DOCUMENT RESUME

ED 028 664 FL 001 040

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The Learning Strategy of the Total Physical Response: A Review.

National Federation of Modern Language Teachers Association.

Spons Agency-Office of Naval Research, Washington, D.C. Personnel and Training Branch.

Pub Date Feb 66

Contract-NR-154-257-12-8-64

Note-6p.

Journal Cit-The Modern Language Journal; v50 n2 p79-84 February 1966

EDRS Price MF-$0.25 HC-$0.40

Descriptors-Behavioral Science Research, Behavior Theories, Conditioned Response, Japanese, Language Ability, Language Instruction, *Language Research, Language Skills, *Learning Theories, *Pilot Projects, Psycholinguistics, Retention Studies, Russian, *Second Language Learning, Stimulus Behavior, Teaching Techniques, *Verbal Operant Conditioning

Described in this article are five pilot studies that explored the effects of the learning strategy of the total physical response under a variety of conditions using Japanese and Russian with adults and children. Some general conclusions suggest that dramatic facilitation in learning listening skills for a second language is related to acting out during retention tests. (AF)

*The Learning Strategy of the Total Physical Response: A Review**

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PERHAPS one of the most complex tasks in human learning is the problem of how to achieve fluency in a foreign language. To illustrate the extraordinary stress and intricacy of this task, an instructor in one of the more esoteric languages at the Defense Language Institute in Monterey, California, remarked that "... after 12 months of intensive language training for 8 to 10 hours a day in small classes of six students, only one in twenty graduates was what one may describe as 'fluent'."

What will be reported next may suggest a partial solution to this ancient learning problem. This paper will describe a learning approach called the *strategy of the total physical response.* The theory behind this learning strategy was described in an earlier paper.[1] Essentially, the notion developed in that theoretical article was that solutions for intricate human problems require invention rather than discovery. After the invention of a solution possibility, a closed-system is generated which may be explored successfully with discovery activities such as experimental research.[2]

In pilot studies,[3] it was demonstrated that subjects had unusually long-term retention for Japanese when they listened to the Japanese and then were required to make a *total physical response.* For example, the subjects heard *tate* and immediately along with the instructor, stood up; then *aruke*, and they walked forward. Other commands were *tobe* (jump), *maware* (turn), *kagame* (squat) and *hashire* (run). The training began with brief one-word utterances, but within thirty minutes, the morphological and syntactical complexity was increased as the following utterances illustrate:

Isu kara tatte, kokuban no anata no namae o kese.
(Stand up and erase your name from the blackboard.)

Kare no namae o enpitzu de konokami ni kake.
(Take the pencil and write his name on this paper.)

Sono hana o tsukue kara tori, kanojo ni watase.
(Take that flower from the desk and give it to her.)

FIG. 1. The boys and the adult model jumped when they heard the command, "Tobe!"

The results of pilot studies were almost perfect retention in listening to Japanese from two weeks to a year when the subjects ranged from school children to adults. The procedure is illustrated in figure 1 in which the adult model and three boys jumped in response to the Japanese command "Tobe." This photograph is from the sound motion picture entitled, "Demonstration of a New Strategy in Language Learning." The

* Most of the studies reported in this article were supported by a research contract from the Personnel and Training Branch of the Office of Naval Research (NONR-4817(00), NR-154-257/12-8-64). Reproduction in whole or in part is permitted for any purpose of the United States Government.

[1] J. J. Asher, "Toward a neo-field theory of behavior," *Journal of Humanistic Psychology*, Vol. IV, No. 2 (Fall, 1964), pp. 85–94.

[2] For an application of the theory to a problem having to do with man-computer communication in the field of Engineering Psychology, see J. J. Asher and R. I. Post, "The new field theory: An application to postal automation," *Human Factors*, Vol. VI, No. 5 (October, 1964), pp. 517–522.

[3] Cf. Asher, *op. cit.*

film, which is 15 minutes in length, shows the complexity of Japanese which three 12 year old boys were able to assimilate in twenty minutes of training. Also shown in retention after a time interval of one year.

With the preliminary data from these pilot studies as a guide, Kunihira for his master's thesis decided to test the hypothesis of the total physical response under controlled conditions.[4]

Study I

Eighty-eight volunteer college students, who had no prior contact with the Japanese language, were randomly divided into an experimental and three control groups. The groups of subjects (*Ss*) who finished the experiment were shown to be homogeneous as measured by the *Modern Language Aptitude Test* and the *American College Testing Program*.

Procedure

An experimental and three control groups learned a sample of Japanese which began with simple commands as "tate" (stand) and "aruke" (walk), but within twenty minutes the complexity of the utterances was increased to this for example: "Mado ni hashitte itte hon o motte tsukue ni oite isu ni suware" (Run to the window, pick up the book, put it down on the desk, and sit down on the chair).

The experimental group (N=16) listened to the Japanese commands played on a tape recorder, and after each utterance, acted with the instructor as their model. If the utterance was "To ni aruite ike" (Walk to the door), the *Ss* and model walked to the door. If the command was "Kami to hon to enpitsu o motte isu ni suware" (Pick up the paper, book and pencil and sit down on the chair), the *Ss* and the model picked up a paper, book, and pencil, returned to their chairs and sat down. *Ss*, who were run in groups of four or five, were instructed to be silent, listen to the Japanese, and do exactly what the instructor does.

The first control group (N=15) was treated the same as the experimental group except that these *Ss* sat and observed the model perform during training. The second control group (N=18) listened to the English translation from the tape after each Japanese command, but they did not observe the model perform. The third control group (N=18) read the English translations in a booklet after they heard a Japanese utterance. They also did not observe the performance of a model.

Scoring of the Retention Tests

The retention tests were given immediately after training, 24 hours later, and then following a two week interval. These retention tests were scored in *behavioral units* as, for example, if an *S* in the experimental group heard "Isu ni hashitte itte hon o oke" (Run to the chair and put down the book), he received one point for running, another point if he ran to a chair, another point if he put an object on the chair, and a point if the object was a book. Therefore, for the utterance "Isu ni hashitte itte hon o oke," the total possible score was four points. The same scoring procedure was used for *Ss* in the control groups except that these people wrote down the English translation for the Japanese.

As to scoring categories, a *single word* was for example "aruke" (walk); a *short utterance* was a thought unit as "To ni aruite ike" (Walk to the door); a *long utterance* was more than one thought unit as "Tsukue ni aruite itte enpitsu to hon o oke" (Walk to the desk, and put down the pencil and book); and a *novel utterance* was a recombination of utterances used in training so that, in this sense, novel commands were heard for the first time in the retention tests.

Results

The experimental group, who used the strategy of the *total physical response*, had significantly better retention than each control group. Generally, the *t* tests were highly significant beyond the .005 level for (a) long or novel Japanese utterances, and (b) when the time interval after training increased to 24 hours or two weeks. The control groups did not show significant differences in retention among themselves as measured by *F* tests.

Encouraged by these findings, a study was designed[5] to test whether the power of a total

[4] S. Kunihira and J. J. Asher, "The strategy of the total physical response: An application to learning Japanese," *International Review of Applied Linguistics* (in press).

[5] J. J. Asher, "The strategy of the total physical response: An application to learning Russian," *International Review of Applied Linguistics* (in press).

physical response would hold when a different language was used such as Russian.

Study II

This study was similar to the Japanese experiment except that the experimental group (N=18) learned a sample of Russian[6] using the strategy of the total physical response while the control group (N=18) observed the model perform in training and wrote English during the retention tests. The *Ss* were college undergraduates who volunteered to participate in response to the incentive of extra course credit. Although an attempt was made to assign *Ss* randomly to each group, an *Otis Intelligence Test* administered after the experiment was significantly better at the .05 level for the control group. All *Ss* had no background or training in Russian.

The results were quite similar to the findings with Japanese. The retention scores using *t* tests were significantly better for the experimental group, especially as the complexity of Russian increased from single or short utterances to long or novel Russian commands. Also, when the time interval between training and retention increased to two weeks, the experimental group was significantly better beyond the .005 level on almost every retention measure.

At least with adults from a college population the strategy of the total physical response seemed to be vastly more effective as a learning format than merely a sedentary kind of observation during training. This generalization appeared to hold for Japanese and Russian.

At this point the data suggested some provocative theoretical implications. For example, could the strategy of the total physical response account for the puzzling fact that children living in a foreign country achieve in a short time the fluency of native speakers while the parents of these children may struggle unsuccessfully for years to be fluent? Some theories suggest that an explanation may be imprinting[7] or neurological differences.[8] However, still another possibility is that children tend to use the technique of a *total physical response* while their parents do not. Much of children's play is language synchronized with physical locomotion of the entire body (i.e., "Come on, Tommy, let's ride our bikes!"). By contrast, most language for adults may be quite independent of physical action. Adults tend to be rather stationary and inert when they transmit or receive language (i.e., "Hello, John. Anything new today? A baby girl, eh? Well, congratulations."). With the strategy of the total physical response, adults seemed to understand complex foreign utterances in an incredibly short amount of training.

In the research just reported, the task was listening but not speaking the Japanese or Russian. The usual audio-lingual approach is to make the task one of learning both listening and speaking together. To force speaking from the beginning of training may be somewhat analogous to the electroshock experiments with rats. These animal studies have suggested that if rats are shocked immediately after they have learned to navigate a maze, the effect seems to be the "erasure of memory traces." It may be that a technique of language learning in which the student is compelled to utter alien sounds from the start of training may act like shock. For example, when one tries to learn listening fluency and speaking simultaneously, the forced noise-making may function as a stressful stimulus which tends to erase, prematurely, memory traces for understanding. The ideal, as hinted by our data, may be for the student to achieve listening fluency before he attempts to utter the alien sounds. However, this is only speculation.

Before the relationship of speaking to listening can be determined, it would be helpful to know more about listening, especially as this intersects with the variable of physical action. The purpose of the next study was to further expand the generality for the strategy of the total physical response.

Study III

Studies I and II indicated that the strategy of the total physical response seemed to facilitate the learning of listening skill for complex foreign

[6] Professor Taras Lukach from the Foreign Language Department of San Jose State College recorded the Russian utterances on tape.

[7] E. H. Hess, "Imprinting in animals," *Scientific American*, Vol. 198, No. 3 (March, 1958), pp. 81–90.

[8] W. Penfield and L. Roberts, *Speech and Brain Mechanisms*, Princeton, New Jersey: Princeton University Press, 1959.

utterances. This generalization may hold for adults, but how about children? Study III replicated Study II except that 6th grade children rather than college students were the subjects.[9]

The experimental and control groups were composed of children (N=32) matched on the *California Test of Mental Maturity*, the *California Achievement Test*, and teacher ranking on classroom performance. None of the children were bilingual and none had prior exposure to the Russian language.

The children in the experimental group listened to the Russian and acted along with an adult model; the control children listened to the Russian and observed the adult model perform. During the retention tests, children in the E group acted individually while those in the C group wrote English translations.

The results were spectacular differences in retention favoring the children who applied the strategy of the total physical response. The *t*s were significant beyond the .01 level no matter what the complexity of the Russian. For long or novel Russian utterances, most of the *t*s were significant beyond the .0005 level of confidence.

Next, it was decided to try the strategy of the total physical response with other grade levels.

Study IV

For a master's thesis, Price[10] collected data from samples of children in the 2nd, 4th, and 8th grades.[11] In each of these grade levels, sixteen pairs of children were matched on the *California Test of Mental Maturity*, the *California Achievement Test*, and teacher ranking on classroom performance.

This was a replication of studies II and III using Russian and with the experimental group applying the technique of the total physical response while the controls observed the model perform. During the retention tests, however, the children in both the experimental and control groups individually listened to each Russian utterance, then acted out their response. Always in previous studies, the controls wrote English translations in the retention tests.

Unexpectedly, the results yielded no significant differences between the experimental versus the control group for the 2nd, 4th, or 8th graders.[12]

Table 1

Acting Versus Writing During Retention Tests Given to 8th Graders Two Months After Training

	$\overline{X}_a$	$\overline{X}_w$	S_a	S_w	t^*	p
Total	69.29	62.07	26.50	23.34	1.91	.05
Single	11.21	11.86	2.91	1.56	−0.84	NS
Short	18.43	17.93	6.86	8.13	0.30	NS
Long	39.64	31.57	18.63	15.43	2.89	.01
Novel	19.36	15.71	10.10	8.13	2.51	.025

* One-tailed *t* tests for fourteen matched pairs

Apparently, whether *Ss* acted or observed the model act during training was not relevant as a variable for children of these ages. At this point, the generalization seemed to be that spectacular differences in retention were somehow a function of whether subjects acted or wrote their responses during the retention tests. As a further check on the conclusion that acting facilitated a greater retrieval of information than writing, a follow-up study was conducted on the 8th graders. Approximately two months after the 8th graders had completed their training in Russian, another retention test was admnistered. Experimental and control children were matched on their overall performance in the training and half of the 8th graders in the experimental and control groups acted during the two-month retention test while the other half wrote English.

The results, in Table 1, showed that for complex Russian utterances, the children who acted out their responses in the retention test had significantly better recall than the children who wrote English translations.

At least three explanations seemed possible. One we have called the *translation hypothesis*,

[9] Data for this study were collected by Mrs. Mary Hamilton at the Portal School in Cupertino, California.

[10] B. Price, *Developmental factors in the learning strategy of the total physical response.* Unpublished master's thesis, San Jose State College, 1966.

[11] These data were drawn from the Blackford School in San Jose, California. Appreciation is expressed to Mr. William M. Phelps for coordinating the scheduling of the students.

[12] An intriguing secondary finding was that age was related to the retention of the Russian. College adults as a group had near maximum retention, the 8th and 4th graders had significantly less retention than the adults, and the 2nd graders had significantly lower retention scores in comparison with the older children.

another the *position-cue hypothesis*, and a third the *concurrency hypothesis*.

The translation hypothesis assumes that when one writes the English during retention, the cognitive process of translation has a disruptive or impeding effect. Another explanation, the position-cue hypothesis, was that acting out a response gives cues as to what the following response will probably be. For example, if a command in Russian is to pick up a book, and *S* does this, he knows that there is a high probability that the next command will have something to do with the book. When one *writes* "pick up the book," cues suggesting the next response may not be as clear.

A third explanation was the concurrency hypothesis. When one acts in the retention test, he may move before the voice on the tape has completed the utterance. One may act out part of the command and simultaneously be listening to the next phrase. This would greatly simplify lengthy commands as "Walk to the window, pick up the book and pencil, then return to the table." When one writes the English, it may be more difficult, for some unknown reason, to write and listen simultaneously. Therefore, one may have to wait until the entire command has been uttered in Russian before one writes.

In the next study the intent was to test simultaneously the translation hypothesis, position-cue hypothesis, and the concurrency hypothesis.

Study V

From 8th grade classes at the John F. Kennedy Junior High School in Cupertino, California, fifteen pairs of children were matched as in previous studies on IQ, achievement, and teachers' ratings. Approximately half of the pairs were boys and the other half girls.[13]

In this study both the experimental and control children learned a sample of Russian by observing a model perform during training. The difference between the groups was that in the retention tests, the experimental children acted in response to the Russian commands and the controls *spoke* the English.

The results showed no significant differences between the two groups in their retention scores. This finding does not support either an explanation based on the translation hypothesis, nor one based on the position-cue hypothesis. Since significant differences seem to be related to writing rather than speaking English, the general cognitive process involved in translating may not be disruptive. Also, when *Ss* verbalized in English rather than acted out, position-cues suggesting the next response may not have been as distinct as when *Ss* wrote. The reason is that when one writes the English translation, one has rather easy visual access to prior responses written on the paper.

The remaining explanation, the concurrency hypothesis, was tested by counting the number of times during a retention test that a child began acting if he was in the E group or verbalizing in English if he was in the C group before the voice on the tape had finished speaking the Russian utterance.

Almost all the concurrent responses were made by the group that acted during retention and almost no concurrent responses were observed for the group that verbalized in English. As expected, concurrent responses were associated with complex Russian utterances. Of all concurrent responses, in Unit IV, there were none for single words, 3% for short utterances, 58% for long utterances, and 39% for novel utterances.

Since concurrent responses were almost exclusively found only in the experimental group and the latter group did not differ significantly in retention from the control group, the concurrency hypothesis will probably not explain the differences between acting and writing in retention.

An interesting side finding with the concurrent responses was that the more concurrent responses a child made, the better his retention score, especially for complex Russian. The correlations in Unit IV between concurrent responses and each retention score were as follows:

Total score	.75
Long utterances	.75
Novel utterances	.81
Short utterances	.45
Single utterances	.36

It was also curious that although concurrent responses correlated highly with understanding of complex Russian, these responses had low to

[13] Data for this study were collected by Mrs. Natasha Wist, Miss Sue Hartley and Mrs. Berdeen E. Coven.

moderate correlations with general ability measures as shown below:

California Test of Mental Maturity	
Total Score	.41
Verbal	.40
California Achievement Test	
Total Score	.30
Verbal	.02

The Phenomenon of Writing

The generalization which appears to be reliable is that when *Ss* are asked to act out responses to commands in retention tests rather than write the English, performance is significantly better. Why this should be is not yet clear. It has been suggested that for children, writing is a more difficult task than acting or speaking. This explanation seems plausible except that one would not expect college students to have difficulty writing common English sentences as "Walk to the door." Yet, for college adults who acted, retention was significantly greater in comparison with the adults who wrote. Experiments are now in progress to explore how acting, speaking, and writing differentially operate on retention.

Conclusion

The learning strategy of the total physical response was studied under a variety of conditions using Japanese and Russian with adults and children. The results suggest that dramatic facilitation in learning listening skill for a second language is related to acting out during retention tests. Although acting out during training for children in certain age groups did not seem to be relevant in these experiments, pilot studies[14] strongly indicate that this conclusion may be limited to short-term training which is typically characteristic of experiments. When the training is extended for many weeks, acting-out in training seems to have intense motivational power which sustains student interest and effort.

[14] Cf. Asher, *op. cit.*: "Toward a neo-field theory of behavior."