lake | 284 | 3 | 4 | 3 | 18 | 100 |
| lace | 7 | 41 4 | 0 | 1 | ц | 753 |
| lame | 15 | б | 91 | 242 | <u></u> 4 л | 30 |
| lane | 16 | 8 | 69 | 256 | 52 | 30 |
| lay | 25 | 1 | 6 | -20 26 | 346 | 20 |
| late | 30 | 17 | 7 | 16 | 21 | 29 346 |
| No. F12 | mat | man | mad | magg | meth | |
| mat | 332 | 25 | 15 | 7 | 22 | ഫൂറ |
| man | 36 | 289 | | י זה | 22 | 23 |
| mad | 40 | 103 | 235 | то 1 | 21 | 10 |
| mass | 5 | 200 | -JJ 1 | 100 100 | ر ۲ | 73 |
| math | 90 | 23 | 22 | 722 | ц Олг | 2 |
| map | 128 | 33 | 20 | 14 | 240 25 | 10 217 |
| | | | | | | • |

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| <u>No. F13</u> | pane | pay | pave | pale | pace | page |
|----------------|------|------|-------|------|------|-------|
| pane | 316 | 51 | 23 | 16 | 8 | 21 |
| pay | 33 | 336 | 24 | 21 | 4 | 14 |
| pave | 17 | 101 | 272 | 18 | 9 | 17 |
| pale | 12 | 99 | 30 | 263 | 12 | 17 |
| pace | 2 | 5 | 3 | 4 | 415 | 4 |
| page | 22 | 51 | 40 | 12 | 11 | 301 |
| <u>No. F14</u> | pan | path | pad | pass | pat | pack |
| pan | 299 | 27 | 44 | - 4 | 44 | 16 |
| path | 8 | 235 | 13 | 60 | 96 | 21 |
| pad | 25 | 51 | 298 | 11 | 33 | 14 |
| pass | 6 | l | 4 | 422 | 2 | 2 |
| pat | 3 | 20 | 13 | 2 | 360 | 37 |
| pack | 15 | 34 | 21 | 11 | 128 | 224 |
| <u>No. F15</u> | peat | peak | peace | peas | peal | peach |
| peat | 351 | 42 | 5 | 9 | - 9 | - 17 |
| peak | 103 | 272 | 9 | 15 | 24 | 10 |
| peace | 35 | 5 | 380 | 8 | 3 | б |
| peas | 16 | 5 | 15 | 381 | 5 | 13 |
| peal | 59 | 45 | 9 | 9 | 304 | 6 |
| peach | 22 | 16 | 7 | 8 | 7 | 374 |
| <u>No. F16</u> | pip | pit | pick | pig | pill | pin |
| pip | 200 | 105 | 48 | 31 | 32 | 17 |
| pit | 10 | 348 | 32 | 22 | 11 | 11 |
| pick | 23 | 73 | 277 | 36 | 12 | 14 |
| pig | 25 | 22 | 18 | 336 | 7 | 24 |
| pill | 17 | 54 | 23 | 23 | 308 | 12 |
| pin | 7 | 52 | 36 | 41 | 10 | 287 |

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| <u>No. F17</u> | pus | pup | pun | puff | puck | pub |
|----------------|------|------|------|------|------|------------|
| pus | 423 | 0 | l | l | 2 | 6 |
| pup | 6 | 231 | 11 | 97 | 56 | 32 |
| pun | 6 | 29 | 285 | 33 | 44 | 40 |
| puff | 6 | 47 | 12 | 303 | 44 | 22 |
| puck | 7 | 51 | 17 | 100 | 234 | 23 |
| pub | 3 | 23 | 26 | 60 | 21 | 301 |
| | | | | | | |
| <u>No. F18</u> | rate | rave | raze | race | ray | rake |
| rate | 377 | 11 | 6 | 6 | 15 | 17 |
| rave | 40 | 264 | 24 | 8 | 82 | 19 |
| raze | 16 | 3 | 387 | 13 | 6 | 8 |
| race | 3 | 1 | 7 | 415 | 3 | 4 |
| ray | 37 | 26 | 10 | б | 343 | 12 |
| rake | 107 | 15 | 11 | 3 | 26 | 273 |
| | | | | | | |
| <u>No. F19</u> | sake | sale | save | same | safe | sane |
| sake | 314 | 10 | 21 | 5 | 73 | 1 4 |
| sale | 25 | 279 | 50 | 13 | 51 | 17 |
| save | 34 | 11 | 275 | 29 | 65 | 19 |
| same | 11 | 14 | 25 | 139 | 27 | 218 |
| safe | 68 | 4 | 12 | 9 | 334 | 6 |
| sane | 22 | 8 | 33 | 97 | 23 | 249 |
| | | | | | | |
| <u>No. F20</u> | sad | sass | sag | sat | sap | sack |
| sad | 281 | 4 | 53 | 50 | 20 | 29 |
| Sass | 2 | 430 | 0 | 2 | 0 | 1 |
| sag | 86 | б | 272 | 29 | 9 | 32 |
| sat | 13 | 13 | 6 | 317 | 25 | 60 |
| sap | 23 | 8 | 14 | 92 | 237 | 59 |
| sack | 13 | б | 19 | 75 | 37 | 282 |

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| <u>No. F21</u> | seem | seethe | seep | seen | seed | seek |
|----------------|--------------|--------|------|------|------|------|
| seem | 1 1 4 | 38 | 14 | 175 | 40 | 52 |
| seethe | 21 | 189 | 23 | 52 | 92 | 56 |
| seep | 7 | 34 | 210 | 13 | 20 | 153 |
| seen | 52 | 38 | 7 | 225 | 64 | 49 |
| seed | 31 | 91 | 11 | 80 | 194 | 25 |
| seek | 3 | 35 | 26 | 13 | 12 | 345 |
| <u>No. F22</u> | sip | sing | sick | sin | sill | sit |
| sip | 199 | 15 | 40 | 15 | 13 | 151 |
| sing | 10 | 333 | 41 | 25 | 2 | 26 |
| sick | 21 | 23 | 310 | 10 | 4 | 64 |
| sin | 25 | 47 | 37 | 280 | 11 | 33 |
| sill | 16 | 20 | 42 | 17 | 304 | 35 |
| sit | 16 | 9 | 79 | 11 | 6 | 314 |
| No. F23 | sung | sup | sun | sud | sum | sub |
| sung | 232 | 15 | 106 | 17 | 49 | 15 |
| sup | 27 | 313 | 15 | 15 | 18 | 45 |
| sun | 4 <u>1</u> | 20 | 312 | 17 | 23 | 19 |
| sud | 12 | 31 | 27 | 316 | 11 | 40 |
| sum | 131 | 19 | 60 | 11 | 187 | 27 |
| sub | 26 | 30 | 16 | 38 | 16 | 307 |
| <u>No. F24</u> | tap | tack | tang | tab | tan | tam |
| tap | 305 | 74 | 12 | 15 | 16 | 12 |
| tack | 79 | 272 | 27 | 15 | 14 | 26 |
| tang | 5 | 11 | 350 | 9 | 34 | 23 |
| tab | 34 | 36 | 37 | 250 | 32 | 48 |
| tan | 12 | 9 | 70 | 13 | 234 | 97 |
| tam | 16 | 18 | 38 | 19 | 80 | 262 |

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| <u>No. F25</u> | teal | teach | team | tease | teak | tear |
|----------------|------|-------|------|-------|------|------|
| teal | 281 | 9 | 46 | 7 | 63 | 26 |
| teach | 5 | 354 | 17 | 7 | 43 | 11 |
| team | 33 | 15 | 303 | 24 | 50 | 8 |
| tease | 3 | 12 | 6 | 399 | 11 | 2 |
| teak | 14 | 10 | 25 | 80 | 293 | 12 |
| tear | 44 | 3 | 24 | 6 | 48 | 320 |

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| <u>No. 11</u> | red | wed | shed | bed | led | feđ |
|---------------|------|------|------|------|------------------|----------------------|
| red | 286 | 65 | 11 | 26 | 21 | 20L |
| wed | 47 | 339 | 6 | 12 | 19 | |
| shed | l | 1 | 428 | 0 | -> | 2 |
| bed | 33 | 44 | 8 | 320 |) 1位 | 13 |
| led | 41 | 56 | 9 | 26 | 2011 | 11 |
| fed | 28 | 25 | 5 | 10 | ہر ۔ 9 | 356 |
| <u>No. 12</u> | sold | told | hold | cold | gold | fold |
| sold | 425 | 3 | 0 | 3 | 3 | |
| told | 0 | 429 | 3 | 1 | ך נ | כ ו |
| hold | 3 | 14 | 258 | 101 | 45 | י פו |
| cold | 3 | 11 | 20 | 369 | 16 | 16 |
| gold | 11 | 12 | 19 | 30 | 220 | 22 |
| fold | 7 | 12 | 9 | 15 | 3 | 386 |
| <u>No. 13</u> | fig | pig | rig | dig | wie | hte |
| fig | 391 | 9 | 3 | 4 | 13 | 7-0 14 |
| pig | 21 | 342 | 10 | 8 | 22 | 30 |
| rig | 15 | 20 | 233 | 4 | 133 | 27 |
| dig | 24 | 28 | б | 291 | 37 | 51 |
| wig | 8 | 13 | 27 | 4 | 333 | 50 |
| big | 13 | 40 | 24 | 15 | 57 | 284 |
| No. 14 | lick | pick | tick | wick | sick | ktek |
| lick | 319 | 12 | 16 | 61 | 10 | 17 |
| pick | 12 | 382 | 3 | 19 | 7 | <u> </u> |
| tick | 2 | 7 | 406 | 4 | 7 | 8 |
| wick | 15 | 40 | 10 | 355 | 4 | õ |
| sick | 2 | 2 | l | 0 | 426 | 2 |
| kick | 15 | 23 | 17 | 20 | 17 | 345 |
| | | | | | | |

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| <u>No. 15</u> | look | hook | cook | book | took | shook |
|---------------|------|------|------|------|------|-------|
| look | 326 | 30 | 13 | 38 | 17 | 10 |
| hook | 44 | 283 | 42 | 28 | 27 | 9 |
| cook | 21 | 19 | 352 | 15 | 19 | 6 |
| book | 89 | 30 | 19 | 270 | 14 | 15 |
| took | 5 | 2 | 6 | 0 | 420 | 2 |
| shook | 5 | б | 4 | 5 | 4 | 409 |
| | | | | - | | |
| <u>No. 16</u> | dark | lark | bark | park | mark | hark |
| dark | 317 | 44 | 34 | 9 | 17 | 14 |
| lark | 18 | 231 | 72 | 26 | 55 | 30 |
| bark | 10 | 29 | 318 | 26 | 41 | 10 |
| park | 5 | 11 | 32 | 338 | 23 | 24 |
| mark | 20 | 27 | 64 | 40 | 259 | 23 |
| hark | 3 | 15 | 23 | 89 | 32 | 275 |
| | | | | | - | ., |
| <u>No. 17</u> | tale | pale | male | bale | gale | sale |
| tale | 371 | 20 | 7 | 10 | 16 | 9 |
| pale | 11 | 365 | 13 | 12 | 25 | 8 |
| male | 11 | 23 | 289 | 73 | 27 | 12 |
| bale | 6 | 23 | 49 | 321 | 24 | 9 |
| gale | 14 | 17 | 20 | 28 | 345 | 13 |
| sale | 0 | 0 | 0 | 2 | 0 | 431 |
| | | | | | | - |
| <u>No. 18</u> | feel | eel | reel | heel | peel | keel |
| feel | 366 | 5 | 14 | 16 | 14 | 18 |
| eel | 24 | 273 | 22 | 73 | 22 | 20 |
| reel | 23 | 31 | 330 | 20 | 19 | 12 |
| heel | 18 | 48 | 10 | 321 | 21 | 14 |
| peel | 19 | 50 | 16 | 14 | 354 | 14 |
| keel | 19 | 10 | 5 | 33 | 15 | 351 |
| | | | | | _ | |

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| No. 19 | hill | t1 11 | b 171 | * +11 | Jed 7 7 | |
|----------------|-----------|--------------|--------------|--------------|---------|----------|
| hill | 265 | 18 | 20 | | KIII | Will |
| t111 | | 101 | 30 | 50 | 43 | 29 |
| b111 | 16 | +0+ | 200 | 2 | 11 | 3 |
| £411 | 10 | 11 | 266 | 19 | 22 | 78 |
| 2222 V-111 | - 0 | 10 | 6 | 379 | 17 | 13 |
| 84477 10477 | 10 | 11 | 10 | 15 | 371 | 8 |
| WTTT | 24 | 20 | 22 | 17 | 20 | 334 |
| <u>No. IlO</u> | 011 | foil | toil | boil | 8011 | 0011 |
| oil | 328 | 24 | 14 | 33 | 6 | 0011 |
| foil | 12 | 350 | 18 | 14 | 5 |) ع م |
| toil | 10 | 10 | 360 | 10 | ر لا | 20 |
| boil | 41 | 25 | 14 | 320 | - 6 | 19 |
| soil | 1 | 3 | 1 | ע_ע ו | 426 | 10 |
| coil | 19 | 25 | 14 | 7 | 720 | 267 |
| | | - | | ſ | 5 | 201 |
| <u>No. Ill</u> | game | tame | name | fame | same | came |
| game | 372 | 3 | 26 | 2 | 11 | 20 |
| tame | 14 | 390 | 4 | 6 | 10 | q |
| name | 33 | 12 | 318 | 28 | 10 | 31 |
| fame | 12 | 9 | 18 | 350 | 9 | 39 |
| same | 1 | 1 | 1 | 1 | 431 | 0 |
| came | 23 | 12 | 14 | 10 | 6 | 368 |
| | | | | | | 0 |
| <u>No. 112</u> | men | then | hen | ten | pen | den |
| men | 297 | 56 | 19 | 12 | - 39 | 11 |
| then | 74 | 284 | 13 | 14 | 27 | 21 |
| hen | 41 | 18 | 262 | 21 | 77 | 13 |
| ten | 6 | 7 | 5 | 406 | 6 | -5 |
| pen | 26 | 11 | 10 | 4 | 376 | 8 |
| den | 34 | 78 | 9 | 17 | 15 | 280 |
| | - | | - | ÷ (| TD - | i |

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| <u>No. 113</u> | din | tin | pin | sin | win | fin |
|--|--|---|--|---|---|---|
| din | 344 | 16 | 19 | 8 | 37 | 9 |
| tin | 9 | 396 | 3 | 11 | 8 | 6 |
| pin | 10 | 12 | 373 | 15 | 8 | 19 |
| sin | 0 | 2 | 1 | 425 | 1 | 6 |
| win | 14 | 7 | 20 | 13 | 363 | 15 |
| fin | 7 | 12 | 7 | 5 | 13 | 390 |
| | | | | | | |
| <u>No. I14</u> | gun | run | nun | fun | sun | bun |
| gun | 322 | 32 | 28 | 16 | 11 | 24 |
| run | 17 | 356 | 27 | 14 | 11 | 10 |
| nun | 60 | 36 | 303 | 11 | 3 | 21 |
| fun | 27 | 11 | 6 | 380 | 4 | 4 |
| sun | 0 | 2 | 2 | 0 | 432 | l |
| bun | 31 | 75 | 17 | 18 | 11 | 281 |
| | | | | | | |
| <u>No. 115</u> | bang | rang | sang | gang | hang | fang |
| | | | _ | ~ ~ | 10 | 20 |
| bang | 326 | 41 | 3 | 21 | 19 | 22 |
| bang rang | 326 28 | 41 343 | 3 10 | 18 | 20 | 18 |
| bang rang sang | 326 28 1 | 41 343 1 | 3 10 427 | 21 18 1 | 20 1 | 18 2 |
| bang rang sang gang | 326 28 1 25 | 41 343 1 39 | 3 10 427 6 | 21 18 1 319 | 19 20 1 26 | 18 2 18 |
| bang rang sang gang hang | 326 28 1 25 22 | 41 343 1 39 9 | 3 10 427 6 7 | 18 1 319 19 | 20 1 26 338 | 18 2 18 39 |
| bang rang sang gang hang fang | 326 28 1 25 22 14 | 41 343 1 39 9 18 | 3 10 427 6 7 3 | 18 1 319 19 3 | 19 20 1 26 338 8 | 18 2 18 39 389 |
| bang rang sang gang hang fang | 326 28 1 25 22 14 | 41 343 1 39 9 18 | 3 10 427 6 7 3 | 18 1 319 19 3 | 19 20 1 26 338 8 | 18 2 18 39 389 |
| bang rang sang gang hang fang <u>No. 116</u> | 326 28 1 25 22 14 tent | 41 343 1 39 9 18 bent | 3 10 427 6 7 3 went | 18 1 319 19 3 sent | 19 20 1 26 338 8 rent | 18 2 18 39 389 dent |
| bang rang sang gang hang fang <u>No. 116</u> tent | 326 28 1 25 22 14 tent 404 | 41 343 1 39 9 18 bent 6 | 3 10 427 6 7 3 went 7 | 21 18 1 319 19 3 sent 5 | 19 20 1 26 338 8 rent 7 | 22 18 2 18 39 389 dent 8 |
| bang rang sang gang hang fang <u>No. 116</u> tent bent | 326 28 1 25 22 14 tent 404 6 | 41 343 1 39 9 18 bent 6 351 | 3 10 427 6 7 3 went 7 32 | 18 1 319 19 3 sent 5 3 | 19 20 1 26 338 8 rent 7 31 | 22 18 2 18 39 389 dent 8 12 |
| bang rang sang gang hang fang <u>No. 116</u> tent bent went | 326 28 1 25 22 14 tent 404 6 15 | 41 343 1 39 9 18 bent 6 351 18 | 3 10 427 6 7 3 went 7 32 348 | 21 18 1 319 19 3 sent 5 3 12 | 19 20 1 26 338 8 rent 7 31 34 | 22 18 29 389 dent 8 12 6 |
| bang rang sang gang hang fang <u>No. 116</u> tent bent went sent | 326 28 1 25 22 14 tent 404 6 15 1 | 41 343 1 39 9 18 bent 6 351 18 0 | 3 10 427 6 7 3 went 7 32 348 1 | 21 18 1 319 19 3 sent 5 3 12 431 | 19 20 1 26 338 8 rent 7 31 34 0 | 22 18 29 389 dent 8 12 6 1 |
| bang rang sang gang hang fang <u>No. I16</u> tent bent went sent rent | 326 28 1 25 22 14 tent 404 6 15 15 1 7 | 41 343 1 39 9 18 bent 6 35 1 18 0 20 | 3 10 427 6 7 3 went 7 32 348 1 63 | 21 18 1 319 19 3 sent 5 3 12 431 16 | 19 20 1 26 338 8 rent 7 31 31 34 0 316 | 22 18 29 389 dent 8 12 6 1 |

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| <u>No. 117</u> | tip | lip | rip | dip | sip | hip |
|----------------|------|------|------|------|------|------|
| tip | 399 | 1 | 8 | 14 | 6 | - 5 |
| lip | 12 | 314 | 38 | 22 | 9 | 39 |
| rip | 9 | 44 | 324 | 23 | 13 | 22 |
| dip | 6 | 24 | 23 | 350 | - 7 | 22 |
| sip | 0 | 3 | 3 | 2 | 427 | 2 |
| hip | 24 | 28 | 19 | 15 | 6 | 341 |
| <u>No. I18</u> | cop | top | тор | pop | shop | hop |
| cop | 344 | 12 | 7 | 12 | 4 | 53 |
| top | 46 | 330 | 13 | 12 | 5 | 31 |
| mop | 24 | 7 | 318 | 21 | 7 | 56 |
| рор | 21 | 9 | 26 | 343 | 6 | 28 |
| shop | 7 | 0 | 2 | 0 | 418 | 7 |
| hop | 34 | 12 | 17 | 28 | 1 | 343 |
| <u>No. 119</u> | seat | meat | beat | heat | neat | feat |
| seat | 427 | 0 | l | 2 | 1 | l |
| meat | 6 | 252 | 81 | 37 | 4ı | 20 |
| beat | 4 | 62 | 295 | 27 | 22 | 23 |
| heat | 8 | 31 | 27 | 298 | 28 | 41 |
| neat | 5 | 93 | 48 | 47 | 221 | 20 |
| feat | 4 | 9 | 12 | 24 | l | 385 |
| <u>No. 120</u> | wit | fit | kit | bit | sit | hit |
| wit | 326 | 33 | 15 | 30 | 11 | 18 |
| fit | 16 | 364 | 22 | 13 | 4 | 14 |
| kit | 7 | 26 | 365 | 8 | 4 | 27 |
| bit | 60 | 13 | 10 | 322 | 24 | 26 |
| sit | 3 | 4 | 2 | 0 | 421 | 2 |
| hit | 16 | 40 | 18 | 21 | 4 | 335 |

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| <u>No. 121</u> | hot | got | not | tot | lot | pot |
|----------------|------|------|------|------|------|------|
| hot | 329 | 25 | 27 | 12 | 11 | 33 |
| got | 15 | 338 | 56 | 11 | 12 | 3 |
| not | 29 | 57 | 312 | 13 | 8 | 14 |
| tot | 9 | 11 | 6 | 403 | 1 | 4 |
| lot | 47 | 32 | 32 | 5 | 299 | 18 |
| pot | 59 | 17 | 11 | 11 | 11 | 323 |
| | | | | | | |
| <u>No. 122</u> | rest | best | test | nest | vest | west |
| rest | 287 | 25 | 12 | 18 | 26 | 66 |
| best | 25 | 307 | 9 | 10 | 44 | 38 |
| test | 3 | 4 | 405 | 6 | 6 | 8 |
| nest | 23 | 58 | 22 | 278 | 28 | 28 |
| vest | 29 | 63 | 11 | 30 | 267 | 35 |
| west | 47 | 15 | 15 | 14 | 18 | 324 |
| | | | | | | |
| <u>No. 123</u> | rust | dust | just | must | bust | gust |
| rust | 331 | 9 | 12 | 29 | 24 | 28 |
| dust | 15 | 346 | 8 | 15 | 16 | 34 |
| just | 4 | 12 | 390 | 9 | 6 | 14 |
| must | 25 | 15 | 9 | 308 | 53 | 22 |
| bust | 18 | 12 | 11 | 41 | 341 | 14 |
| gust | 20 | 53 | 10 | 14 | 19 | 317 |
| | | | | | | |
| <u>No. 124</u> | raw | paw | law | saw | thaw | jaw |
| raw | 276 | 26 | 70 | 21 | 31 | 13 |
| paw | 17 | 356 | 27 | 1 | 27 | 7 |
| law | 53 | 43 | 301 | 6 | 19 | 11 |
| saw | 3 | 1 | 2 | 422 | 3 | 3 |
| thaw | Ŕ | 49 | 14 | 5 | 351 | 6 |
| jaw | 12 | 9 | 21 | 4 | 20 | 366 |

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the second

| <u>No. 125</u> | day | say | way | may | gay | pay |
|----------------|-----|-----|-----|-----|-----|-----|
| day | 326 | 6 | 13 | 22 | 47 | 19 |
| say | 1 | 424 | 2 | 0 | 3 | 3 |
| way | 21 | 5 | 352 | 15 | 15 | 29 |
| may | 21 | 3 | 40 | 314 | 19 | 38 |
| gay | 24 | 2 | 13 | 15 | 357 | 21 |
| pay | 7 | 7 | 13 | 12 | 7 | 388 |

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