DOCUMENT RESUME

ED 028 409 48 AL 001 389

By-Tikofsky, Ronald S.

Structural Apperception in the Absence of Syntactic Constraints.

Michigan Univ., Ann Arbor. Center for Research on Language and Language Behavior.
Spons Agency-Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No-BR-6-1784
Pub Date Jul 67
Contract-OEC-3-6-061784-0508
Note-27p.; Expanded version of speech presented at the Linguistic Society of America Summer I ting, University of Michigan, Ann Arbor, July 27-28, 1967.
EDRS Price MF-$0.25 HC-$1.45
Descriptors-Grammar, *Linguistic Performance, Semantics, *Standard Spoken Usage, *Syntax

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Ronald S. Tikofsky
University of Michigan

Donald G. Reiff
University of Rochester

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Psycholinguistics has devoted considerable attention to issues surrounding the concept of linguistic competence and linguistic performance. As part of the attack on the problem have come a series of papers which attempt to explain how a native speaker understands or processes the sentence. Osgood (1963) and Berlyne (1965) as as well as others hold to a chaining or mediational view to explain our ability to understand what we read or hear. The position taken by S-R psychology on this topic has been challenged by those closely aligned with the proponents of the new linguistics as proposed by Chomsky (1957), later by Miller and Chomsky (1963). Attempts have been made to test empirically hypotheses emanating from the transformational view of grammar. Many of these studies deal with the role of sentential complexity as a function of syntactic relations in the surface structure (Fodor and Garrett, 1967; Maclay and Sleator, 1960; Marks and Miller, 1964; Stoltz, 1967). These studies use fully grammatical utterances as stimuli and memory or a paraphrase as the response mode. Some attention (Downey and Hakes, 1968; Miller and Isard, 1963) has been given to the speaker's processing of putative sentence which are less

than fully grammatical. Tasks requiring the language user to make judgments of such strings may provide additional data on linguistic competence and its application. Such data can be obtained without requiring that the user be able to recall or paraphrase the stimulus.

Saporta (1967) states that, "a theory which purports to simulate the speaker's ability to distinguish between syntactically well-formed sentences of his language and the syntactically deviant ones must avoid making intuitively incorrect statements about what sentences are grammatical." Recognizing that the living speaker-hearer is at best a poor approximation to the ideal speaker-listener of the theory, it seems reasonable to examine the language user's processing of grammatically deviant strings. The assumption is that the language user will attempt to apply his linguistic knowledge to such strings in an effort to respond to them as though they were sentences of his language.

It is generally agreed that normal discourse does not in fact consist of fully grammatical strings and complete sentences. Yet language users seem able to cope with less than fully grammatical and/or incomplete sentences with only little difficulty. Several strategies can be proposed to account for the apparent lack of interference in communicative efficiency resulting from such deviant utterances. The listener is of course in the position of being able to treat such utterances in terms of the total context of the discourse, as well as the situational context, and

the utterances' overall structure, i.e., semantic, syntactic and phonological features. However, attempts on the part of the language user to cope with single or paired grammatically deviant strings which are not part of discourse or normal communication situations would not be aided by either context. What could be said about strategies that might be employed by the language user in such cases? Some possible alternatives are given below.

If the user were presented with a single grammatically deviant string and he were to judge its approximation to an adequate grammatical sentence he might be expected to judge the utterance as being completely unacceptable. However, it is also possible that he might respond not to the totality of the utterance but rather to parts of it, or base his judgments on his perception and interpretation of the prosodic features. Other alternatives suggest that the user disregard some aspects of the utterance. He might impose an interpretation on the whole or on some portion analogizing to structural features which he considers nondeviant. In so doing, he would in effect be selectively attending to part of the utterance or some aspect of it, while relegating the remainder to the background. Thus, he would treat the utterance as a "figure-ground" problem in much the same manner as Gestalt psychology accounts for perception. In this process, it is reasonable to assume that the figure will contain segments of the utterance which form either

a semantically or syntactically acceptable unit, or some combination of the two given a nondeviant phonological rendering. If this in fact were the way the language user operated on grammatically deviant utterances, then it would be predicted that those utterances containing both syntactic and semantic segments which can be interpreted as non-deviant would be ranked as close approximations to fully grammatical sentences. If either one or the other (but not both) aspects just noted were present, then the utterance would be ranked as somewhat less acceptable. Finally, utterances which could be treated as having only minimally adequate semantic or syntactic segments would be ranked as only minimally acceptable. Such considerations might well enter into the user's decision as to which member of a pair of strings would be selected as being the best approximation to an adequate grammatical sentence.

The present study examines the judgments of native American speakers concerning the "well-formedness" of random string of English sentence-formatives presented as putative sentences. Speakers responded to these strings in two experimental conditions. In one, they were required to determine which member of a pair of such strings was the better approximation to "good English," and in the other they were asked to rank each string in terms of its approximation to "good English." Since the subjects were college students, it was assumed that they had achieved a

reasonably complete degree of linguistic knowledge. One of the major purposes of this research was to determine if subjects would show general agreement in their preference for a member of a pair of strings and how well they would agree on ranking each string. In addition, the consistency of judgments over time was studied.

Method

Stimuli. The stimuli were 50 pairs of grammatically deviant strings where the distribution of the formatives was uniformly random. This precluded the recovery of any syntactic regularity. The 50 pairs were randomly selected from a set of 1000 pairs of computer generated strings of "equal syntactic length," each member of a pair had the same number of formatives.

Pairs were generated from ten fully grammatical sequences in English having the form:

determiner + adverb + adjective + noun + S + verb + S + noun + preposition + noun.

This yielded a 10 x 10 matrix, representing 100 grammatical English sequences. The computer program operated on the matrix in the following fashion:

1. it first selected on a random basis, a length between 1 and 10;
2. it then selected randomly, items from the matrix;
3. it continued to select items until a number of them representing twice the length had been reached;

4. it printed 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 statements of equal length); and
5. it continued this operation until the upper limit (1000 pairs) had been reached.

The 50 pairs (100 strings) used in this study are given in Table 1. In addition, this table also identifies the pair to which each string belongs in each of two orders, and the sequence in which they appear in the pair for the two orders. Sequence of string in a pair was random. Each order was presented to each subject in the manner described below.

Each of the random orders was recorded on one channel of a two channel Ampex 351-2 tape recorder, with the number of the pair preceding each pair. Utterances were recorded with normal English sentence intonation. A signal was recorded on the second channel at the end of the second member of the pair. This signal stopped the tape playback. Stimuli were presented through an Ampex loudspeaker. These tapes were used in the forced choice preference task described below.

Each string was also typed on a 3 x 5 card and bound in the order in which it appeared on the stimulus tape. These cards were used in the ranking task also described below.

Subjects. Twenty-eight University of Michigan students served as subjects. Each subject was randomly assigned to one of two groups, with fourteen in each group. One group of subjects responded to Order 1 on Day 1 and Order 2 on Day 2, while for the other group the orders were reversed on Days 1 and 2. There was a one day interval between experimental sessions. All subjects were individually tested.

Test procedures: Forced choice preference task. In this phase of the experiment, pairs of strings were presented to the subjects as described above. Subjects were told that they would hear pairs of "statements that are not good English" and which probably would not make sense. They were told to select the one member of the pair which they felt to be the best approximation to "good English," by pushing one of two buttons on a response panel. The buttons were marked A and B to indicate the order of the statements in the pair, A being the first and B the second statement. Subjects took as long as they wished to respond.

Choice was automatically recorded by a PDP-4 computer. When a response was completed, the playback was automatically reactivated and the next pair in the sequence was presented.

Test procedure: Ranking task. Upon completion of the preference task, each subject ranked each of the 100 statements. Subjects were given the deck of cards on which each statement appeared and a response booklet containing the printed strings.

This booklet had five columns, numbered from one to five, to indicate degree of approximation to a "good English" sentence. The number 1 indicated complete unacceptability and 5 complete acceptability as a "good English" sentence. Subjects were told to rank each statement in terms of its approximation to a "good English sentence" by putting a check in the appropriate column.

Results

Preference data are given in Table 1. The columns headed "preference task" show the number of subjects who chose each string in a pair as the best approximation to a "good English sentence" for each order of presentation. Visual inspection of these data indicates that some statements are selected more frequently than others, while for some statements choices are not as well defined. If both statements in a pair were perceived as equally ungrammatical, then it would have been the case that the subjects would have selected either member of the pair equally often. This does not seem to be the case. For Order 1 there were 12 (24%) pairs where approximately 50% of the subjects chose each member of the pair, and for Order 2 this occurred for 20 (40%) pairs. Most strings (36) were preferred by 25-49% of the subjects, while only 15 preferred by 0-24% of the subjects and 19 were preferred by 75% or more of the subjects. The remaining 30 statements were preferred by 50-74% of the subjects.

Even this gross analysis of the preference data serves as a basis for concluding that the subjects were making differential responses to the strings, and that there must be something in the string which allows the subjects to show strong or weak preferences.

Two other factors emerged from visual inspection of these data. Subjects appear to prefer one button as against the other. However, there also appears to be a tendency for subjects to select the same string on both experimental days. These tendencies can be considered as competing, when a reversal in sequence in the pairs occurs over days, or as facilitory, when there is no change in position of the strings within the pair.

When all preference data are combined there is a significant ($\chi^2 = 10.0$, $p < .01$) tendency to prefer the first member of a pair. For pairs not reversed across orders, there are 454 consistent (i.e., same member of the pair chosen on both days) as opposed to 209 inconsistent responses. When sequence within a pair is reversed, there are 476 consistent as opposed to 245 inconsistent responses. This suggests that, on the whole, subjects tend to make their preference decisions in response to the strings rather than by an arbitrary decision based on button preference or position in the pair.

Consistency of preference was also examined by determining the correlation of preference responses with orders and days. No obtained correlations were significant at or beyond the .01 level

of confidence. This indicates that subjects exhibit similar preference behavior over days, and further, the order of presentation of the pairs does not influence preference.

Data for the ranking task are also summarized in Table 1, under the columns headed "ranking task." These columns give the percent subjects assigning a particular rank to a given string for each order. It must be remembered that for this task subjects saw the individual string one at a time, in contrast to listening to pairs of strings in the preference task. Inspection of the data reveals that there is no string which receives the same rank by all subjects, nor is there a string which does not have some proportion of the subjects assign less than three ranks to a statement. Of even greater interest is the fact that so many of the strings are assigned all five ranks. There is, nevertheless, a frequent preponderance of subjects who assign a particular rank to a string. Subjects, however, do not necessarily assign the middle rank to the string, but seem to be using the ranks as a device by which to interpret the acceptability of the particular string. That the subjects are not always in agreement as to where a string lies with respect to the criterion only suggests that they apply their linguistic knowledge in an idiosyncratic fashion to the task. Certainly these data do not reveal what it is that the subject responds to in making his judgment as to the grammatical adequacy of the string.

Individual subjects were remarkably consistent in their ranking. Correlations between ranks for days and order are significant at or beyond the .01 level. Further there is no evidence to indicate that the assignment of a rank to a string is a function of where it occurs (beginning or end) within the sequence of strings. An analysis of variance was carried out to determine if there were day, list or order effects influencing the ranking behavior of the subjects. None of the effects tested by the analysis approached significance.

Degree of correspondence between performance on the preference and ranking was also tested. The obtained overall correlations between rank and preference for the four experimental conditions are all statistically significant. Thus, when a subject showed a preference for a member of a pair, he tended to assign a high rank (4 or 5) to that string. When a member of a pair was not preferred it was usually assigned a low rank (1 or 2). This result lends support to the hypothesis that subjects were using their "knowledge of English" in making preference and ranking decisions.

Discussion

Statistical treatment of the data reveals that on the whole the subjects performed in a reliable and consistent manner in the experiment. It is also clear from the analysis that except

for a relatively few pairs, subjects tend to select one member of a pair as representing a closer approximation to "good English" than the other member. This is the case even when the procedures by which the stimuli were generated assured that each member of a pair have the same syntactic form. Further, the subjects can and do apply some differential judgments to each of the strings, even when given the opportunity to indicate that the strings are totally unacceptable. Of course, some strings do receive such judgments, but they do not represent the typical response to most of the statements. What the statistical analysis does not provide is an explanation to account for the results. Rather, the analyses suggest that it is necessary to examine the data and stimuli in such a way so as to generate hypotheses which will provide such explanations.

Several possibilities present themselves as bases for interpretation of the results reported.

One approach assumes that a subject making the response closer to a "good English sentence" to a given string or putative sentence, contributes criteria in making the judgment that represent his ability to interpret and respond to strings of formatives in his language. Such a notion is implied in Chomsky's concept of "creativity" (1965) in terms of the language user's ability to handle novel sentences. The implications of this concept in relation to the issue of linguistic "competence"

is discussed by Moravcsik (1968). This is also implied in the arguments developed by Saporta (1967). Since, in the present study, all surface syntactic constraints were removed in the construction of the stimuli, the response required of the subject in terms of the judgment he makes may arise from one or both of two possible properties of the subject:

a) one string in the pair possesses, for him, a greater degree of situational adequacy than the other (i.e., it is semantically closer to "normal English"); or

b) in the absence of a, the preferred string possesses a greater degree of grammatical adequacy than does the nonpreferred string (i.e., it is formally closer to normal English).

Both a) and b) above carry the implication that the subject is responding to the entire string. This is not, as will be shown below, a necessary condition for the interpretation of the present findings.

Assignment of properties such as those noted above to the listener represent competence considerations, which will retain the status of hypotheses. The act of interpretation on the part of the listener as he responds to the strings, although nonverbal, does indeed focus a performance consideration with all the constraints which are typically imposed on performance. Thus, the data of the present experiment are performance data. This

leads to the conclusion that when a listener indicates his preference for one string of a pair, he is in essence stating that either:

a) he has previously responded to the string elsewhere, or to one similar to it, regardless of its degree or type of deviance; or

b) if a) is not true, the preferred string might be considered more easily "adjustable" or interpretable, than the other member of the pair via projections made on it from the listener's normal linguistic repertoire.

The data do not of course reveal theoretically-expressible properties of the strings whose analogues are not within the individual subject's repertoire.

A second approach by which the data may be interpreted also has to do with what are essentially performance-criteria. This approach assumes that the subject's expression of a preference for a string is the result of his responding or attending to some part or parts, but not all of the string. The possibility exists, that given a pair of nonsensical, agrammatical strings, the member of the pair possessing even the slightest suggestion of "normality" within the string will be preferred, since the subject is forced to choose one of the two strings. Consideration of the following pair illustrates his position:

5. "Meal sand soldier wine after the."

6. "Show rice wine daughters delicious home."

Categorial relations for English determine that the only reasonable projection on the first statement for normality of element-ordering, is on the substring "after the." The remaining elements can be treated as a list. However, in the second statement there are many features of the structure of English, and perhaps, also features of a given subject's experience, which might be projected upon the string. First, in terms of an individual's experience, the string might appear to have "telegraphic" form, i.e., determiners deleted for economy. On the other hand, it resembles, in its syntactic shape, either an imperative or an infinitive construct: something similar, say to:

6a. "Show high society women beautiful jewelry" (in answer to a question, such as "What does George do for a living?" or, "What are my duties?") in which case it resembles a truncated sentence; or perhaps it might be an imperative (in answer to the question, "What shall I do today?").

The relations between show--home, or show--daughters--home are perfectly normal sequences which can occur in a number of fully adequate sentences in English. The sequence rice wine is normal. Further, though grammatical relations are obscure, the collocation of wine--delicious is common.

Finally, in the first statement, the only possible collocation of semantic items might involve meal--wine--after--the; however, their ordering is far from normal, and this particular ordering would not appear in normal English even under the most complex of transformational relations.

The above interpretation is not intended to explain the fact that the second string was preferred to the first by more than 75 percent of the subjects. Rather, it simply serves to suggest that this string appears to accommodate more projections by the subject from a grammatical pattern that he doubtless knows. In addition, it exhibits a larger number of compatible semantic notions or situational responses and has more parts which, to the exclusion of the rest of the string, are either fully normal or closer to normal than anything found in the first string. Neither of these strings were assigned to one particular category on the ranking task by 50 percent or more of the respondents. However, there was a tendency to assign string 5 to positions which suggest that it is a poor approximation to "good English." On the other hand, there was a somewhat stronger tendency to assign ranks to string 6 indicating that it approximates "good English."

The ranking data can be interpreted in much the same way as the preference data. Strings such as the following:

86. whiskeys buildingseses jobses daughters

58. food strong simplyseseseseses

23. food those during woods thoses

are ranked by most respondents in the categories representing the poorest approximation to "good English." However, strings such as the following:

49. with outside show classes help

4. young young buildings grow less hole milk

33. man grows soldiers among several

are assigned ranks indicative of close approximations to "good English." Strings 86, 58, and 23 offer little possibility for the subject to apply any of the criteria described in relation to the preference data in such a way as to allow the strings to be considered as good approximations to English. This is not the case for strings 49, 4, and 33. These strings and others ranked as being good approximations to English can be easily segmented so that some sequence of elements within the string meet or nearly meet the criteria noted above.

It is also interesting to note that even in those cases where one member of a pair was highly preferred, the two strings may be assigned the same rank. However, in other instances, the preferred member was ranked as being an adequate approximation to "good English" but the other member of the pair a poor approximation. Both members of the first pair given below were called good approximations, but the second item was preferred 3 to 1. Exactly the same situation exists for the second pair below, except that both members were ranked as poor approximations to good English.

In the third pair, both ranking and preference were divided. Here the preferred member of the pair was ranked as a close approximation to "good English" at a 10 to 1 ratio over the member ranked as a poor approximation. The sample pairs are:

31. food show

32. above wine[1]

23. food those during woods thoses

24. old rice good delicious grow strong eat[2]

93. group seven simply green[3]

94. above bigs meal[4]

Even on the basis of the present analysis of the data it seems reasonable to argue that native speakers can and do interpret random strings of formatives in their language. Further, such interpretations are made even when it is known that there are no constraints whatsoever within the strings themselves. Thus, even when the "sender" is encoding no message, the "receiver" does not receive a non-message. How this reconstruction is performed and on what levels, remains obscure, but it is reasonable to hypothesize that syntax, lexicon, and meaning are to some degree involved.

The results of the present study lend support to the argument that an organism having acquired a grammar can at some point in its history respond to any string in the language in terms of the internalized grammar. That the subjects had no experimentally

induced criteria of "acceptability" or "good English" strengthens this claim. Thus, what has been demonstrated in the present experiment is that the subjects do in fact make reliable and relatively consistent judgments in response to putative linguistic material which contributes little to these judgments. Considering the subjects' decisions as dependent variables, it seems clear from the data presented in this paper that there are indeed independent variables which influence them. However, the nature, function and interactions of these variables still need to be identified and subjected to further study.

Footnotes

*This research was carried out at the Center for Research on Language and Language Behavior of The University of Michigan, and was supported by the Language Development Section, U. S. Office of Education, Contract OEC-3-6-061784-0508, and ONR Contract N00014-68A-0091(CNR). A preliminary version of the paper was presented at the summer 1967 meetings of the Linguistic Society of America. The authors wish to thank Rita Tikofsky, Merilee Oakes, Ellen Glazer, and James R. McInish for their assistance in the collection and statistical analysis of the data. Special thanks are given to Professor Bernard Galler of The University of Michigan's Computing Center for his assistance in developing the computer program.

[1]Preferred string-both members ranked as good approximation.

[2]Preferred string-both members ranked as poor approximation.

[3]Preferred string-ranked as good approximation.

[4]Non-preferred string ranked as poor approximation.

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TABLE 1

Grammatically deviant strings, orders of presentation, preference an

PAIR NO. O_1	PAIR NO. O_2	STRING NO.	STRING
1A	38B	1	Fcws make home book old professors man.
1B	38A	2	With drink the young knowledge primarily especially amongs.
2A	22A	3	Whiskeys straws wine makes daughters.
2B	22B	4	Young young buildings grow less hole milk.
3A	44A	5	Meal sand soldier wine after the.
3B	44B	6	Show rice wine daughters delicious home.
4A	11B	7	New show these extremely.
4B	11A	8	Rices above a.
5A	36B	9	Intelligence news good deliciouses many strong.
5B	36A	10	Extremely primarily beautiful foods food windows lakes.
6A	4B	11	The milk those rice.
6B	4A	12	Around milk paint around.
7A	19A	13	Around drink machines windows more book the jobs.
7B	19B	14	Many especiallys big ugly machineseses.
8A	21B	15	Help quiteses extremely windows paint lady sand.
8B	21A	16	During sand paint essentials good man above big.
9A	45B	17	Verys.
9B	45A	18	Make among.
10A	12B	19	Group deliciouses paint some outside.
10B	12A	20	Lady sand through grow soldiers.
11A	26A	21	Home dishes.
11B	26B	22	Eats.
12A	6B	23	Food those during woods thoses.
12B	6A	24	Old rice good delicious grow strong eat.
13A	3B	25	With professors lakes drink.
13B	3A	26	Seven seven man seven machines view.

TABLE 1

ation, preference and ranking scores for Order 1 and Order 2

	PREFERENCE DATA[1]		RANKING DATA[2]									
	O_1	O_2	1	2	3	4	5	1	2	3	4	5
	15	20	04	21	60	14	--	10	18	32	28	10
especially amongs.	13	8	07	21	43	28	--	10	27	21	25	10
	9	5	07	14	28	43	07	04	07	60	24	10
k.	19	23	--	07	10	40	43	--	14	32	36	21
	9	3	18	40	18	18	07	10	28	40	21	--
	19	25	--	18	28	25	28	18	14	40	14	14
	22	22	10	14	36	28	07	--	32	21	40	07
	6	6	10	14	32	40	04	14	32	18	21	14
strong.	9	12	32	39	24	--	04	18	39	14	28	--
d windows lakes.	19	16	36	39	14	07	04	32	40	18	10	--
	8	6	10	57	21	10	--	14	28	36	14	07
	20	22	--	10	36	32	36	04	39	21	36	--
the jobs.	22	26	04	25	42	24	04	07	10	36	28	18
	6	2	40	36	18	07	--	36	43	18	04	--
ndy sand.	15	14	32	32	10	24	--	24	50	10	14	--
bove big.	13	13	10	57	14	14	04	22	24	39	07	07
	12	9	10	36	28	41	04	18	36	10	21	14
	15	19	--	07	18	64	10	18	32	21	10	18
	11	13	07	24	25	32	10	07	21	36	25	10
	17	15	04	21	32	28	07	07	32	36	18	07
	18	16	04	04	18	24	50	07	24	04	24	39
	10	12	07	18	10	10	54	18	14	14	14	40
	6	8	24	60	07	07	--	25	50	18	04	04
.	22	19	10	54	14	14	07	04	43	36	18	--
	17	6	--	24	24	39	14	04	04	18	64	14
	11	18	04	24	18	46	07	--	28	42	28	--

Table 1 (cont.)

PAIR NO. O_1	PAIR NO. O_2	STRING NO.	STRING
14A	37B	27	Make delicious eats.
14B	37A	28	Through prefer few delicious.
15A	7B	29	Professors group group.
15B	7A	30	Quite dishes meal after.
16A	14B	31	Food show.
16B	14A	32	Above wine.
17A	10A	33	Man grows soldiers among several.
17B	10B	34	Help view daughters ins whiskey dishes.
18A	32B	35	Home make rices showseses intelligence.
18B	32A	36	Quite jobs strong machines very drinks straw help.
19A	43A	37	Very with make extremely the windowses.
19B	43B	38	Newses very delicious man.
20A	8A	39	Grow makes rice.
20B	8B	40	Building quite soldiers.
21A	5A	41	Especially old.
21B	5B	42	Lakeses.
22A	16B	43	Rices greens grow view.
22B	16A	44	Around above lady like fields lady.
23A	23A	45	Book bigs during green prefer jobses.
23B	23B	46	Prefers daughters groups the drinks.
24A	20B	47	Woods.
24B	20A	48	Machines classes.
25A	31B	49	With outside show classes help.
25B	31A	50	Classes machines building intelligence especially.
26A	34A	51	Soldier group makeses wood man disheses.
26B	34B	52	Simply paint make with these daughters news group.

Table 1 (cont.)

PREFERENCE DATA O_1	PREFERENCE DATA O_2	RANKING DATA 1 2 3 4 5	RANKING DATA 1 2 3 4 5	
22	20	07 07 14 36 36	04 28 39 41 07	
6	8	10 36 32 21 --	-- 28 46 14 10	
20	19	-- 10 36 24 28	04 18 39 28 14	
8	9	04 43 43 04 07	07 54 28 10 --	
9	7	-- 07 21 32 39	04 28 14 21 32	
19	21	-- 07 18 40 36	07 24 07 28 32	
24	25	-- 14 18 28 39	-- 07 32 40 21	
4	3	10 24 32 41 10	07 40 40 14 --	es.
13	14	28 36 28 07 --	07 28 41 36 07	nce.
15	14	14 54 28 04 --	14 46 24 07 04	ks straw help.
10	14	14 54 18 14 --	10 46 28 14 --	es.
18	14	18 32 28 18 04	18 36 40 -- 07	
22	23	-- 14 10 36 40	-- 18 43 32 07	
6	5	07 21 36 18 18	04 36 36 21 04	
25	26	04 18 18 21 40	10 21 10 21 36	
3	2	36 28 28 07 --	39 24 25 -- 10	
15	19	-- 21 32 40 07	-- 28 39 21 10	
13	9	14 28 24 28 04	07 32 40 14 07	
6	9	-- 40 28 24 07	07 24 32 21 14	s.
22	19	07 28 32 25 07	04 39 36 21 --	.
18	18	04 10 10 21 54	18 24 14 07 36	
9	10	07 14 21 46 10	07 18 40 28 07	
20	27	-- 04 18 57 21	-- 04 21 43 32	
8	1	07 32 42 18 --	04 21 18 57 --	nce especially.
4	8	28 32 28 10 --	14 32 36 18 --	heses.
24	20	07 40 32 21 --	04 43 28 22 04	ters news group.

Table 1 (cont.)

PAIR NO. O_1	PAIR NO. O_2	STRING NO.	STRING
27A	2A	53	Home steel classes.
27B	2B	54	Beautifuls extremely.
28A	46A	55	This book daughters.
28B	46B	56	Lakes new totally.
29A	30B	57	Someses like lakes few windows ugly.
29B	30A	58	Food strong simplysesesesesses.
30A	41A	59	Strong very through grows a jobs very.
30B	41B	60	Outside very less sand help less strong ugly.
31A	40A	61	The beyond knowledge thoses building seven intelligence.
31B	40B	62	Windowses holes arounds help primarily.
32A	9A	63	Paint esp' ciallys.
32B	9B	64	Essentials dishes jobs.
33A	1A	65	After totally.
33B	1B	66	Buildings.
34A	13A	67	Windows intelligences strong soldier seven hole intelligence.
34B	13B	68	After some especially help lady daughters new sand.
35A	24A	69	Big home.
35B	24B	70	Those several.
36A	48B	71	Beyond primarily seven fields this.
36B	48A	72	Prefer intelligence grow big make.
37A	35A	73	View group intelligences.
37B	35B	74	Beautifuls young man.
38A	25B	75	Especially a sand helps these extremely view the.
38B	25A	76	Lesses cat totally thoses with beautiful these.
39A	17A	77	Prefer jobs less man.
39B	17B	78	Green primarily especially wood.

Table 1 (cont.)

	PREFERENCE DATA		RANKING DATA									
	O_1	O_2	1	2	3	4	5	1	2	3	4	5
	24	25	--	18	21	50	10	--	21	25	36	28
	4	3	36	28	25	07	04	21	47	25	07	--
	11	14	04	21	28	28	18	07	04	28	43	18
	17	14	--	18	47	28	07	07	14	28	47	07
	27	27	21	36	25	14	04	21	32	24	18	04
	1	1	54	39	07	--	--	68	24	07	--	--
y.	17	14	18	40	04	36	04	10	57	18	10	04
ong ugly.	11	14	10	54	24	07	04	18	18	57	07	--
seven intelligence.	16	15	14	40	24	18	04	10	32	28	25	04
ly.	12	13	10	36	39	10	04	07	28	40	14	10
	11	14	10	28	24	28	07	10	36	39	10	04
	17	14	04	43	24	21	07	14	24	40	18	--
	12	14	--	18	32	32	18	10	36	14	28	10
	16	13	--	14	14	14	57	14	22	--	18	46
seven hole intelligence.	6	8	18	28	24	28	--	18	42	22	14	04
ghters new sand.	12	20	04	36	28	28	04	14	21	28	28	07
	21	25	--	10	18	21	50	07	24	18	04	46
	5	3	04	14	40	32	10	07	26	32	21	14
	11	14	--	32	14	43	10	--	28	28	36	07
	17	14	--	28	36	28	07	--	50	28	21	--
	19	23	--	10	14	43	32	--	07	36	28	28
	9	5	07	32	60	14	--	14	36	21	22	04
mely view the.	11	20	10	32	32	25	--	04	18	46	24	07
tiful these.	17	8	24	28	18	24	04	25	36	14	24	--
	11	16	--	18	28	46	07	04	28	43	18	07
	11	12	--	24	36	28	10	04	36	28	39	10

Table 1 (cont.)

PAIR NO. O_1	PAIR NO. O_2	STRING NO.	STRING
40A	15A	79	Several rice during book outside hole.
40B	15B	80	Quite throughses prefer daughters.
41A	50A	81	Help outside whiskey professor good extremelys with.
41B	50B	82	More amongs classes windowses above big.
42A	39A	83	Steel fields knowledge eat wood.
42B	39B	84	In shows seven around.
43A	42B	85	Prefer building daughters meal classes few withs meal.
43B	42A	86	Whiskeys buildingseses jobses daughters.
44A	18B	87	Classes beyond with green.
44B	18A	88	Machines seven the home.
45A	33B	89	Uglys prefer good a these deliciouseses.
45B	33A	90	Few beyond fields simply book after big hole.
46A	49B	91	After help machines disheses mores buildings.
46B	49A	92	Aboves soldier several group professor foods ugly.
47A	29A	93	Group seven simply green.
47B	29B	94	Above bigs meal.
48A	27A	95	Show after several help professors above.
48B	27B	96	Seven preferseses good view.
49A	28B	97	Verys.
49B	28A	98	With wine.
50A	47B	99	Several theses prefer eat group simply
50B	47A	100	Strong the meal drink during quite classes

O_1 - Order 1

O_2 - Order 2

[1]Number of subjects selecting the string over days for each order.

[2]Percent subjects assigning a given rank for each string over days for each order

Table 1 (cont.)

	PREFERENCE DATA		RANKING DATA									
	O_1	O_2	1	2	3	4	5	1	2	3	4	5
le.	12	13	04	36	40	18	04	10	25	18	32	14
	16	15	14	14	28	39	04	14	32	14	32	07
extremelys with.	19	15	21	36	32	10	--	21	54	21	04	--
big.	9	13	10	50	24	14	--	14	46	36	04	--
	11	7	04	07	32	46	10	04	18	28	53	10
	17	21	07	10	28	43	10	04	28	42	14	10
ses few withs meal.	23	16	14	54	21	10	--	07	50	32	10	--
ters.	5	12	46	46	04	04	--	50	24	14	10	--
	12	15	--	--	39	39	21	04	18	25	42	10
	16	13	--	07	24	43	24	04	18	28	28	21
eses.	5	9	22	60	07	07	04	07	36	43	14	--
r big hole.	23	19	--	10	36	39	14	04	07	18	57	14
buildings.	14	13	32	24	24	18	--	10	36	39	10	04
sser foods ugly.	14	15	14	46	24	14	--	21	43	18	18	--
	26	25	--	10	21	54	14	--	21	32	28	18
	2	3	04	43	39	14	--	18	32	28	21	--
above.	17	16	--	18	46	36	--	07	32	32	28	--
	11	12	18	28	32	18	04	10	21	36	24	07
	6	5	10	43	25	14	07	32	46	10	10	--
	22	23	--	--	18	25	57	07	24	10	24	32
imply	11	16	04	36	32	21	04	18	36	32	14	--
e classes	17	12	10	46	28	14	--	10	24	50	14	--

ch order.

over days for each order.