

The Effects of Visual Contextual Cues and Listening Comprehension on Memory Retention

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1. INTRODUCTION

Kiji(1991:1992) has found that baroque music and α -music employed in Suggestopedia combined with a verbotonal filter are very effective for improving the retention rate of sentences. This paper provides a focus in the investigation of memory retention and the effects of learning with visual aids in listening comprehension.

According to Mueller(1980), visual aids do not always promote EFL students' listening skills but they improve their listening abilities to some extent. Various studies concerned with listening abilities and visual aids have been attempted (Loneragan 1984, Allan 1985, MacWilliam 1986, Takeuchi et al.1990). But in these studies, only relationships between listening ability and visual aids have been considered. And psychological research about what occurs in memory retention using visual aids has not yet been reported. This paper will try to examine the effects of visual aids and listening comprehension on memory retention after listening practice.

2. PURPOSE

In the auditory learning process, Lafon(1968) emphasizes that visual stimuli are rather important in the retention of speech sounds. This author postulates that listening comprehension practice using visual aids should be effective for memory

retention. The following things are considered: 1)How will visual aids affect memory retention when visual aids unrelated to sounds are used in listening practice? 2)What about Japanese translation instead of visual aids? 3)Which class shows higher test results when visual aids are used in listening comprehension practice, the upper class, or the lower class?

3. STUDY

3.1. Study 1

3.1.1. Subjects

The subjects of this study were 100 female first year and second year students at Baika Women's College, Osaka. They were all Japanese between 18 and 19 years old. They majored in English, Japanese, and Japanese children's literature and had studied at least six years of English before admission to the college. This study was carried out in the first semester of 1992.

3.1.2. Method

A proficiency test was carried out to divide the subjects into two groups; one is the upper group, and the other is the lower group. This test consisted of listening comprehension and dictation (Appendix A). The former test consisted of twenty questions taken from Step's 2nd Grade Test. Each sentence was read twice. Then the first reading was made with pauses at five-second intervals and the second reading was made with pauses at ten-second intervals. The subjects were instructed to answer each question during those intervals. The latter test was taken from "The American Way" published by SONY and each question was repeated four times with pauses at five-second intervals. During every interval the subjects were instructed to write down each sentence.

The results can be seen in Table 1. There were 47 subjects in the lower group and 53 in the upper group. The highest score

was 61 points. The subjects whose scores were lower than 25 were placed in the lower group and those with scores above 25 into the upper group.

Table 1 Proficiency test

Group	N	M	SD
Upper	53	32.679	5.507
Lower	47	19.851	4.047

Upper vs Lower $t=12.988$ ($p<.01$)

After the subjects were divided into two groups, Pre-test, Post test 1 and Post test 2 were administered to each group. The Pre-test had 4 questions and each question was comprised of 5 sentences with blanks(Appendix B). A particular treatment was given with each question and the subjects were instructed to fill in the blanks by choosing appropriate words from vocabulary sections. A vocabulary section accompanied each question. Post test 1 was carried out one week later and Post test 2 followed 4 weeks later. All three question sheets were exactly the same in format and content. However, unlike the Pre-test, there were no treatments in Post tests 1 and 2.

The treatments used in Pre-test as follows:

I. Sound Only

II. Sound + Picture related to the sound

III. Sound + Picture unrelated to the sound

IV. Sound + Japanese Translation

The experiment was made in a language laboratory with 48 booths. All the sentences in the Pre-test were chosen from The American Way (Basics) published by SONY because of the uniform difficulty of each question. The first treatment (sound only) was employed in question No.1. The second treatment (sound+picture related to the sound) was used for question No.2. The third treatment (sound+picture unrelated to the sound) was made for question No.3. The fourth treatment (sound+Japanese translation) was used for question No.4. During each question, all five sentences were repeated ten times, and the subjects were instructed not to look at the question sheet until the repetition was over.

During the first question, they were just told to fill in the blanks after all the sentences were repeated. During the second question, each picture related to a sentence was presented for five seconds and during the sentence repetition the five pictures (Appendix C) were continuously shown. After this process, the subjects were instructed to fill in the blanks. The pictures used in these experiments were also taken from The American Way(Basics) and they were presented by means of OHP (PANASONIC WE-9051) through four monitors (Pana Color 20). During the third question, an unrelated picture (Appendix D) was presented and each sentence was repeated as in the process of the second question. After the repetition, a fill-in-the-blank test was carried out. Finally, during the fourth treatment, Japanese translation was given twice orally before the sentence repetition and following this step, a fill-in-the-blank test was conducted. All the above processes were completed for the Pre-test. Post tests 1 and 2 were finished one week later and 4 weeks later without any special treatments.

Before all the tests were conducted, baroque music and α -music were played to make the subjects relax and reduce their anxiety.

3.1.3. Results

The results of Post tests 1,2 (one week later and four weeks later) are shown in Tables 2, 3, 4 and 5.

Table 2 Ms, SDs and ANOVA for Homogeneity Test
(Lower Group)

Treatement	Pre-test		Post test 1		Post test 2	
	M	SD	M	SD	M	SD
I	6.532	2.766	4.897	2.452	3.787	1.570
II	10.340	2.467	9.553	3.201	9.085	3.488
III	5.128	2.455	4.872	1.770	4.489	2.152
IV	14.362	2.671	11.553	3.859	8.511	2.665
F(3,184)=116.173		F(3,184)=61.112		F(3,184)=51.471		
(p<.01)		(p<.01)		(p<.01)		

Tables 2 and 3 show the means, and the standard deviations for the lower and upper classes. Tables 4 and 5 show the LSD (the least significant difference) of each treatment for the lower and upper classes. The Pre-test of Table 2 (lower group) indicates that a statistically significant difference exists between all

the treatments. The Pre-test of Table 4 also shows a statistically significant difference in the LSD and the highest mean is found in IV (sound+Japanese translation). The second highest is found in II (sound+picture related to the sound); the third is I (sound only) and the lowest is III (sound+picture unrelated to the sound). The Pre-tests of Table 3 and Table 5 (upper group) show that statistically significant differences exist in both ANOVA and LSD. The order of the means dose not change and is as follows: III < I < II < IV. According to the results, the visual aids work effectively and enhance memory retention in listening comprehension. This fully supports the idea of Lonergan(1984).

Table 3 Ms, SDs and ANOVA for Homogeniety Test
(Upper Group)

Treatment	Pre-test		Post test 1		Post test 2	
	M	SD	M	SD	M	SD
I	11.113	3.373	10.170	3.358	8.093	2.421
II	13.623	2.615	13.245	2.684	13.132	2.614
III	9.924	3.358	8.679	2.834	8.094	2.928
IV	16.377	1.718	14.924	2.684	11.736	2.147
F(3,208)=52.519		F(3,208)=49.859		F(3,208)=53.072		
(p<.01)		(p<.01)		(p<.01)		

Table 4 LSD of Each Treatment
(Lower Group)

	Pre-test Mse=6.958			Post test 1 Mse=8.755			Post test 2 Mse=6.734		
	II	III	IV	II	III	IV	II	III	IV
I	**	**	**	**	NS	**	**	NS	**
II		**	**		**	**		**	NS
III			**			**			**
Order of Ms	III < I < II < IV			III < I < II < IV			I < III < IV < II		

** p<.01 NS: No Significance

Table 5 LSD of Each Treatment
(Upper Group)

	Pre-test Mse=8.269			Post test 1 Mse=8.589			Post test 2 Mse=6.593		
	II	III	IV	II	III	IV	II	III	IV
I	**	*	**	**	**	**	**	NS	**
II		**	**		**	**		**	**
III			**			**			**
Order of Ms	III < I < II < IV			III < I < II < IV			I < III < IV < II		

* p<.05 ** P<.01 NS: No Significance

Chart 1 Rate of Memory Retention (Lower)

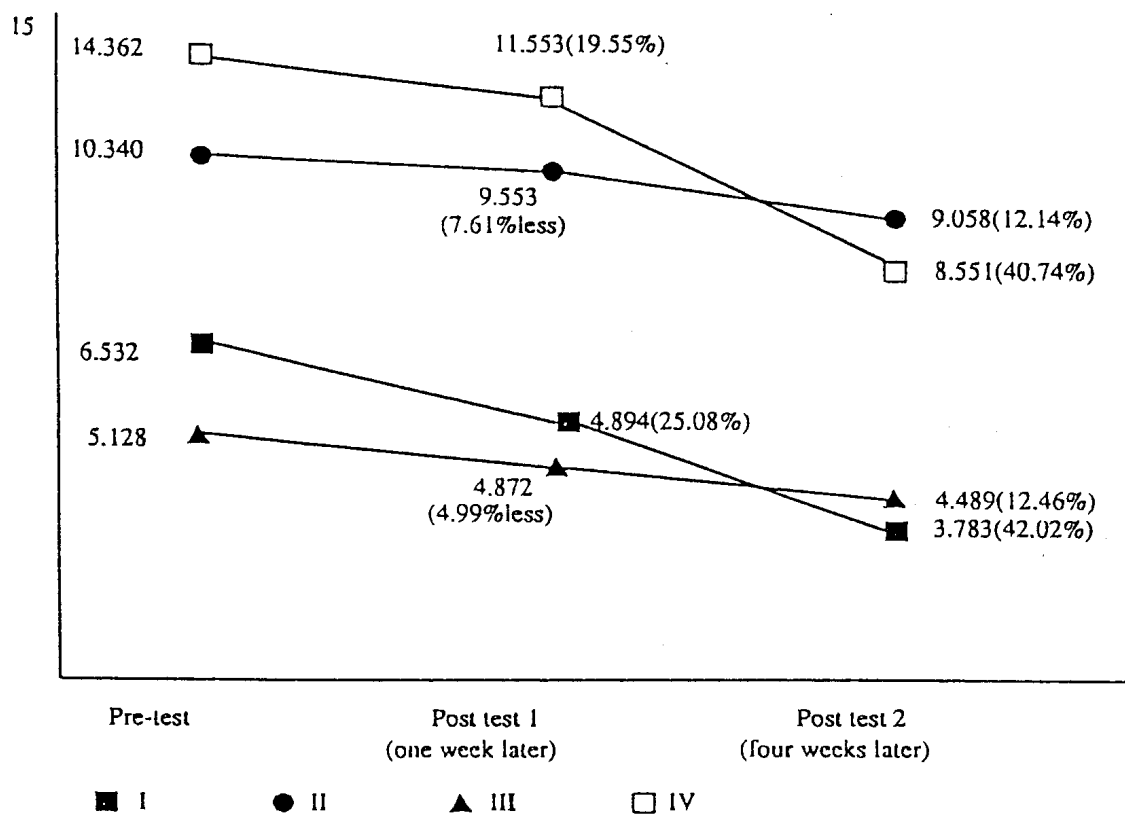
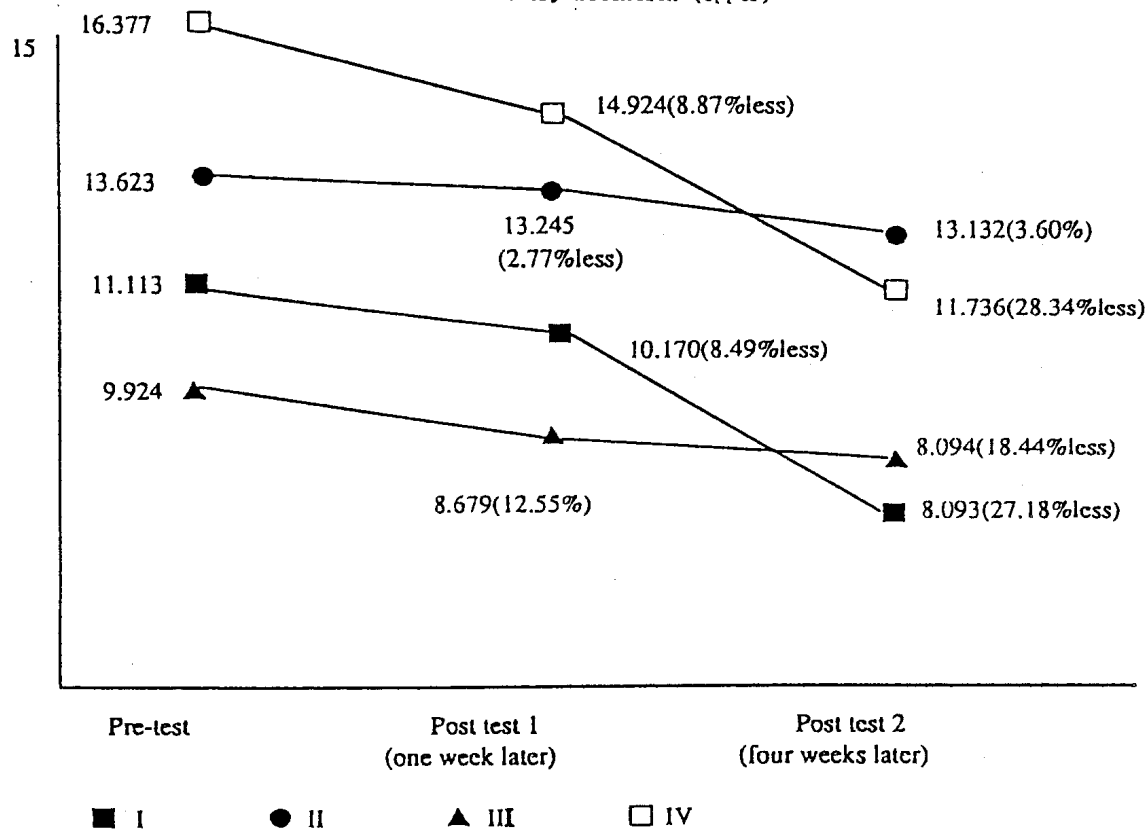


Chart 2 Rate of Memory Retention (Upper)



There is not a very great difference between the results of the Pre-test and Post test 1. Post test 1 of Table 2 (lower group) indicates a significant difference for all the treatments as previously seen in the Pre-test. And Post test 1 of Table 3 (upper group) also indicates a significant difference. In Table 4, the results of Post test 1 (lower group) show statistically significant differences between all treatments except I (sound only) vs. III (sound+picture unrelated to the sound). The order of the difference of the means is the same as the Pre-test: $III < I < II < IV$. The ANOVA and LSD of the first Post tests on Tables 3 and 5 show the same tendency as those on Tables 2 and 4 did previously. But the results of Post tests 2 (Tables 2,3,4,and 5) show a dramatic change.

The differences of the means of Tables 4 and 5 (in both the lower and upper groups) are transformed into $I < III < IV < II$. Charts 1 and 2 show the rate of memory retention in both the lower and upper groups calculated from the difference between the means of each treatment for the Pre-test, and both Post tests. In Chart 1 (lower group), the rate of memory retention for II (sound+picture related to the sound) four weeks later decreased only 12.14% and that of III (sound+picture unrelated to the sound) four weeks later also decreased only 12.46%. In Chart 2 (upper group), the rate of memory retention for II decreased 3.80% and that of III decreased 18.44%. These rates are comparatively higher than those of other treatments. This means that visual aids in listening comprehension are very effective for memory retention.

3.2. Study 2

In recent studies concerned with the relationship between visual effects and listening ability, video cassette recorders have been used as visual stimuli. In Study 1, however, several illustrations were used as visual stimuli. To prove whether this difference will effect the result, a video cassette recorder was

used for the memory retention experiment in Study 2.

3.2.1. Subjects

58 subjects were selected from 100 subjects in Study 1, and they were divided into two groups of similar level (group A and group B) based on the results of the proficiency test in Study 1 (Table 6).

Table 6 Proficiency Test

Group	N	Ms	SD
A	35	24.371	7.430
B	23	25.261	6.589
Group A vs group B		t=0.458 (NS)	

3.2.2. Method

A skit from the children's show, Sesame Street was presented as a visual stimulus for group A. This skit was broadcasted by the NHK station on October 1, 1989, and it was a two-minute skit about the process of making a wooden chair (Appendix E).

The subjects were told to watch the skit five times. Then five sentences from the skit were chosen, and these sentences were repeated ten times. As soon as this treatment was over, a fill-in-the-blank test (Appendix F) was given to them. One month later, the same test without any treatment was conducted.

For group B, the same skit (sound only) using a tape recorder was repeated five times. After that, the same test used for group A was conducted in a similar manner. One month later, they took the same test.

3.2.3. Results

Tables 7 and 8 show the results of the test immediately after the treatment, and the test one month later. Both of them indicate a significant difference between group A and group B ($t=3.511$, $p<.01$ and $t=5.804$, $p<.01$).

The ratings of memory retention in Chart 3 show similar results to those shown in Study 1. In short, the rate of group A is much higher with 42.80% less than the rate of group B.

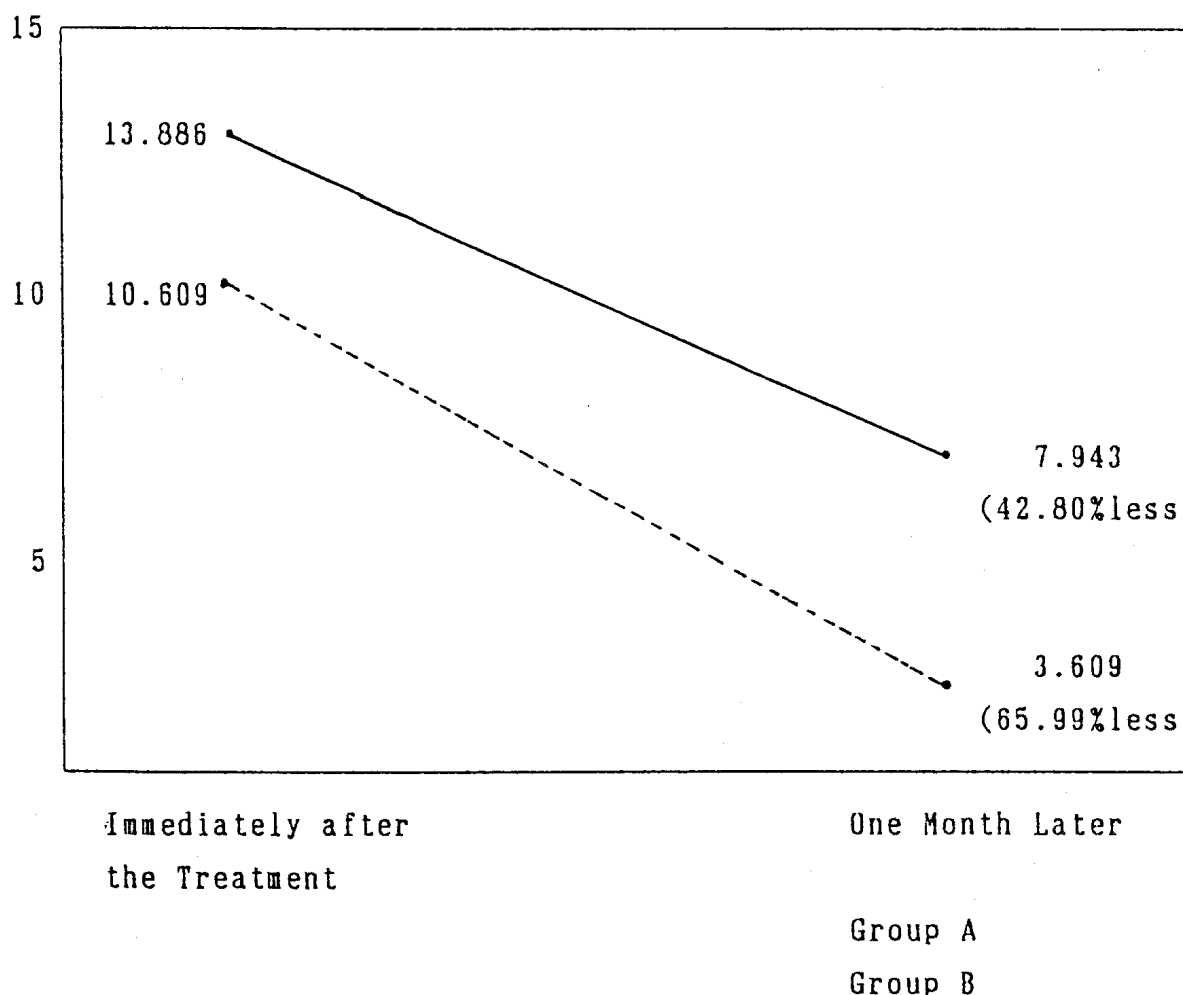
Table 7 The Results of the Test immediately after the Treatment

Group	N	Ms	SD
A	35	13.886	3.528
B	23	10.609	3.248
Group A vs group B $t=3.511$ ($p<.01$)			

Table 8 The Results of One-Month-Later Test

Group	N	Ms	SD
A	35	7.943	3.061
B	23	3.609	2.141
Group A vs Group B $t=5.804$ ($p<.01$)			

Chart 3 Rate of Memory Retention
(Groups A and B)



4. DISCUSSION

Paivio(1971) argues that imagery may occur as a response to word associations. And Mizushima & Uesugi also contend that words can be systematized and retained in the memory by connecting with objects and images. These arguments clarify the results of the experiments above, in that visual aids in listening comprehension are efficacious for the enhancement of memory retention. However, the means of sound vs picture unrelated to the sound are the lowest in both upper and lower classes. The possible explanation of this phenomenon is that the pictures did not trigger any images related to the sounds and thus the subjects could not effectively

utilize schema. Kohno (1992) implies that pictures may compete with sounds because of Gestalt generated perception and cognition. From his point of view, this will be the result if the sounds are not related to the pictures as demonstrated here. But the rate of memory retention after one week or four weeks was comparatively high. Paivio et al(1968) and Shepard(1967) contend that memory retention through pictures is superior to memory retention through words alone. And the pictures influence the efficacy of words in memory retention. Klatzky(1980) argues that in long term memory there is storage for visual information and storage for word information. These two systems influence each other. This means that visual stimuli allow for memory retention over a longer period whether visual stimuli are related to sounds or not. However, Bransford & Johnson(1972), and Weisberg(1980) imply that related pictures are superior to unrelated pictures in memory retention.

In the treatment of sound and Japanese translation, the means of the Pre-test in both lower and upper classes were higher than any other treatment, but the rate of the memory retention was rather low. This means that Japanese translation given at an appropriate time will encourage effective learning.

In the treatment of sound only, the means of Post test 2 (four weeks later) in both lower and upper classes were the lowest. The reason may lie in the fact that continuous listening does not help recognition and memory retention. Long term memory can be tapped depending on auditory codes, meanings, visual cues and so on (Takefuta 1989).

Visual aids are very effective for both lower and upper groups, regardless of their level of English proficiency. The rate of memory retention four weeks later in the upper group was especially high(3.60%less). This may be due to the systematization of images and words in the upper group which is stronger compared with that of the lower group. In short, the effects of visual aids

in the upper group are much higher than those in the lower group.

The results of the experiment using a video cassette recorder in Study 2 also indicates the effects of visual aids. This means that memory retention in both studies, one using illustrations and the other a video cassette recorder, is more effective than the rate of retention without them.

5. CONCLUDING REMARKS

Visual image is a fundamental element in the study of the memory process. But behavioral psychologists have done limited work in studying the visual image and this study has been ignored until recently. So the lack of reference books has limited the approach and discussion of this paper. However, the results of the experiments surely indicate the efficacy of visual aids employed in listening comprehension that affect memory retention.

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APPENDIX A

第1回聞き取りテスト

当館番号

氏名

1. 試験官の指示に従い、次の問に答えなさい。

- No.1 1 Don't visit without telling your intentions.
2 Don't call before visiting.
3 Don't write a letter before visiting.
4 Don't make a telephone call.

- No.2 1 Yesterday I spoke to a foreigner, and enjoy talking with him.
2 Yesterday a foreigner spoke to me, but I couldn't follow him.
3 Yesterday I spoke to a foreigner, but I was very happy.
4 Yesterday I spoke to a foreigner, but he was a poor speaker of English.

- No.3 1 The book wasn't interesting enough to read through.
2 I looked for the interesting book which I had lost.
3 I read the interesting book just once.
4 The book was so interesting that I finished reading it quickly.

- No.4 1 Tom was on top of a building.
2 Tom was on the top of a mountain.
3 Tom was at the top of a tree.
4 Tom was at the top of a roof.

- No.5 1 Jerry gave up changing his job for good.
2 Jerry decided to quit his job and go back to the university.
3 Jerry is far from being satisfied with his present job.
4 Jerry was fired because of his laziness.

- No.6 1 Hiroshi is wondering if he should enter the trading company or not.
2 Hiroshi wants to go abroad for sightseeing.
3 Hiroshi is a student of a commercial high school.
4 Hiroshi is satisfied with his future job.

- No.7 1 Mrs. Johnson found her necklaces stolen.
2 Mrs. Johnson had her necklaces and jewelry box stolen.
3 Mrs. Johnson found a burglar in the bedroom.
4 Mrs. Johnson found her jewelry box stolen.

- No.8 1 The man gets to the station before ten o'clock.
2 The man can jump onto the train.
3 The train will wait for the man to take.
4 The train always leaves on time.

- No.9 1 Ken also watched the drama, but he didn't like it.
2 Ken didn't watch the drama, which was very thrilling.
3 Ken watched the drama, and liked it very much.
4 Ken is going to watch the drama tonight.

- No.10 1 Tom enjoyed seeing the movie very much.
2 All the tickets were completely sold out.
3 Tom gave up seeing the movie on the first day.
4 Tom sees only movies starring his favorite stars.

- No.11 1 People didn't like to swim in the crowded pool.
2 People had to swim in the crowded pool.
3 Swimming in the crowded pool wasn't interesting.
4 Because of the weather, the pool wasn't crowded.

- No.12 1 The son was too wise to lose his friend.
2 The son was too foolish to think about his future life.
3 The son was rich all his life.
4 The son left a lot of money.

- No.13 1 The Bible used in Greece is the greatest book.
2 The Greek meaning of the Bible is "the greatest book".
3 The world's greatest book is the Greek book.
4 The word "Bible" means "the books" in Greek.

- No.14 1 Roy found the roof of his car was missing.
2 Roy heard the roof of his car was damaged by some boys.
3 Roy heard the roof of his car was damaged by an elephant.
4 Roy saw an elephant damage the roof of his car.

- No.15 1 Yasuo is opening a furniture store.
2 Yasuo is interested in making furniture.
3 Making things always costs less than buying them.
4 Making things never costs more than buying them.

- No.16 1 I don't admire Mike.
2 I do admire Mike.
3 I can't admire Mike.
4 I had admired Mike.

- No.17 1 No friends got married.
2 Nancy got married this year.
3 All my friends are married.
4 All my friends aren't married.

- No.18 1 I'm sorry you didn't go to the opera.
2 I'm sorry you don't go to the opera.
3 I'm glad you went to the opera.
4 I'm glad you'll go to the opera.

- No.19 1 John doesn't listen to music.
2 John doesn't appreciate music.
3 John doesn't like music.
4 John doesn't study music.

- No.20 1 It's nice to work for hours in the office.
2 We don't have to enjoy leisure time.
3 We have to work hard all day.
4 It's nice to be free from duties.

2. 試験官の指示に従い書き取りをおこないなさい。

1. (I don't feel like going to work this morning.)
2. (I'll be back in a few days.)
3. (I'll join you as soon as I finish my work.)
4. (It smells so good I can't resist it.)
5. (Why don't we have another drink together?)

APPENDIX B

設問 1. 指示にしたがって次の間に答えなさい。

1. I should have () carefully.

2. I can't () the cold anymore.

3. I'm supposed () every day.

4. I'll try to reach () this afternoon.

5. It's too bad () with us.

nice, can't, three, today, you, read,
hear, come, office, the, out, these, at,
my, your, more, that, sitting, take, miles,
on, mean, instructions, in, run, walk,
to, sit, stand, often,

設問 2. 指示にしたがって次の間に答えなさい。

1. I'll have () my steak:

2. I was sleeping () in.

3. I drank too () a hangover.

4. I hear you () in Florida.

5. I used to climb () a kid.

burglar, three, recently, a, have, need, I,
trees, during, eating, my, or, much,
before, salad, each, listen, when, was,
after, but, bought, the, can, came, and,
house, were, some, not,

設問 3. 指示にしたがって次の間に答えなさい。

1. I've already () my quilting.

2. I can't get () me awake.

3. I just can't () cold.

4. It's too bad () with us.

5. I've heard of () no film.

take, can't, seen, when, camera, told,
above, this, which, usually, boss, coffee,
mine, come, you, uses, now, keep, the,
about, seem, and, my, are, a,
shake, that, to, other, enough,

設問 4. 指示にしたがって次の間に答えなさい。

1. Who asked you () so early?

2. It's dangerous () New York at night.

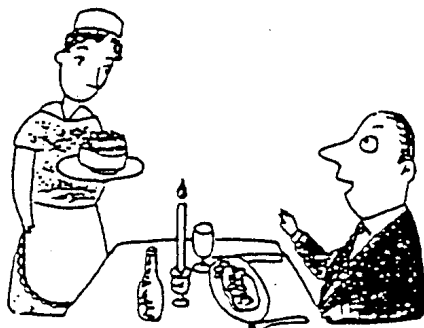
3. He's never on time, so () him.

4. How far is it from () supermarket?

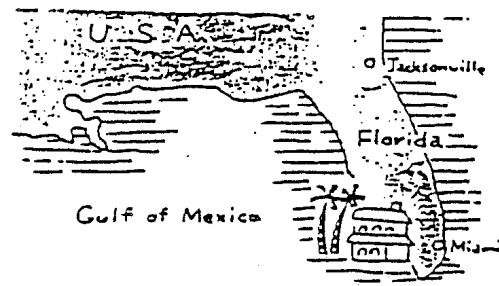
poke, to, punish, alone, set, nearest, this,
gets, here, up, be, without, walk, are, I,
begin, work, me, more, let's, on, my, rode,
wake, eye, the, in, finish, with, hear,

APPENDIX C

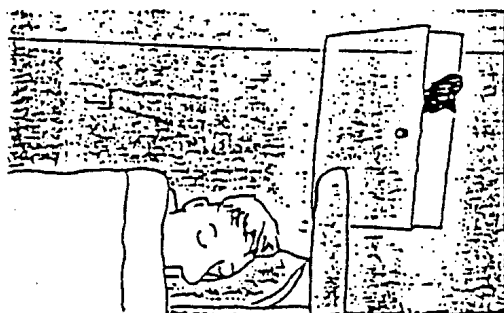
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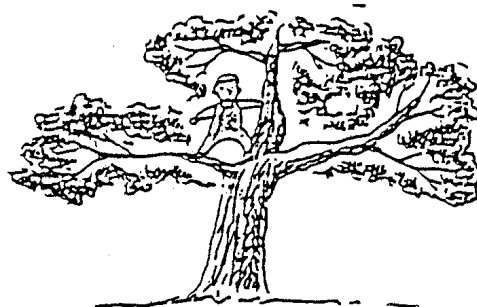
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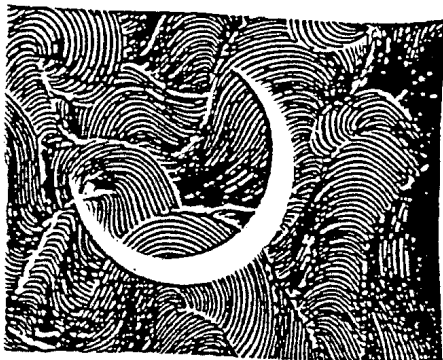


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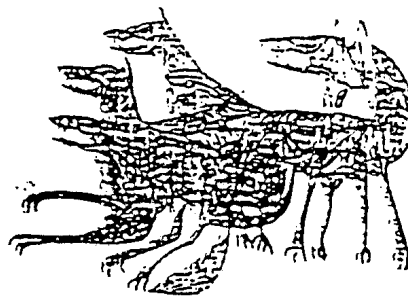


APPENDIX D

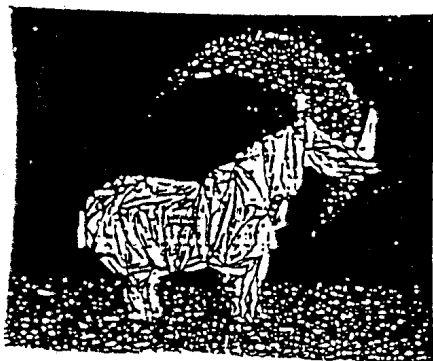
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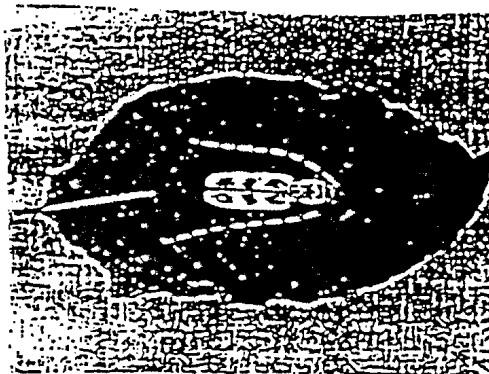
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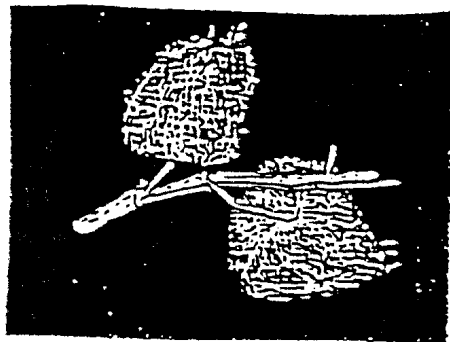
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FROM IKARI ORIGINAL CALENDER 1992

APPENDIX E

<A Skit from Sesame Street>

This is the stool that I built. My father helped me. First we sawed off a round piece from a big old tree. Now, that's gonna be the seat of the stool for me. Then we hunted the little straight tree to make the leg. Now we're gonna make the stool, lickety-split. Then we whittled them clean and white. See how white the legs can be? Now, my daddy takes the bark off from 'round that old tree. One, two, three, four, we don't need anymore to make a stool for me. And now we're gonna make three holes in the seat to hold the legs. Now I'm gonna bang the legs in. Now I have a little stool for me.

APPENDIX F

英語ヒアリングテスト

学籍番号

氏名

1. 次の各々の英文の空白を下の単語を使って埋めなさい。

1. This is () built.
2. First we () from a big old tree.
3. () the legs can be?
4. We don't () a stool for me.
5. Now I'm () in.

sea, two, how, bad, and, stool, make, a, gonna, red, bad, that,
piece, eye, white, legs, steel, to, bang, fang, knew, see, sawed,
of, the, need, the, off, peace, round, I, anymore, over