

# Comparative Effectiveness of Three Language Laboratory Methods Using a New Equipment System<sup>1</sup>

TOSHIKO CHOMEI

ROBERT HOULIHAN

In 1965, Chomei (Chomei & Houlihan, 1968-69) devised a new type of automatic short-delay-playback laboratory system which provided the student with immediate playback of his utterance, i.e., the student's voice could be played back within one and a half seconds after he had recorded his response. However, experimentation uncovered several shortcomings, and in 1968 Chomei devised a new system. Entirely different mechanically from the previous one, the new system not only overcomes previous shortcomings, but also provides instant playback as well as conventional language laboratory operations.

CHARACTERIS-  
TICS OF THE  
NEW SYSTEM

The new system consists of one master console and 48 tape recorders set in separate, semisoundproof booths. The compact cassette recorder in each booth has a maximum recording time of one hour.

There are three different learning methods: instant playback, long-delay playback, and audio active. Instant playback enables the student to play back his recorded answers in 1/30

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*Toshiko Chomei is an English instructor at Ochanomizu University, Tokyo, and Robert Houlihan is Director of Language Institute, Tokyo.*

of his recording time (.3 to .6 seconds), while long-delay playback provides the conventional type of language laboratory method.

Following the latter methodology, the student records the teacher's questions and his own responses successively on the cassette, rewinds, and plays back the questions and answers. Alternatively, by using the booth tape recorder's special device—the instant playback button—the student can hear his recorded answer immediately, in about half a second. Then, if he rewinds the tape and rerecords the same answer, he can hear his response again instantly by pushing the instant playback button. Thus, by repeating this process over and over, he may successively improve his responses. Pressing a button rewinds the tape, releasing it starts the tape again.

The machine can be remotely controlled and fully automated by the autostudy controller. A simple button on the autostudy controller enables the master tape to run and stop automatically. The master tape remains in the stop position while the students play back their answers. Then, the tape recorder automatically starts again and they go on to the next exercise. In this arrangement, two types of automatic playback, selected by one button, can be used: playback of both the model and the student's response for comparison; and playback of the student's response only. The maximum response time that can be recorded is 20 seconds. One button on the autostudy controller at the beginning of the lesson starts the program. Thereafter, the machine works automatically by voice operation.

While the students' recorded answers are being played back, the teacher can monitor them. The autostudy controller permits teacher-directed group work.

Commercial as well as teacher-made tapes can be used directly on the master tape recorder in automatic learning. When the teacher finds a pause on the commercial tape is a little too short, he can lengthen it as required by pushing a button on the autostudy controller.

EXPERIMENT ON  
COMPARATIVE  
EFFECTIVENESS

It was hypothesized that in language laboratory (LL) training the new instant playback method would provide higher efficiency in the improvement of English hearing comprehension and production skills than the two other methods.

*Subjects*

Participants in the project were 140 Japanese Ochanomizu University High School students in grade 10. They were di-

vided into three groups according to matched scores on intelligence and English standardized achievement tests. All three groups were taught English in this new type of LL using three different methods: instant playback (*IP*), audio active (*AA*), and long-delay playback (*LDP*).

In the *IP* group, after mimicking the model once, the student could hear the model and his own response for self-evaluation within about  $1/30$  of recording time (.3 to .6 sec.). The autostudy controller was used to control the booth machines remotely.

In the *AA* group, the subject imitated the recorded material only while listening through the headphones. There was no playback. To make the experimental time the same as that for the other groups, the students practiced the same material twice.

In the *LDP* group, the students recorded models and their imitations successively on the tapes, and then played them back for self-evaluation—the conventional LL method.

*Length of  
Experiment*

All three groups were taught by the same instructor, Chomei, with class meetings of 50 minutes a day, three days a week, totaling 22 days during April, May, and June, 1968. Twelve periods were devoted to practice sessions only. Ten periods were devoted to practice sessions of 40 minutes with a 10-minute testing period following each.

*Teaching  
Materials*

All three groups practiced the same material—*Modern English Conversation* (commercial tapes) composed of dialogs and sentence pattern drills, and *The Elementary Reader in English*, by R. J. Dixson (recorded on tapes by Americans), for 11 periods each. With *Modern English Conversation*, after hearing a dialog, the students had pattern practice based upon the dialog. As for the elementary reader, the students listened to each story and practiced answering questions concerning the story.

*Tests  
Administered*

Before, during, and after the experiment, 10 production tests were administered to the students—the same five translation tests and the same five speaking tests. For the Japanese-English translation tests (written tests) the students listened to a dialog and then were administered the test consisting of 20 items. The tests and evaluation were made by Chomei. Spearman Brown's reliability coefficients were high; the highest was .886 and the lowest, .725.

In the speaking tests, students listened to a story once and recorded their answers to 20 questions concerning the story on their tapes. Of the 20 questions, 10 were from the reader and 10 were made by Chomei. Evaluation was made by Houlihan, a native speaker of American English, and by Chomei, a Japanese instructor of English. Each item was graded on structure and pronunciation. Spearman Brown's reliability coefficients of Chomei's scores in both items were high: the highest was .896 and the lowest, .737. The same was the case with Houlihan's scores: the highest was .894 and the lowest, .690. In both structure and pronunciation tests, correlation between Houlihan's scores and Chomei's was significantly high; the highest was .997 and the lowest, .834.

RESULTS There was no significant difference in the standard scores of intelligence and English achievement tests among the three groups (Table 1).

TABLE 1  
The Standard Scores of Intelligence and English Achievement Tests

Group	Intelligence Test			English Test	
	n	$\bar{x}$	$s^2$	$\bar{x}$	$s^2$
AA	46	68.72	76.681	61.00	67.435
IP	47	67.89	88.648	61.34	74.778
LDP	46	69.50	61.728	60.57	61.941

On the Japanese-English translation test there was no significant difference between the three groups except on the fifth test, in which  $IP > LDP$ , significant at the .05 level. With the first test (pretest) excluded, the other four tests were analyzed by the coefficient of concordance,  $W$ , to verify concordance of ranking of three groups through four tests. Judged by  $W$  coefficient,  $IP$  was superior to the other two groups. Ranking order was  $IP, AA, \text{ and } LDP$  (Table 2).

TABLE 2  
Ranking of Three Groups in Four Tests

Group	Test				Total
	2	3	4	5	
AA	2	2	2	2	8
IP	1	1	1	1	4
LDP	3	3	3	3	12

As there was no big difference between Chomei's and Houlihan's scoring of the speaking test, in both pronunciation and structure tests, their mean scores were used.

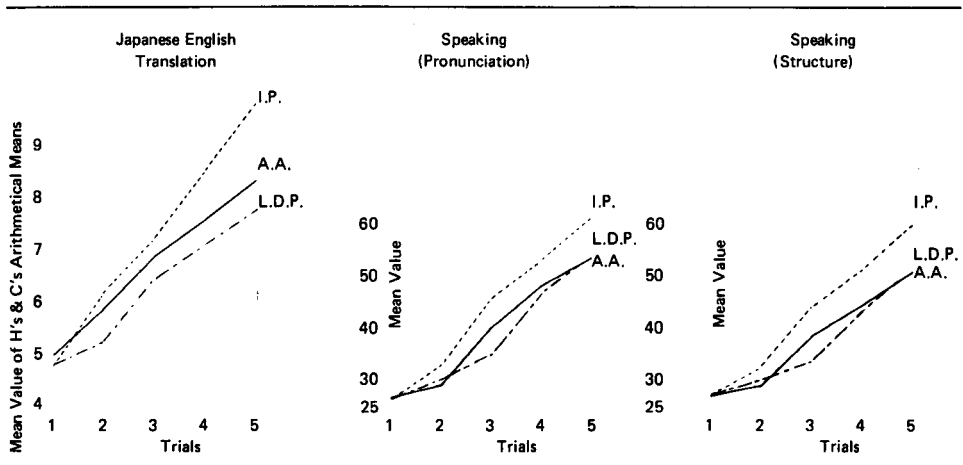
In both pronunciation and structure there was no significant difference between the three groups in the first test. Ranking on those tests that did show significant differences are summarized in Table 3.

TABLE 3		Pronunciation	Structure
Rankings Among the Three Groups over Four Tests	Test 2	IP>AA*	IP>AA*
	Test 3	IP>LPP** IP>AA** AA>LDP**	IP>LDP** AA>LDP** IP>AA*
	Test 4	IP>LDP*	IP>LDP** IP>AA**
	Test 5	IP>LDP** IP>AA**	IP>LDP** IP>AA**

\* significant at the .05 level  
 \*\* significant at the .01 level

The learning curves which represent the mean values of the individuals' scores on five successive tests are shown in Figure 1. The mean value of the scores is not represented by the probabilistic process, but is fairly well represented by the logistic curve, i.e., the second type of Gulliksen's learning curve where the speed of learning is proportionate to the product of the amount unlearned and the amount learned.

FIGURE 1  
 Learning Curves of the Tests



The logistic curve of the mean of each group's scores in the speaking tests (pronunciation) is well approximated by the following equation with the exception of the *LDP* group.

$$AA \quad \bar{x} = \frac{70.274}{1 + 10^{0.38089 - 0.17558 n}} \quad n = 1, 2, 3, 4, 5$$

$$IP \quad \bar{x} = \frac{72.833}{1 + 10^{0.47760 - 0.24273 n}}$$

$$LDP \quad \bar{x} = \frac{69.013}{1 + 10^{0.38064 - 0.18510 n}}$$

The limiting values of the above logistic curves indicate that the *IP* group ranks first; the *AA* group, second; and the *LDP*, third. The learning curves grew slowly for the first two trials, then rose rapidly and gradually increased, approaching the limiting values. This indicates that the students' ability to do the work was slow at first, then apparently proceeded rapidly with understanding and gradually continued to increase up to a certain limit.

Just as in the case of the speaking tests (pronunciation), the logistic curve of the mean of each group's scores in the speaking tests (structure) is well approximated by the following equation, with the exception of the *LDP* group.

$$AA \quad \bar{x} = \frac{73.260}{1 + 10^{0.37840 - 0.14711 n}} \quad n = 1, 2, 3, 4, 5$$

$$IP \quad \bar{x} = \frac{80.645}{1 + 10^{0.48184 - 0.19140 n}}$$

$$LDP \quad \bar{x} = \frac{80.971}{1 + 10^{0.42248 - 0.13196 n}}$$

The limiting values of the logistic curve indicate that the *AA* group ranks last. Since the logistic curve of the mean of the *LDP* group's scores is not well approximated by the equation, there is not much difference between the limiting values of

the *IP* group and those of the *LDP* group. However, if more trials were given, the *IP* group would probably rank first.

The logistic curve of the mean of each group's scores in the Japanese translation tests is well approximated by the following equation.

$$AA \quad \bar{x} = \frac{10.00}{1 + 10^{0.16765 - 0.17114 n}} \quad n = 1, 2, 3, 4, 5$$

$$IP \quad \bar{x} = \frac{15.67}{1 + 10^{0.49893 - 0.14250 n}}$$

$$LDP \quad \bar{x} = \frac{9.76}{1 + 10^{0.15297 - 0.15219 n}}$$

The limiting values of the logistic curves indicate that the *IP* group ranks first, the *AA* group, second, and the *LDP* group, third.

#### CONCLUSION

It is apparent from the results of the tests that the *IP* students showed significantly better performance in the production tests, such as Japanese-English translation and especially in the speaking tests than the two other groups. The limiting values of the logistic curves indicate that the *IP* group ranks first, and the *AA* group and the *LDP* group are not much different. This suggests that even if many more tests had been given (in this experiment only five trials were given), the same results would have been obtained.

The conventional type of language laboratory emphasizes the promotion of recognition and comprehension skills, because it provides active learning while the students are recording their answers. However, during the whole time that they are playing back their own recorded answers, their learning switches to a passive condition. The new *IP* method is effective in developing production skills, because it offers the students active learning all through their language laboratory practice, by forcing them to respond and compare continuously. Thus the students become conditioned to the clearer Gestalten of the sentences through immediate playback and hence can reproduce these patterns more easily.

With the conventional type of language laboratory, the student is often tempted to mumble along while listening to the

playback of the whole program, which develops bad speech habits. They also become bored with mimicking dialogs and the rote learning of drill exercises, because they cannot hear their voices immediately after they have recorded. As Mueller (1968) notes, "The low aptitude student in particular is at a disadvantage since auditory memory is his weakest." With the instant playback system, however, the student can hear his voice in three to six tenths of a second after he has recorded. This increases his interest and concentration, which results in giving him a surer basis for comparison with the model. This short interval between recording and playback is in accordance with Skinner's principle, that reinforcement must be contingent upon the accomplishment of each step.

In the conventional type of language laboratory, teacher monitoring is sometimes of little effect, because the student must reintegrate himself into the program sequence quickly and has little time to think about the suggestions made during student recording sessions (Rivers, 1968). With the instant playback system, however, the teacher can make comments while the student is listening to a particular recorded answer, and if many of them are making the same mistakes while recording, the teacher can push all the switches and discuss the problem with the whole group when their answers have immediately been played back.

Currently the basic question seems to be: Is language learning a skill or an intellectual exercise? In the learning of a foreign language, experience has shown that mental comprehension is not sufficient. The student must also practice the use of complex elements of the language until they come to him effortlessly. The *IP* system develops these skills efficiently through ease of repetition and automaticity. Chomei often introduces two methods, *IP* and *LDP* into one laboratory session. The students record the programs and their answers successively on their booth tapes and then rewind and play back what they have recorded. While they are listening to their recorded answers, they push down the instant playback buttons and improve their original sentences whenever they come to difficult places. After they have finished practicing individually, Automatic Instant Playback (group work) is presented. Students seem to react well to these variations and



have indicated that they feel less fatigued and mentally keener after such learning periods.

SUMMARY One hundred and forty senior high school students were divided into three matched groups according to the results of intelligence and English achievement tests, and taught English in the same LL with three different methods: *IP* (instant playback), *AA* (audio active), and *LDP* (long-delay playback). To verify the results, all three groups were given the same five Japanese-English translation tests and the same five speaking tests all through the experiment. As a result, the *IP* group gained higher scores in both tests than the *AA* group and the *LDP* group. The limiting values of the logistic curves indicate that the *IP* group ranks first, and the *AA* and *LDP* groups are not much different.

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