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PERCEPTION OF GRAMMATICALNESS.

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THIS EXPERIMENT IS DESIGNED TO ULTIMATELY ESTABLISH A TECHNIQUE FOR STUDYING THE APHASIC'S ABILITY TO DEMONSTRATE HIS GRAMMATICAL COMPETENCE. HOWEVER, BEFORE EXPOSING APHASICS TO THE TASK, AN EXPERIMENT WAS CARRIED OUT WITH NORMAL SUBJECTS (COLLEGE STUDENTS) TO OBTAIN BASELINE DATA. THE MAIN PURPOSE OF THE PRESENT STUDY WAS TO DETERMINE WHETHER NORMAL SUBJECTS (SS) SHOW GENERAL AGREEMENT IN THEIR PREFERENCE OF MEMBERS OF A PAIR OF NON-GRAMMATICAL STATEMENTS AND HOW SUCH STATEMENTS WOULD BE RANKED WITH RESPECT TO THEIR APPROXIMATION TO "GOOD ENGLISH." TWENTY-EIGHT SS WERE PRESENTED WITH COMPUTER GENERATED NON-GRAMMATICAL STATEMENTS, AND ASKED TO CARRY OUT TWO TASKS ON EACH OF TWO EXPERIMENTAL DAYS. TASK 1 WAS A FORCED-CHOICE EXPERIMENT IN WHICH 50 PAIRS OF STATEMENTS WERE PRESENTED AURALLY TO EACH S, AND HE HAD TO SELECT THAT MEMBER OF THE PAIR WHICH HE FELT WAS THE BEST APPROXIMATION TO A GOOD ENGLISH SENTENCE. IN TASK 2, SS WERE REQUIRED TO READ AND RANK EACH STATEMENT ON A SCALE RUNNING FROM 1 (COMPLETELY UNACCEPTABLE) TO 5 (COMPLETELY ACCEPTABLE). A DIFFERENT ORDER OF STIMULUS PRESENTATION WAS EMPLOYED ON EACH EXPERIMENTAL DAY. FOURTEEN SS WERE ASSIGNED TO ONE ORDER ON THE FIRST DAY, AND RECEIVED THE OTHER ORDER ON THE SECOND DAY. RESULTS SHOW THAT SS TEND TO PREFER THE SAME STATEMENT OVER ORDERS, AND THAT RANK AND PREFERENCE ARE HIGHLY CORRELATED. THERE WERE CONSIDERABLE DIFFERENCES IN PREFERENCE AMONG THE 50 PAIRS OF STIMULUS ITEMS. PRELIMINARY ANALYSIS OF THE DATA SUGGESTS THAT THIS TASK YIELDS INFORMATION RELEVANT TO THE LINGUISTIC AND IN PARTICULAR THE SYNTACTIC COMPETENCE OF SS WHEN APPLIED TO NON-GRAMMATICAL STATEMENTS. SS APPEAR TO BE TRYING TO COPE WITH THE STATEMENTS BY COMPARING THEM TO AN ACCEPTABLE SYNTACTIC PATTERN. THIS PAPER APPEARS IN "STUDIES IN LANGUAGE AND LANGUAGE BEHAVIOR, PROGRESS REPORT IV," PUBLISHED BY THE CENTER FOR RESEARCH ON LANGUAGE AND LANGUAGE BEHAVIOR, UNIVERSITY OF MICHIGAN, 220 EAST HURON STREET, ANN ARBOR, MICHIGAN 48108. (AUTHOR/AMM)

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Perception of Grammaticalness

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Twenty-eight Ss were presented with computer generated non-grammatical statements, and asked to carry out two tasks on each of two experimental days. Task 1 was a forced-choice experiment in which 50 pairs of statements were presented aurally to each S, and he had to select that member of the pair which he felt was the best approximation to a good English sentence. In task 2, Ss were required to read and rank each statement on a scale running from 1 (completely unacceptable) to 5 (completely acceptable). A different order of stimulus presentation was employed on each experimental day; 14 Ss were assigned to one order on the first day, and received the other order on the second day.

Results show that Ss tend to prefer the same statement over orders, and that rank and preference are highly correlated. There are considerable differences in preference among the 50 pairs of stimulus items. Preliminary analysis of the data suggests that this task yields information relevant to the linguistic and in particular the syntactic competence of Ss when applied to non-grammatical statements. Ss appear to be trying to cope with the statements by comparing them to an acceptable syntactic pattern.

This experiment is designed to ultimately establish a technique for studying the aphasic's ability to demonstrate his grammatical competence. However, before exposing aphasics to the task an experiment was carried out with normal Ss (college students) to obtain baseline data. The main purpose of the present study is to determine whether normal Ss show general agreement in their preference of members of a pair of non-grammatical statements and how such statements would be ranked with respect to their approximation to "good English".

If preferences do occur, and Ss rank statements differentially, this would suggest that they are using their implicit knowledge of English syntax in making their judgments. Another possible explanation for preferences might be related to Ss' attempt to apply some criteria of "meaningfulness", or perhaps both semantic and syntactic knowledge to guide the judgment of grammaticalness.

Fifty pairs of non-grammatical statements were generated for use in this study, with the members of the pairs of equal syntactic length. The procedures by which these statements were generated assured nongrammaticality. The pairs were presented to normal speakers of English in a forced-choice task. Ss were also required to rank each statement as to its approximation to good English.

Method

Construction of test materials. A computer program was designed to generate a set of 1000 pairs of statements of equal syntactic length. Fifty pairs were selected for the study. The pairs were generated from ten grammatical sequences in English having the form: determiner + adverb + adjective + noun + S + verb + S + noun + preposition + noun. This yields a 10 x 10 matrix, representing 100 grammatical English sentences. The program operates on this matrix in the following fashion:

1. it first selects on a random basis, a length, between 1 and 10;
2. it then selects, randomly, items from the matrix;
3. it continues to select items until a number of them representing twice the length has been reached;
4. it prints the selection of items with a space between the first and second halves of the string generated by step 3 above (this procedure yields pairs of equal length); and
5. it continues this operation until the upper limit (1000 pairs) has been reached.

The 50 pairs (100 statements) are given in Table 1. In addition,

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Insert Table 1 about here

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this table also identifies the pair to which each statement belongs in each of two orders, and the sequence in which they appear in the pair for each order. Sequence of pairs was randomized separately for the two orders. Sequence within the pair was also random. Each order was presented to each S in the manner described below.

Test procedures. Ss were randomly assigned to one of two experimental conditions. One group of Ss responded to order one on day one of the experiment and order two on day two. A second group of Ss were given order two on day one, and order one on day two. There was a one-day interval between experimental sessions.

The statements were recorded onto magnetic tape for presentation to Ss who were tested individually. Each pair was preceded by the statement indicating the pair number. A signal which activated a timer at the end of the second member of the pair was recorded on the second channel of the magnetic tape. The Ss heard the stimuli through a loudspeaker and responded by depressing one of two buttons on a response board. Their choice and response latency were automatically recorded by a computer (PDP-4). Upon completion of the response the tape playback was activated and, after a brief interval, the next pair in the sequence was presented.

For the ranking task which was administered immediately following the preference experiment, Ss were given a test booklet which contained the 100 statements and a deck of cards with each statement in the order in which they appeared on the tape. The response booklet had columns, marked one to five, indicating approximation to a good English sentence, with one being completely unacceptable and five completely acceptable. Ss indicated their ranking for each statement by putting a check mark in the appropriate column. Statements were ranked on each experimental day.

In the forced-choice task, Ss were told they would hear pairs of ungrammatical statements which probably would not make sense. The Ss' were instructed to select that member of each pair which they felt to be the best approximation to [good] English. They were told to indicate their choice by pushing one of two buttons on the response board. Ss were given as much time as they required to make a response.

For the ranking task, Ss were told that they were going to rank the statements they had just heard on the basis of their approximation to a good English sentence. They were instructed as to the degree of approximation represented by each number above the columns on the response sheets.

Subjects. Each of twenty-eight college students with normal hearing was assigned to one of two experimental conditions, day one, order one - day two, order two, or day one, order two - day two, order one.

Results and Discussion

While all the data for this study have been obtained, the results have been analyzed and interpreted only in part. In particular, the implications of the results to be described below have not yet received adequate attention.

Results obtained for the preference task will be taken up first. Table 2 shows the number of times a member of a pair was selected by the Ss for

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Insert Table 2 about here

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each order of presentation on each experimental day.

Among the artifacts that may confound the present results, one is the possibility that S may consistently prefer one button, while another is that he may prefer the same statement on both experimental days. These tendencies could be considered either as competing, when a reversal in the sequence in the pair occurs over days, or as facilitory, when there is no change in position.

When all of the preference data are combined there is a significant tendency to prefer the first member of the pair over the second ($\chi^2 = 10.0$, $p < .01$) There is, however, a strong tendency for consistency in selection. For pairs that were not reversed across orders, there are 454 consistent responses as opposed to 209 nonconsistent responses. When order within the pair is reversed, there are 476 consistent responses as against 245 inconsistent responses. This suggests that, on the whole, Ss tend to be responding to the statements rather than making some arbitrary decision without regard to the stimulus items.

Examination of the preference data reported in Table 2 shows that there are considerable differences in preference among the 50 pairs of stimulus items. In some cases there is almost perfect agreement among Ss as to preference. On the other hand, some items showed little agreement among Ss. More detailed analysis of the individual items is necessary before any theoretical and linguistic interpretation can be given to these data.

The question of consistency of preference was also examined by obtaining the correlation of preference responses for orders and days. Table 3 gives these correlations. It is evident from the significant and high correlations that Ss exhibit similar choice behavior on different days, and the order in which the pairs are presented does not influence preference.

Insert Table 3 about here

Latency of response in the preference task does not appear to be a powerful variable. The amount of inter-subject variability was too great to permit anything but a gross analysis of the data. There is a tendency for the latencies to increase with high inter-subject variability.

The distribution of ranks in terms of per cent Ss assigning a rank for each item on each day and each order is given in Table 4. Correlations between rank and preference were obtained for each pair. The overall correlations

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Insert Table 4 about here

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between preference and rank for all four experimental conditions is given in Table 5. These correlations are all significant at the .01 level. This

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Insert Table 5 about here

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means that when a S preferred a member of a pair, he tended to give it a high rank. When the member of a pair was not preferred it was given a low rank. These findings lend support to the argument that the S was in fact using his implicit knowledge of English to guide him in his preferences, as well as his decision with respect to an item's approximation to good English.

Subjects are remarkably consistent in their ranking behavior on this task, as is illustrated by the correlations given in Table 6. These correlations

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Insert Table 6 about here

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are all significant at the .01 level; there is no evidence to indicate that rankings tend to be higher or lower in the initial or final portions of the set of items. Analysis of variance was carried out to determine if there were significant day, list or order effects which were influencing the results. All of the obtained F values did not approach significance.

On the whole, the results obtained in this study permit the conclusion that this task can yield data relevant to the linguistic and in particular the syntactic competence of Ss when applied to non-grammatical statements. It is apparent that Ss must be trying to cope with the statements by comparing them to an acceptable syntactic pattern. The fact that there are strong preferences for a member of a pair of statements of similar syntactic length in part supports this contention. It does not, however, rule out the

possibility of Ss responding to something that is semantic. This is also true when considering the data obtained from the ranking task. A more complete interpretation of the results reported here must await further analysis of the responses to the particular items.

This study will be repeated with four groups of Ss. In the replication one group will receive only a visual presentation of all the material, another only auditory, the third and fourth both visual and auditory. In addition, a population of aphasics will be studied, using the preference task with visual and auditory presentations.

Table 1

Stimulus Statements, Order of Presentation and Button Assignment for Orders 1 and 2

	Statement	Order 1		Order 2	
		Pair No.	Button	Pair No.	Button
1.	Fews make home book old professors man.	1	A	38	B
2.	With drink the young knowledge primarly especially amongs.	1	B	38	A
3.	Whiskeys straws wine makes daughters.	2	A	22	A
4.	Young young buildings grow less hole milk.	2	B	22	B
5.	Meal sand soldier wine after the.	3	A	44	A
6.	Show rice wine daughters delicious home.	3	B	44	B
7.	New show these extremely.	4	A	11	B
8.	Rices above a.	4	B	11	A
9.	Intelligence news good deliciouses many strong.	5	A	36	B
10.	Extremely primarily beautiful foods food windows lakes.	5	B	36	A
11.	The milk those rice.	6	A	4	B
12.	Around milk paint around.	6	B	4	A
13.	Around drink machines windows more book the jobs.	7	A	19	A
14.	Many especiallys big ugly machineseses.	7	B	19	B
15.	Help quiteses extremely windows paint lady sand.	8	A	21	B
16.	During sand paint essentials good man above big.	8	B	21	A
17.	Verys.	9	A	45	B
18.	Make among.	9	B	45	A
19.	Group deliciouses paint some outside.	10	A	12	B
20.	Lady sand through grow soldiers.	10	B	12	A
21.	Home dishes.	11	A	26	A
22.	Eats.	11	B	26	B
23.	Food those during woods thoses.	12	A	6	B
24.	Old rice good delicious grow strong eat.	12	B	6	A
25.	With professors lakes drink.	13	A	3	B
26.	Seven seven man seven machines view.	13	B	3	A
27.	Make delicious eats.	14	A	37	B
28.	Through prefer few delicious.	14	B	37	A
29.	Professors group group.	15	A	7	B
30.	Quite dishes meal after.	15	B	7	A
31.	Food show.	16	A	14	B
32.	Above wine.	16	B	14	A
33.	Man grows soldiers among several.	17	A	10	A
34.	Help view daughters ins whiskey dishes.	17	B	10	B
35.	Home make rices showseses intelligence.	18	A	32	B
36.	Quite jobs strong machines very drinks straw help.	18	B	32	A
37.	Very with make extremely the windowses.	19	A	43	A
38.	Newses very delicious man.	19	B	43	B
39.	Grow makes rice.	20	A	8	A
40.	Building quite soldiers.	20	B	8	B
41.	Especially old.	21	A	5	A
42.	Lakeses.	21	B	5	B
43.	Rices greens grow view.	22	A	16	B
44.	Around above lady like fields lady.	22	B	16	A
45.	Book bigs during green prefer jobses.	23	A	23	A
46.	Prefers daughters groups the drinks.	23	B	23	B
47.	Woods.	24	A	20	B
48.	Machines classes.	24	B	20	A
49.	With outside show classes help.	25	A	31	B
50.	Classes machines building intelligence especially.	25	B	31	A

Table 1 (Continued)

Stimulus Statements, Order of Presentation and

Button Assignment for Orders 1 and 2

	Statement	Order 1		Order 2	
		Pair No.	Button	Pair No.	Button
51.	Soldier group makeses wood man disheses.	26	A	34	A
52.	Simply paint make with these daughters news group.	26	B	34	B
53.	Home steel classes.	27	A	2	A
54.	Beautifuls extremely.	27	B	2	B
55.	This book daughters.	28	A	46	A
56.	Lakes new totally.	28	B	46	B
57.	Someses like lakes few windows ugly.	29	A	30	B
58.	Food strong simplyseseseseses.	29	B	30	A
59.	Strong very through grows a jobs very.	30	A	41	A
60.	Outside very less sand help less strong ugly.	30	B	41	B
61.	The beyond knowledge thoses building seven intelligence.	31	A	40	A
62.	Windowses holes arounds help primarily.	31	B	40	B
63.	Paint espeiciallys.	32	A	9	A
64.	Essentials dishes jobs.	32	B	9	B
65.	After totally.	33	A	1	A
66.	Buildings.	33	B	1	B
67.	Windows intelligences strong soldier seven hole intelligence.	34	A	13	A
68.	After some especially help lady daughters new sand.	34	B	13	B
69.	Big home.	35	A	24	A
70.	Those several.	35	B	24	B
71.	Beyond primarily seven fields this.	36	A	48	B
72.	Prefer intelligence grow big make.	36	B	48	A
73.	View group intelligences.	37	A	35	A
74.	Beautifuls young man.	37	B	35	B
75.	Especially a sand helps these extremely view the.	38	A	25	B
76.	Lesses cat totally thoses with beautiful these.	38	B	25	A
77.	Prefer jobs less man.	39	A	17	A
78.	Green primarily especially wood.	39	B	17	B
79.	Several rice during book outside hole.	40	A	15	A
80.	Quite throughses prefer daughters.	40	B	15	B
81.	Help outside whiskey professor good extremelys with.	41	A	50	A
82.	More amongs classes windowses above big.	41	B	50	B
83.	Steel fields knowledge eat wood.	42	A	39	A
84.	In shows seven around.	42	B	39	B
85.	Prefer buidling daughters meal classes few withs meal.	43	A	42	B
86.	Whiskeys buildingseses jobses daughters.	43	B	42	A
87.	Classes beyond with green.	44	A	18	B
88.	Machines seven the home.	44	B	18	A
89.	Uglys prefer good a these deliciouseses.	45	A	33	B
90.	Few beyond fields simply book after big hole.	45	B	33	A
91.	After help machines disheses more buildings.	46	A	49	B
92.	Aboves soldier several group professor foods ugly.	46	B	49	A
93.	Group seven simply green.	47	A	29	A
94.	Above bigs meal.	47	B	29	B
95.	Show after several help professors above.	48	A	27	A
96.	Seven prefeseses good view.	48	B	27	B
97.	Verys.	49	A	28	B
98.	With wine.	49	B	28	A
99.	Several theses prefer eat group simply simply.	50	A	47	B
100.	Strong the meal drink during quite classes.	50	B	47	A

Table 2

Number of Times a Member of a Pair Selected by Ss for Days and Orders and for Orders Across Days. (N=14, in Each Group)

	Statement	Day_1 $Order_1$	Day_1 $Order_2$	Day_2 $Order_2$	Day_2 $Order_1$	$Order_1$	$Order_2$
1.	Fews make homebook old professors man.	6	10	10	9	15	20
2.	With drink the young knowledge primarly especially amongs.	8	4	4	5	13	8
3.	Whiskeys straws wine makes daughters.	7	4	1	2	9	5
4.	Young young buildings grow less hole milk.	7	10	13	12	19	23
5.	Meal sand soldier wine after the.	2	2	1	7	9	3
6.	Show rice wine daughters delicious home.	12	12	13	7	19	25
7.	New show these extremely.	12	11	11	10	22	22
8.	Rices above a.	2	3	3	4	6	6
9.	Intelligence news good deliciouses many strong.	5	7	5	4	9	12
10.	Extremely primarily beautiful foods food windows lakes.	9	7	9	10	19	16
11.	The milk those rice.	4	5	1	4	8	6
12.	Around milk paint around.	10	9	13	10	20	22
13.	Around drink machines windows more book the jobs.	12	13	13	10	22	26
14.	Many especiallys big ugly machineseses.	2	1	1	4	6	2
15.	Help quiteses extremely windows paint lady sand.	5	5**	9	10	15	14
16.	During sand paint essentials good man above big.	9	8**	5	4	13	13
17.	Verys.	7**	4	5	5	12	9
18.	Make among.	6**	10	9	9	15	19
19.	Group deliciouses paint some outside.	8	5	8	3	11	13
20.	Lady sand through grow soldiers.	6	9	6	11	17	15
21.	Home dishes.	10	9	7	8	18	16
22.	Eats.	4	5	7	6	10	12
23.	Food those during woods thoses.	2	3**	5	4	6	8
24.	Old rice good delicious grow strong eat.	12	10**	9	10	22	19
25.	With professors lakes drink.	7	5**	1*	10	17	6
26.	Seven seven man seven machines view.	7	6**	12*	4	11	18
27.	Make delicious eats.	10	10	10	12	22	20
28.	Through prefer few delicious.	4	4	4	2	6	8
29.	Professors group group.	9	7	12	11	20	19
30.	Quite dishes meal after.	5	7	2	3	8	9
31.	Food show.	3	2	5	6	9	7
32.	Above wine.	11	12	9	8	19	21
33.	Man grows soldiers among several.	13	11	14	11	24	25
34.	Help view daughters ins whiskey dishes.	1	3	0	3	4	3
35.	Home make rices showseses intelligence.	4	6	8	9	13	14
36.	Quite jobs strong machines very drinks straw help.	10	8	6	5	15	14
37.	Very with make extremely the windowses.	2	6	8	8	10	14
38.	Newses very delicious man.	12	8	6	6	18	14
39.	Grow makes rice.	10	12	11	12	22	23
40.	Building quite soldiers.	4	2	3	2	6	5
41.	Especially old.	13	12	14	12	25	26
42.	Lakeses.	1	2	0	2	3	2
43.	Rices greens grow view.	6	10	9	9	15	19
44.	Around above lady like fields lady.	8	4	5	5	13	9
45.	Book bigs during green prefer jobses.	1	7	2	5	6	9
46.	Prefers daughters groups the drinks.	13	7	12	9	22	19
47.	Woods.	12	8	10	6*	18	18
48.	Machines classes.	2	6	4	7*	9	10
49.	With outside show classes help.	9	14	13	11	20	27
50.	Classes machines building intelligence especially.	5	0	1	3	8	1
51.	Soldier group makeses wood man disheses.	2	5	3	2	4	8
52.	Simply paint make with these daughters news group.	12	9	11	12	24	20
53.	Home steel classes.	10	12	13	14	24	25

Table 2 (Continued)

Number of Times a Member of a Pair Selected by Ss for Days and Orders and for Orders Across Days. (N=14, in Each Group)

	Statement	Day_1 $Order_1$	Day_1 $Order_2$	Day_2 $Order_2$	Day_2 $Order_1$	$Order_1$	$Order_2$
54.	Beautifuls extremely.	4	2	1	0	4	3
55.	This book daughters.	5	9	5	6	11	14
56.	Lakes now totally.	9	5	9	8	17	14
57.	Seasons like lakes few windows ugly.	13	14	13	14	27	27
58.	Food strong simplysssssssss.	1	0	1	0	1	1
59.	Strong very through grows a jobs very.	8	6	8	9	17	14
60.	Outside very less sand help less strong ugly.	6	8	6	5	11	14
61.	The beyond knowledge thoses building seven intelligence.	10	7	8	6	16	15
62.	Windowses holes arounds help primarily.	4	7	6	8	12	13
63.	Paint espeiciallys.	6	7	7	5	11	14
64.	Essentials dishes jobs.	8	7	7	9	17	14
65.	After totally.	3	10	4	9	12	14
66.	Buildings.	11	3	10	5	16	13
67.	Windows intelligences strong soldier seven hole intelligence.	4	4	4	2	6	8
68.	After some especially help lady daughters new sand.	10	10	10	12	12	20
69.	Big home.	12	12	13	11	21	25
70.	Those several.	2	2	1	3	5	3
71.	Beyond primarily seven fields this.	6	6	8	5	11	14
72.	Prefer intelligence grow big make.	8	8	6	9	17	14
73.	View group intelligences.	9	11	12	10	19	23
74.	Beautifuls young man.	5	3	2	4	9	5
75.	Especially a sand helps these extremely view the.	4	13	7	7	11	20
76.	Lasses cat totally thoses with beautiful these.	10	1	7	7	17	8
77.	Prefer jobs less man.	5*	7	9	6*	11	16
78.	Green primarily especially wood.	7*	7	5	4*	11	12
79.	Several rice during book outside hole.	7	7	6	5	12	13
80.	Quite throughses prefer daughters.	7	7	8	9	16	15
81.	Help outside whiskey professor good extremelys with.	10	8	7	9	19	15
82.	More amongs classes windowses above big.	4	6	7	5	9	13
83.	Steel fields knowledge eat wood.	6	4	3	5	11	7
84.	In shows seven around.	8	10	11	9	17	21
85.	Prefer buidling daughters meal classes withs meal.	12	7	9	11	23	16
86.	Whiskeys buildingsses jobses daughters.	2	7	5	3	5	12
87.	Classes beyond with green.	6	7	8	6	12	15
88.	Machines seven the home.	8	7	6	8	16	13
89.	Uglys prefer good a these deliciousses.	2	4	5	3	5	9
90.	Few beyond fields simply book after big hole.	12	10	9	11	23	19
91.	After help machines dishes mores buildings.	9	5	8	5	14	13
92.	Aboves soldier several group professor foods ugly.	5	9	6	9	14	15
93.	Group seven simply green.	13	13	12	13	26	25
94.	Above bigs meal.	1	1	2	1	2	3
95.	Show after several help professors above.	10	9	7	7	17	16
96.	Seven preferseses good view.	4	5	7	7	11	12
97.	Verys.	3	4	1	3	6	5
98.	With wine.	11	10	13	11	22	23
99.	Several theses prefer eat group simply simply.	7	6	10	4	11	16
100.	Strong the meal drink during quite classeses.	7	8	4	10	17	12

*Entries with * will not add up to 14 because it was necessary to reject some of the responses.

Table 3

Correlation Coefficients to Estimate Degree of Preference Consistency for Orders and Days

Condition	r*
Day 1 - Order 1 and Order 2	.639
Day 2 - Order 1 and Order 2	.723
Order 1 - Day 1 and Day 2	.888
Order 2 - Day 1 and Day 2	.781

*all r's significant at or beyond the .01 level of confidence

Table 4

Distribution of Ranks in Terms of Per Cent Ss assigning a Particular Rank to Each Item. (N=28)

Sentence	Day_1					$Order_1$					Day_1					$Order_2$				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1	—	21	71	07	—	07	07	36	36	14	07	21	50	21	—	14	28	28	21	07
2	—	21	50	28	—	00	21	21	36	14	14	21	36	28	—	14	43	21	14	07
3	07	21	21	36	14	07	07	57	21	07	07	07	36	50	—	—	07	64	28	—
4	—	07	07	36	50	—	28	28	28	21	—	07	14	43	36	—	—	36	43	21
5	21	36	14	14	14	—	14	64	21	—	14	43	21	21	—	21	43	14	21	—
6	—	36	28	14	21	28	14	43	07	07	—	—	28	36	36	07	14	36	21	21
7	21	07	28	36	07	—	28	21	43	07	—	21	43	28	07	—	36	21	36	07
8	21	14	28	36	—	14	28	21	21	14		14	36	43	07	14	36	14	21	14
9	36	28	28	—	07	14	21	21	43	—	28	50	21	—	—	21	57	07	14	—
10	43	28	14	07	07	28	43	21	07	—	28	50	14	07	—	36	36	14	14	—
11	14	50	21	14	—	28	14	43	07	07	07	64	21	07	—	—	43	28	21	07
12	—	07	21	28	43	07	57	21	14	—	—	14	36	36	14	—	21	21	57	—
13	07	14	57	21	—	14	21	21	28	14	—	36	28	28	07	—	—	50	28	21
14	43	28	28	—	—	36	43	14	07	—	36	43	07	14	—	36	43	21	—	—
15	43	28	07	21	—	28	36	07	28	—	21	36	14	28	—	21	64	14	—	—
16	07	43	28	14	07	36	21	28	07	07	14	71	—	14	—	07	28	50	07	07
17	14	28	28	28	—	14	07	21	36	21	07	43	28	14	07	21	64	—	07	07
18	—	07	14	64	14	36	43	07	—	14	—	07	21	64	07	—	21	36	21	21
19	07	28	14	28	21	14	28	36	07	14	07	21	36	36	—	—	14	36	43	07
20	—	28	36	21	14	14	28	21	28	07	07	28	28	36	—	—	36	50	07	07
21	07	07	07	28	50	14	21	07	28	28	—	—	28	21	50	—	28	—	21	50
22	07	21	14	14	43	28	07	14	07	43	07	14	07	07	64	07	21	14	21	36
23	21	57	07	14	—	36	50	07	—	07	28	64	07	—	—	14	50	28	07	—
24	07	57	14	07	14	07	36	36	21	—	14	50	14	21	—	—	50	36	14	—
25	—	21	21	50	07	07	07	14	64	07	—	28	28	28	14	—	—	21	64	14
26	07	21	14	43	14	—	28	57	14	—	—	28	21	50	—	—	28	28	43	—
27	07	14	14	36	28	07	50	28	14	—	07	—	14	36	43	—	07	50	28	14
28	07	50	28	14	—	—	14	36	28	21	14	21	36	28	—	—	43	57	—	—
29	—	14	28	28	28	07	14	50	21	07	—	07	43	21	28	—	21	28	36	14
30	—	36	43	07	14	14	50	21	14	—	07	50	43	—	—	—	57	36	07	—
31	—	07	28	36	28	07	21	14	14	43	—	07	14	28	50	—	36	14	28	21
32	—	14	14	43	28	14	21	07	21	36	—	—	21	36	43	—	28	07	36	28
33	—	21	14	14	50	—	14	28	36	43	—	07	21	43	28	—	—	36	43	21
34	14	21	28	28	07	14	43	36	07	—	07	28	36	14	14	—	36	43	21	—
35	28	36	36	—	—	—	14	14	57	14	28	36	21	14	—	14	43	28	14	—

Sentence	Day_2					$Order_1$					Day_2					$Order_2$				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1	14	28	28	21	07	04	21	60	14	—	10	18	32	28	10					
2	14	43	21	14	07	07	21	43	28	—	10	27	21	25	10					
3	—	07	64	28	—	07	14	28	43	07	04	07	60	24	10					
4	—	—	36	43	21	—	07	10	40	43	—	14	32	36	21					
5	21	43	14	21	—	18	40	18	18	07	10	28	40	21	—					
6	07	14	36	21	21	—	18	28	25	28	18	14	40	14	14					
7	—	36	21	36	07	10	14	36	28	07	—	32	21	40	07					
8	14	36	14	21	14	10	14	32	40	04	14	32	18	21	14					
9	21	57	07	14	—	32	39	24	—	04	18	39	14	28	—					
10	36	36	14	14	—	36	39	14	07	04	32	40	18	10	—					
11	—	43	28	21	07	10	57	21	10	—	14	28	36	14	07					
12	—	21	21	57	—	—	10	36	32	36	04	39	21	36	—					
13	—	—	50	28	21	04	25	42	24	04	07	10	36	28	18					
14	36	43	21	—	—	40	36	18	07	—	36	43	18	04	—					
15	21	64	14	—	—	32	32	10	24	—	24	50	10	14	—					
16	07	28	50	07	07	10	57	14	14	04	22	24	39	07	07					
17	21	64	—	07	07	10	36	28	41	04	18	36	10	21	14					
18	—	21	36	21	21	—	07	18	64	10	18	32	21	10	18					
19	—	14	36	43	07	07	24	25	32	10	07	21	36	25	10					
20	—	36	50	07	07	04	21	32	28	07	07	32	36	18	07					
21	—	28	—	21	50	04	04	18	24	50	07	24	04	24	39					
22	07	21	14	21	36	07	18	10	10	54	18	14	14	14	40					
23	14	50	28	07	—	24	60	07	07	—	25	50	18	04	04					
24	—	50	36	14	—	10	54	14	14	07	04	43	36	18	—					
25	—	—	21	64	14	—	24	24	39	14	04	04	18	64	14					
26	—	28	28	43	—	04	24	18	46	07	—	28	42	28	—					
27	—	07	50	28	14	07	07	14	36	36	04	28	39	41	07					
28	—	43	57	—	—	10	36	32	21	—	—	28	46	14	10					
29	—	21	28	36	14	—	10	36	24	28	04	18	39	28	14					
30	—	57	36	07	—	04	43	43	04	07	07	54	28	10	—					
31	—	36	14	28	21	—	07	21	32	39	04	28	14	21	32					
32	—	28	07	36	28	—	07	18	40	36	07	24	07	28	32					
33	—	—	36	43	21	—	14	18	28	39	—	07	32	40	21					
34	—	36	43	21	—	10	24	32	41	10	07	40	40	14	—					
35	14	43	28	14	—	28	36	28	07	—	07	28	41	36	07					

Table 4 (Continued)

Distribution of Ranks in Terms of Per Cent Ss assigning a Particular Rank to Each Item. (N=28)

Sentence	Day$_1$ Order$_1$					Day$_1$ Order$_2$					Day$_2$ Order$_1$					Day$_2$ Order$_2$					Order$_1$					Order$_2$				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
36	21	57	21	—	—	14	43	28	07	07	07	50	36	07	—	21	50	21	07	—	14	54	28	04	—	14	46	24	07	04
37	07	71	07	14	—	14	36	36	14	—	21	36	28	14	—	07	57	21	14	—	14	54	18	14	—	10	46	28	14	—
38	14	43	21	14	07	21	36	36	—	07	21	21	36	21	—	14	36	43	—	07	18	32	28	18	04	18	36	40	—	07
39	—	21	14	21	43	—	14	50	21	14	—	07	07	50	36	—	21	36	43	—	—	14	10	36	40	—	18	43	32	07
40	14	21	21	14	28	—	28	36	28	07	—	21	50	21	07	07	43	36	14	—	07	21	36	18	18	04	36	36	21	04
41	07	21	14	21	36	07	21	07	21	43	—	14	21	21	43	14	21	14	21	28	04	18	18	21	40	10	21	10	21	36
42	36	28	21	14	—	57	28	14	—	—	36	28	36	—	—	21	21	36	—	21	36	28	28	07	—	39	24	25	—	10
43	—	21	43	36	—	—	43	14	28	14	—	21	21	43	14	—	14	64	14	07	—	21	32	40	07	—	28	39	21	10
44	07	36	28	28	—	14	21	43	21	—	21	21	21	28	07	—	43	36	07	14	14	28	24	28	04	07	32	40	14	07
45	—	43	28	28	—	07	28	28	21	14	—	36	28	21	14	07	21	36	21	14	—	40	28	24	07	07	24	32	21	14
46	—	50	28	14	07	07	50	21	21	—	14	07	36	36	07	—	28	50	21	—	07	28	32	25	07	04	39	36	21	—
47	07	14	—	28	50	21	28	07	07	36	—	07	21	14	57	14	21	21	07	36	04	10	10	21	54	18	24	14	07	36
48	07	21	14	50	07	07	21	43	14	14	07	07	28	43	14	07	14	36	43	—	07	14	21	46	10	07	18	40	28	07
49	—	07	28	50	14	—	—	21	43	36	—	—	07	64	28	—	07	21	43	28	—	04	18	57	21	—	04	21	43	32
50	14	36	36	14	—	—	28	07	64	—	—	28	50	21	—	07	14	28	50	—	07	32	42	18	—	04	21	18	57	—
51	28	36	28	07	—	14	36	36	14	—	28	28	28	14	—	14	28	36	21	—	28	32	28	10	—	14	32	36	18	—
52	07	36	43	14	—	07	50	28	07	07	07	43	21	28	—	—	36	28	36	—	07	40	32	21	—	04	43	28	22	04
53	—	21	14	50	14	—	28	14	43	14	—	14	28	50	07	—	14	36	28	21	—	18	21	50	10	—	21	25	36	28
54	43	28	14	07	07	21	43	36	14	—	28	28	36	07	—	21	50	14	—	—	36	28	25	07	04	21	47	25	07	—
55	—	21	36	36	07	14	—	21	43	21	07	21	21	21	28	—	07	36	43	14	04	21	28	28	18	07	04	28	43	18
56	—	21	50	21	07	07	14	21	50	07	—	14	43	36	07	07	14	36	43	—	—	18	47	28	07	07	14	28	47	07
57	21	36	07	28	07	21	28	21	21	07	21	36	43	—	—	21	36	28	14	—	21	36	25	14	04	21	32	24	18	04
58	64	28	07	—	—	71	21	07	—	—	43	50	07	—	—	64	28	07	—	—	54	39	07	—	—	68	24	07	—	—
59	14	36	07	36	07	07	64	14	07	07	21	43	—	36	—	14	50	21	14	—	18	40	04	36	04	10	57	18	10	04
60	14	50	21	07	07	21	21	43	14	—	07	57	28	07	—	14	14	71	—	—	10	54	24	07	04	18	18	57	07	—
61	21	36	21	14	07	14	36	28	14	07	07	43	28	21	—	07	28	28	36	—	14	40	24	18	04	10	32	28	25	04
62	14	28	28	21	07	14	28	36	14	07	07	43	50	—	—	—	28	43	14	14	10	36	39	10	04	07	28	40	14	10
63	14	28	28	21	07	14	50	28	—	07	07	28	21	36	07	07	21	50	21	—	10	28	24	28	07	10	36	39	10	04
64	07	36	21	21	14	07	28	43	21	—	—	50	28	21	—	21	21	36	14	07	04	43	24	21	07	14	24	40	18	—
65	—	07	36	36	21	07	36	28	21	07	—	28	28	28	14	14	36	—	36	14	—	18	32	32	18	10	36	14	28	10
66	—	21	07	21	50	14	07	—	21	57	—	07	21	07	64	14	36	—	14	36	—	14	14	14	57	14	22	—	18	46
67	07	28	28	36	—	14	57	07	21	—	28	28	21	21	—	21	28	36	07	07	18	28	24	28	—	18	42	22	14	04
68	07	28	36	21	07	14	14	21	43	07	—	43	21	36	—	14	28	36	14	07	04	36	28	28	04	14	21	28	28	07
69	—	21	14	21	43	07	28	14	—	50	—	—	21	21	57	07	21	21	07	43	—	10	18	21	50	07	24	18	04	46
70	—	21	36	28	14	07	36	21	21	14	07	07	43	36	07	07	14	43	21	14	04	14	40	32	10	07	25	32	21	14
71	—	28	14	43	14	—	36	36	21	07	—	36	14	43	07	—	21	21	50	07	—	32	14	43	10	—	28	28	36	07
72	—	28	36	28	07	—	50	36	14	—	—	28	36	28	07	—	50	21	28	—	—	28	36	28	07	—	50	28	21	—
73	—	14	14	43	28	—	07	28	28	36	—	07	14	43	36	—	07	43	28	21	—	10	14	43	32	—	07	36	28	28

Table 4 (Continued)

Distribution of Ranks in Terms of Per Cent Ss assigning a Particular Rank to Each Item. (N=28)

Sentence	Day$_1$ Order$_1$					Day$_1$ Order$_2$					Day$_2$ Order$_1$					Day$_2$ Order$_2$					Order$_1$					Order$_2$				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
74	07	43	28	21	—	14	43	28	07	07	07	21	64	07	—	14	36	14	36	—	07	32	60	14	—	14	36	21	22	04
75	07	21	36	36	—	07	07	64	21	—	14	43	28	14	—	—	28	28	28	14	10	32	32	25	—	04	18	46	24	07
76	28	36	14	21	—	14	57	07	21	—	21	21	21	28	07	36	14	21	28	—	24	28	18	24	04	25	36	14	24	—
77	—	28	14	57	—	07	21	43	14	14	—	07	43	36	14	—	36	43	21	—	—	18	28	46	07	04	28	43	18	07
78	—	28	28	21	21	07	07	21	57	07	—	21	43	36	—	—	28	36	21	14	—	24	36	28	10	04	36	28	39	10
79	07	36	36	14	07	14	07	28	28	21	—	36	43	21	—	07	43	07	36	07	04	36	40	18	04	10	25	18	32	14
80	07	21	21	50	—	14	36	14	28	07	21	07	36	28	07	14	2[illegible]	14	36	07	14	14	28	39	04	14	32	14	32	07
81	28	50	21	—	—	21	50	21	07	—	14	21	43	21	—	21	57	21	—	—	21	36	32	10	—	21	54	21	04	—
82	21	50	28	—	—	14	36	43	07	—	—	50	21	28	—	14	57	28	—	—	10	50	24	14	—	14	46	36	04	—
83	—	07	28	50	14	07	07	36	36	14	07	07	36	43	07	—	21	21	70	07	04	07	32	46	10	04	18	28	53	10
84	07	14	21	43	14	07	28	28	21	14	07	07	36	43	07	—	28	57	07	07	07	10	28	43	10	04	28	42	14	10
85	07	64	21	07	—	—	50	36	14	—	21	43	21	14	—	14	50	28	07	—	14	54	21	10	—	07	50	32	10	—
86	57	43	—	—	—	50	28	07	14	—	36	50	07	07	—	50	21	21	07	—	46	46	04	04	—	50	24	14	10	—
87	—	—	28	50	21	07	14	07	64	07	—	—	50	28	21	—	21	43	21	14	—	—	39	39	21	04	18	25	42	10
88	—	07	21	50	21	07	14	21	36	21	—	07	28	36	28	—	21	36	21	21	—	07	24	43	24	04	18	28	28	21
89	07	71	—	14	07	07	36	43	14	—	36	50	14	—	—	07	36	43	14	—	22	60	07	07	04	07	36	43	14	—
90	—	14	36	28	21	—	14	14	57	14	—	07	36	50	07	07	—	21	57	14	—	10	36	39	14	04	07	18	57	14
91	28	28	21	21	—	21	21	50	—	07	36	21	28	14	—	—	50	28	21	—	32	24	24	18	—	10	36	39	10	04
92	14	50	21	14	—	14	50	07	28	—	14	43	28	14	—	28	36	28	07	—	14	46	24	14	—	21	43	18	18	—
93	—	14	36	36	14	—	28	28	21	21	—	07	07	71	14	—	14	36	36	14	—	10	21	54	14	—	21	32	28	18
94	07	50	21	21	—	28	28	28	14	—	—	36	57	07	—	07	36	28	28	—	04	43	39	14	—	18	32	28	21	—
95	—	28	36	36	—	07	36	21	36	—	—	07	57	36	—	07	28	43	21	—	—	18	46	36	—	07	32	32	28	—
96	28	07	36	28	—	07	21	36	28	07	07	50	28	07	07	14	21	36	21	07	18	28	32	18	04	10	21	36	24	07
97	07	36	36	14	07	43	36	07	14	—	14	50	14	14	07	21	57	14	07	—	10	43	25	14	07	32	46	10	10	—
98	—	—	14	36	50	07	28	07	28	28	—	—	21	14	64	07	21	14	21	36	—	—	18	25	57	07	24	10	24	32
99	—	36	28	21	07	07	50	36	07	—	07	36	36	21	—	28	21	28	21	—	04	36	32	21	04	18	36	32	14	—
100	14	36	36	14	—	21	21	57	—	—	07	57	21	14	—	—	28	43	28	—	10	46	28	14	—	10	24	50	14	—

Table 5

Overall Correlations Between Preference and Rank for the Four Experimental Conditions

Condition	r*
Day 1 - Order 1	.681
Day 2 - Order 1	.804
Day 1 - Order 2	.444
Day 2 - Order 2	.622

*all r's significant at or beyond the .01 level of confidence

Table 6

Correlations Between Ranks for Days and Orders

Condition	r*
Day 1 - Order 1 and Order 2	.753
Day 2 - Order 1 and Order 2	.669
Order 1 - Day 1 and Day 2	.820
Order 2 - Day 1 and Day 2	.699

*all r's significant at or beyond the .01 level of confidence