DOCUMENT RESUME

ED 066 986 FL 003 515

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TITLE Differential Prediction of Student Success in Intensive Language Training. Final Report.
INSTITUTION San Jose State Coll., California. Dept. of Psychology.
SPONS AGENCY Defense Language Inst., Monterey, Calif. West Coast Branch.
PUB DATE [72]
NOTE 37p.; Amended final report

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS *Aptitude Tests; Arabic; *Educational Research; French; German; *Intensive Language Courses; Korean; Language Instruction; Learning Theories; Mandarin Chinese; *Objective Tests; Russian; Second Language Learning; Semitic Languages; Spanish; Student Evaluation; *Success Factors; Turkish; Vietnamese

ABSTRACT

This report summarizes the results from the first year of a proposed three-year study into ability patterns for learning second languages in intensive training. The languages sampled were Arabic, Mandarin Chinese, German, French, Korean, Russian, Spanish, Turkish, and Vietnamese. Before training, the students were administered these predictive measures: the Modern Language Aptitude Test, the Pimsleur Language Aptitude Battery, the Army Language Test, the Horne Assessment of Basic Linguistic Abilities, the Al-Haik Foreign Language Auditory Aptitude Test, the Foreign Language Interest Inventory, the Otis-Lennon Quick-Scoring Mental Ability Test, the Need for Social Approval, and the Taylor Manifest Anxiety Scale. In addition, certain biographical items were used as predictors, such as age and education. Some of the students in the sample were also assessed for motivation with the Q by Q Interview. Results from preliminary data analysis after six weeks of training suggested that each language may have a unique factor structure with very little overlap between languages. Statistical data are included. (RL)

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Final Report

Differential Prediction of Student Success in Intensive Language Training[1]

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INTRODUCTION

More than five years ago personnel at the Defense Language Institute, West Coast and professors at California State University, San Jose initiated research projects into problems of second language learning. Several projects explored how student aptitude related to success in learning second languages under conditions of intensive training. For example, Banathy, Asher, and Vicory completed studies which contrasted the predictive power of specific predictors for each of several languages versus general predictors such as the Army Language Aptitude Test (Banathy, 1962; Asher and Banathy, 1966; and Vicory and Asher, 1966). The results from pilot studies suggested that the relationship of specific to general aptitude predictors should be explored across many different languages.

In March 1969 the Commandant of DLIWC, Colonel Kibbey M. Horne and his executive staff in Research and Development approved the initiation of a large scale aptitude study which would be a collaborative effort between DLIWC and California State University, San Jose. The plan was to collect extensive aptitude data for approximately 500 DLI students before they began training in these language programs: Spanish, French, German, Russian, Korean, Japanese, Chinese, Serbo-Croation, Polish, Hungarian, Czech, Bulgarian, Arabic, Turkish, and Persian. Then at six week intervals, criteria data would be systematically gathered to measure student fluency in listening, speaking reading, and writing.

[1]Dr. John B. Carroll reviewed an earlier draft of this paper and offered excellent guidance for the final revision.

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The division of labor was this: the R and D staff at DLIWC would administer all predictor measures and collect the criterion data. California State University, San Jose would score the predictor measures from each student, organize the predictor and criterion data for computer processing, then analyze the data using the statistics of correlation, principal components analysis, and multiple regression. The responsibility for coordinating all phases of the project and preparing a final report would be done by Dr. James J. Asher, Professor of Psychology at Californis State University, San Jose.

To get this joint research project underway, DLIWC contributed the services of their R and D staff, and The California State University, San Jose contributed the services of their Testing Center and large segments of time on their CDC 3300 computer. The Department of the Army allocated $1,6000 to the project for certain clerical costs and supplies. The results from preliminary data analysis after six weeks of training suggested that each language may have a unique factor structure with very little overlap between languages. A comprehensive understanding of how aptitude is related to success in language training should result eventually in greater precision for predicting how successful a student will be in each language taught at DLI.

A proposal was submitted to DLI for a three year project designed to explore aptitude patterns across many languages.

HISTORY OF THE PROBLEM

Aptitude research has not generated clear-cut relationships between individual differences and success in mastering second languages. For example, the validity coefficients with general mental ability as the predictor have varied from .21 to .65 (Pimsleur, 1962). If native language ability is the predictor, the validity coefficients have spread from .18 to .53 (Pimsleur, 1962). When a second language aptitude test was the predictor, the validities were from .25 to .78 for high school courses and .13 to .69 for college courses (Carroll, 1963).

The diverse results seem to be a function of many factors which make comparisons from study to study extremely difficult. For instance, comparisons between studies have been blurred because each researcher used different tests, different criteria, different training situations, and different student age groups. These crucial uncontrolled variables obscured a comprehensive picture of how aptitude was related to second language learning.

Our project was designed to solve the problem of comparability since twelve or more foreign languages would be systematically studied under the same conditions. That is, from language to language, the tests were to be the same, the criteria were to be the same, the training format was to be the same, and the student age range was to be the same. This strategy was intended to yield data which are comparable across languages so that clear-cut patterns would be visible.

No study has ever been attempted to achieve data which were comparable across many languages. There are several excellent factor analytic studies of student ability, but these were limited to a single language. For example, Carroll's factor analysis of aptitude at the Defense Language Institute was designed to explore one language, Mandarin Chinese (Carroll, 1958). And, it should be pointed out that the Carroll study was completed twelve years ago. It is not unreasonable to assume that the parameters of the learning experience including the instructional format and the student population may have changed in twelve years.

Not only would the proposed project enable systematic comparisons of ability patterns across languages and language families, but meaningful comparisons can be made with prior work by John Carroll and Paul Pimsleur.

OBJECTIVES

The three year research project was designed to achieve the following goals:

1. To identify in students those individual differences that are critical to the successful mastery of each language taught at DLI;
2. To identify ability patterns that are unique for success in learning a particular language;
3. To identify the ability pattern that is general for learning any language;
4. To determine how aptitude, mental ability, motivation, and the past history of the student is related to success in an intensive training program such as DLI;
5. To identify ability patterns for each language so that before training it will be possible to screen students with great precision;
6. To identify ability patterns for each language so that it may be feasible for the computer to print out a differential prediction of success for an individual in each of 26 languages;
7. To determine the reliability and validity of two new aptitude measures, one new interest measure and one new measure of motivation for second language learning;
8. To contrast the new measures with established tests such as the Modern Language Aptitude Test, the Army Language Aptitude Test, Pimsleur's Aptitude Test, and the Otis Intelligence Test.

PROCEDURE

The research design was to administer the following measures to DLI students before they began their language training: two new aptitude tests, three established aptitude tests, an intelligence

test, an interest measure, biographic data, and for some students, a special interview to assess motivation. Then as students progress through training, four criterion measures were to be collected every 6 weeks to estimate proficiency in listening, speaking, reading, and writing. Principal components analysis and multiple regression analysis would then be applied to explore how aptitude, general mental ability and motivation differentially affected proficiency in different languages.

THE PREDICTORS

Established Aptitude Measures. The Modern Language Aptitude Test (MLAT) was produced by John Carroll and Stanley Sapon. This measure has five subtests selected on the basis of a factor analytic study using almost 30 subtests and a criterion of instructor's academic grades after a one-week trial course in Mandarin Chinese (Carroll, 1958; 1962).

The five subtests of the MLAT are oriented to measure these four abilities: (a) phonetic coding - "The ability to 'code' auditory phonetic material in such a way that this material can be recognized, identified, and remembered over something longer than a few seconds" (Carroll, 1962, p. 128); (b) grammatical sensitivity - the ability to recognize the grammatical functions of words in sentence contexts; (c) rote memorization ability - the ability to learn a large number of associations in a relatively short time; and (d) inductive language learning ability - the ability to infer linguistic forms, rules, and patterns from new linguistic content (Carroll, 1963).

Validity studies using the MLAT show variability from language to language and among instructional settings. Generally, better results have been obtained when the language instruction is intensive training rather than the distributive training which is characteristic of college foreign language courses.

The Pimsleur Language Aptitude Battery (PLAB), developed by Paul Pimsleur, was derived in 1959 from a factor analytic study of college students learning French. From this work, Pimsleur (1963, 1966a, 1966b), evolved these four factors: grade point average in academic areas other than foreign languages, motivation, verbal ability, and auditory ability.

Validity studies have been moderately high for college students and secondary school pupils studying French and Spanish. The PLAB was designed for use at the end of grade 6 and in grades 7 through 12.

A third established aptitude measure was the Defense Language Aptitude Test (DLAT). This is an artificial language test composed of 59 four-alternative multiple choice items. The DLAT requires the subject to learn vocabulary and certain grammatical principles of the artificial language, all of which are applied in the translation of sentences either from the artificial language to English, or vice versa. The testing time is 30 minutes.

New Aptitude Measures. The first test was called the Horne's Assessment of Basic Linguistic Abilities (HABLA) and was developed by Kibbey M. Horne. This measure, based on linguistic theory, attempts to assess a general ability to learn languages and the ability to learn specific languages. The subtests are heuristically derived from the linguistic classifications of phonology, morphology, orthography, and semantics or cultural set.

Contrary to prior factor analytic studies as were the basis for the MLAT and PLAB, Horne postulated that general intelligence, ability to memorize, and motivation are indeed vital in the learning process, but not necessarily critical in the assessment of specific language aptitudes. Reasoning by analogy, however, may be relevant to a general language aptitude.

The unique features of the HABLA are (a) except for the instructions, no English is used in the content of the test, (b) directions are narrated and illustrated and on closed-circuit television tape, and (c) no actual languages are used in the test items. The test has 100 items and the testing time is 100 minutes.

The second aptitude measure called the Al-Haik Foreign Language Auditory Aptitude Test (AFLAAT) was developed by Antoine R. Al-Haik. Al-Haik designed this test to measure the auditory ability which would seem to be important in predicting success in any training rpgram that was audiolingual (Dexter, 1934; Carroll, 1955, 1958, 1960; Pimsleur, 1961, 1962, 1968). This measure has three subtests to assess (a) the ability to discriminate with a phonemic sound-system, (b) sound-symbol association, and (c) the ability to understand syntactic formation. The test has 156 items and the testing time is 100 minutes.

Interest and Motivation. A new measure called the Foreign Language Interest Inventory was synthesized by Alex L. Szaszy. 15 items were adapted from an interest inventory by Fiks and Brown (1969) and 32 items were created by Szaszy from conversations with DLI students over the past 15 years.

Also, new in the category of motivational measurement was the Q by Q Interview (Asher, 1970A, 1970b, 1971). This was a highly simplified interview format which has demonstrated extremely high reliability under certain conditions. The interview was approximately 10 minutes per student and consists of ten questions. Carroll (1962) has achieved promising results when a brief interview was used to assess motivation.

Intelligence. The Otis-Lennon Mental Ability Test, Advanced Level, Form J was used. This measure of general mental ability has been used extensively for adults in industrial and academic settings, and especially in research for second language learning.

Other Measures. Other tests were used as the Need for Social Approval (NSA) and the Taylor Manifest Anxiety Scale (TMA). In addition, biographic items as age and education were used as predictors.

CRITERIA

Every 6 weeks in each language, four criterion measures were to be collected for each student. There was a rating of oral proficiency which included listening and speaking skills, a rating of written proficiency which included reading and writing; then a composite rating based on both the oral and written measures, and finally, an overall rating by the instructor based on test performance and daily observations of the student in the classroom. Each criterion measure was expressed as a percentage.

THE STATISTICAL ANALYSIS

The two main statistical techniques were principal components analysis and multiple regression analysis. The principal components analysis transforms a massive amount of data into underlying patterns. For instance, given 50 ability scores for each student in Russian, the analysis may reduce this array into 12 patterns called factors. The principal components analysis was with a Kaiser Varimax rotation to simple structure. The number of factors was determined using Guttmann's lower bound theorem (1954) which demonstrated that eigenvalues with roots less than 1.0 are statistically insignificant.

Multiple regression analysis selects the combination of ability measures which will result in the most precise prediction of student success for a particular criterion measure in a specific language.

RESULTS AFTER THE FIRST YEAR

COMPARISONS ACROSS LANGUAGES

Meaningful comparisons across languages was dependent upon a random assignment of students to each language training program. If the condition of random placement held true, then there should be no significant.

difference in the mean Defense Language Aptitude Test (DLAT) scores from sample to sample. We expected that if an applicant was at or above the minimal cutoff on the DLAT, he was assigned randomly to a language training program.

However, 7 in 10 t tests showed significant differences which suggested that students were differentially placed into language programs. The mean DLAT scores seemed to indicate, for example, that students who scored high on the DLAT were selected for the Russian program and those who scored relatively low were selected for Korean or French.

THE PRINCIPAL COMPONENTS ANALYSIS OF PREDICTORS AND CRITERIA

In Appendix A may be found the principal components analysis for the total group (except Turkish) N=813, and each of the following languages: Arabic N=121, Chinese Mandarin (Basic) N=77, Chinese Mandarin (MAFAC) N=49, German N=89, French N=70, Korean N=69, Russian (Basic) N=119, Russian (ACC) N=39, Spanish N=95, Turkish N=46, and Vietnamese N=85. Factor loading of .30 and higher are reported in Appendix A. Since it is not permissable in this type of analysis to include composite scores, only the subtests from each aptitude measure were used together with other measures of individual differences and two criterion measures, the oral rating and the written rating taken at the 6th and 12th weeks of training. The nineteen subtests from the aptitude measures arranged themselves into one, two, or three factors depending on the language sample.[3]

Factor I may be called "Language Analysis" since it seems to be measuring a verbal ability in which the individual is sensitive to grammatical features in language. The subtests that clustered into Factor I were the MLAT, Part 4 (Words in Sentences), the PLAB, Part 4 (Language Analysis), the AFLAAT, Part 3 (recognition of grammatical features), the DLAT (decode grammatical features in a FL), and the Otis-Lennon Mental Ability Test - Advanced Level, Form J.

[3]In all cases the conclusions were based on the highest factor loading for the variable within a specific language sample.

Factor II may be described as "Sound Discrimination" since it consisted of these subtests: The PLAB,Part 5 (Sound Discrimination which measures the ability to learn new phonetic distinctions and to recognize them in different contexts), The AFLATT, Part 1 (ability to distinguish Arabic phonemic differences [vowels and consonants]), HABLA, Part 1 (ability to hear sameness and differences in groups of three non-English words), and the MLAT, Part 2 (Phonetic Script which measures the ability to learn correspondence between speech sounds and orthographic symbols).

Factor III was labelled "Sound-Symbol Association" since it contained these subtests: MLAT, Part 3 (Spelling Clues which measures sound-symbol association ability), MLAT, Part 2 (Phonetic Script which measures sound-symbol ability, PLAB, Part 6 (Sound-Symbol Association), AFLAAT, Part 2 (learn a new system of writing using familiar orthography), and HABLA, Part 3 (Sound-Symbol Association).

Factor I (Language Analysis) and Factor II (Sound Discrimination) were distinct with the representative subtests appearing in these factors for most of the language samples. Factor III (Sound-Symbol Association) was not as firmly established since the subtests representing this factor appeared in about half of the language samples, and in half of the language samples, factors II and III merged together.

In addition to the aptitude factors I, II, and III, a fourth factor was grade point average in academic areas other than foreign languages as measured by the PLAB, Part 1. Other factors identified were Factor V, interest, Factor VI, personality, Factor VII, biographical, and Factor VIII, the criterion.

The Interest Factor was identifed since in all eleven language samples, both measures of interest (The Foreign Language Interest Inventory and PLAB, Part 2) shared a common factor. The Personality Factor was established because in 9 of 11 language samples, both personality measures (The Need for Social Approval and The Taylor Manifes Anxiety Scale) were in the same factor. The Biographical Factor was indicated since the two biographic items, age and education, clustered into the same factor in 8 of 11 language samples. Finally, theCriterion Factor was firmly established because all four criterion measures were together in a common factor for 8 of 11 samples.

MULTIPLE REGRESSION ANALYSIS

Horne Assessment of Basic Linguistic Abilities (HABLA)

Two of the four subtests in the HABLA were the "workhorses" in accounting for the predicted variance in the criterion measures. These two subtests were Part 2 - Section 1 and Part 2 - Section 2, which will be called the "best" subtests.

As can be seen in Figures 1 and 2, the two "best" subtests

Insert Figures 1 and 2 About Here

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predicted criterion measures in eleven languages with about as much accuracy as all the subtests together in a multiple regression analysis. The only exception was Korean in which the most effective subtest was HABLA, Part 1.

Al-Haik Foreign Language Auditory Aptitude Test (AFAAT)

One of the three subtests in the AFAAT was the "workhorse" in accounting for the predicted variance in the criterion measures. This subtest was Part 3 which will be called the "best" subtest.

As can be seen in figures 3 and 4, the "best" subtest predicted

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Insert Figures 3 and 4 About Here

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criterion measures in eleven languages with almost the same accuracy as all the subtests together in a multiple regression analysis. The

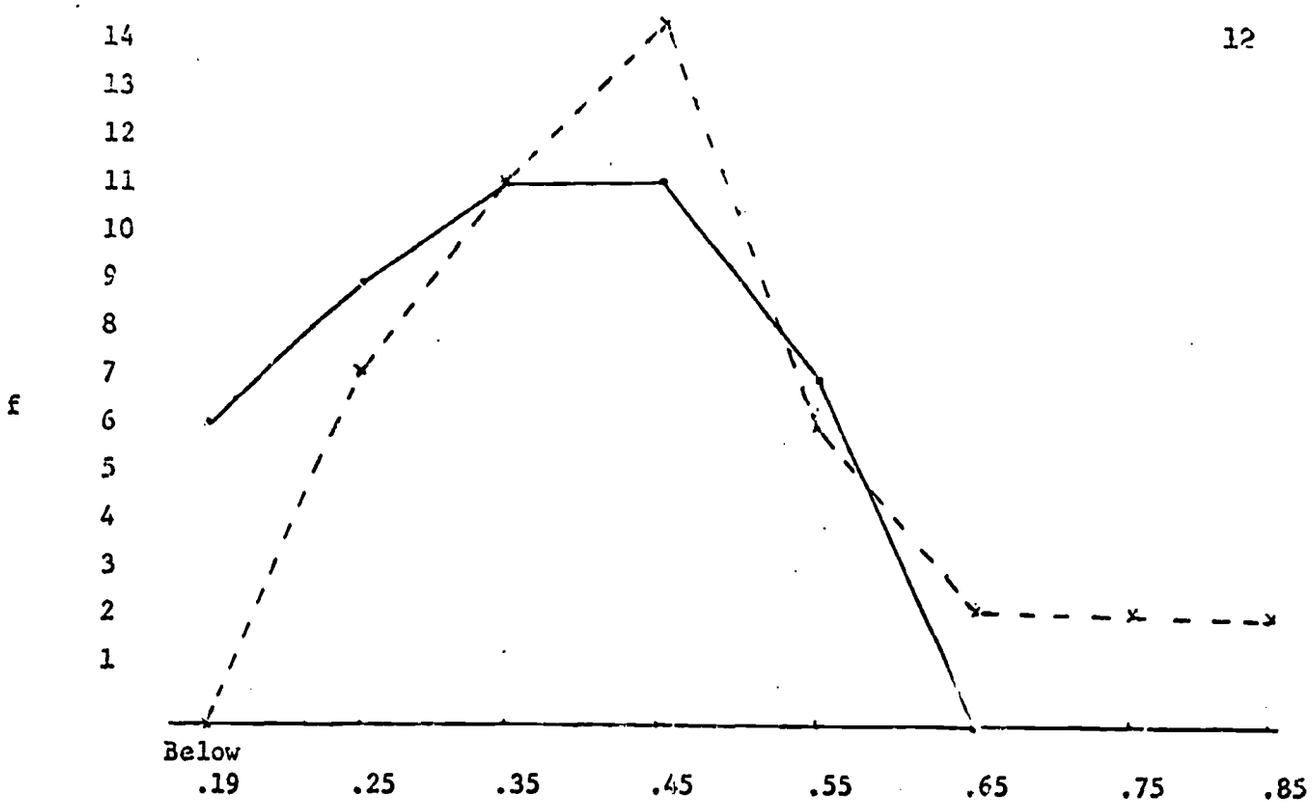

Fig. 1 Validity coefficients after 6 weeks of training in eleven languages.

. _____ HABLA, Part 2, Section 1 and/or Part 2, Section 2

x ----- All subtests of the HABLA

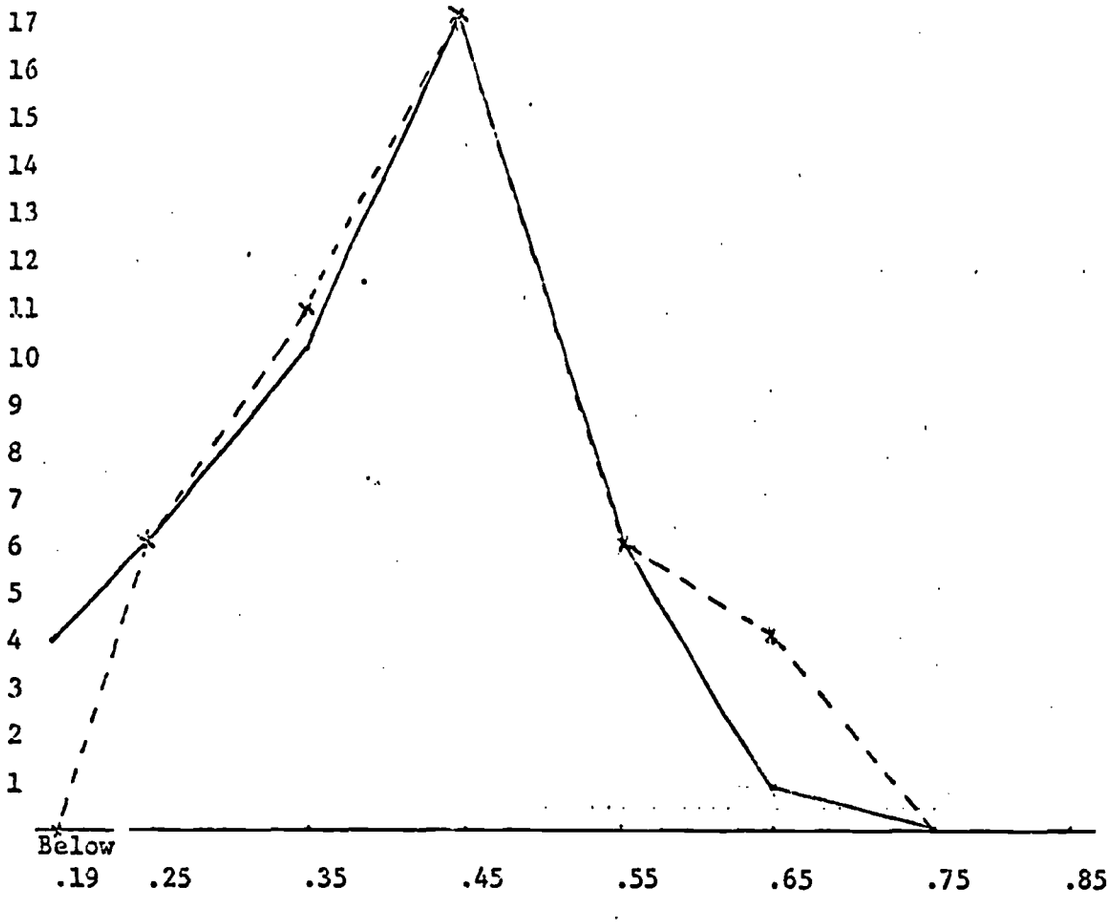

Fig. 2 Validity coefficients after 12 weeks of training in eleven languages

. _____ For HABLA Part 2, Section 1 and/or Part 2, Section 2

x ----- For all subtests of the HABLA

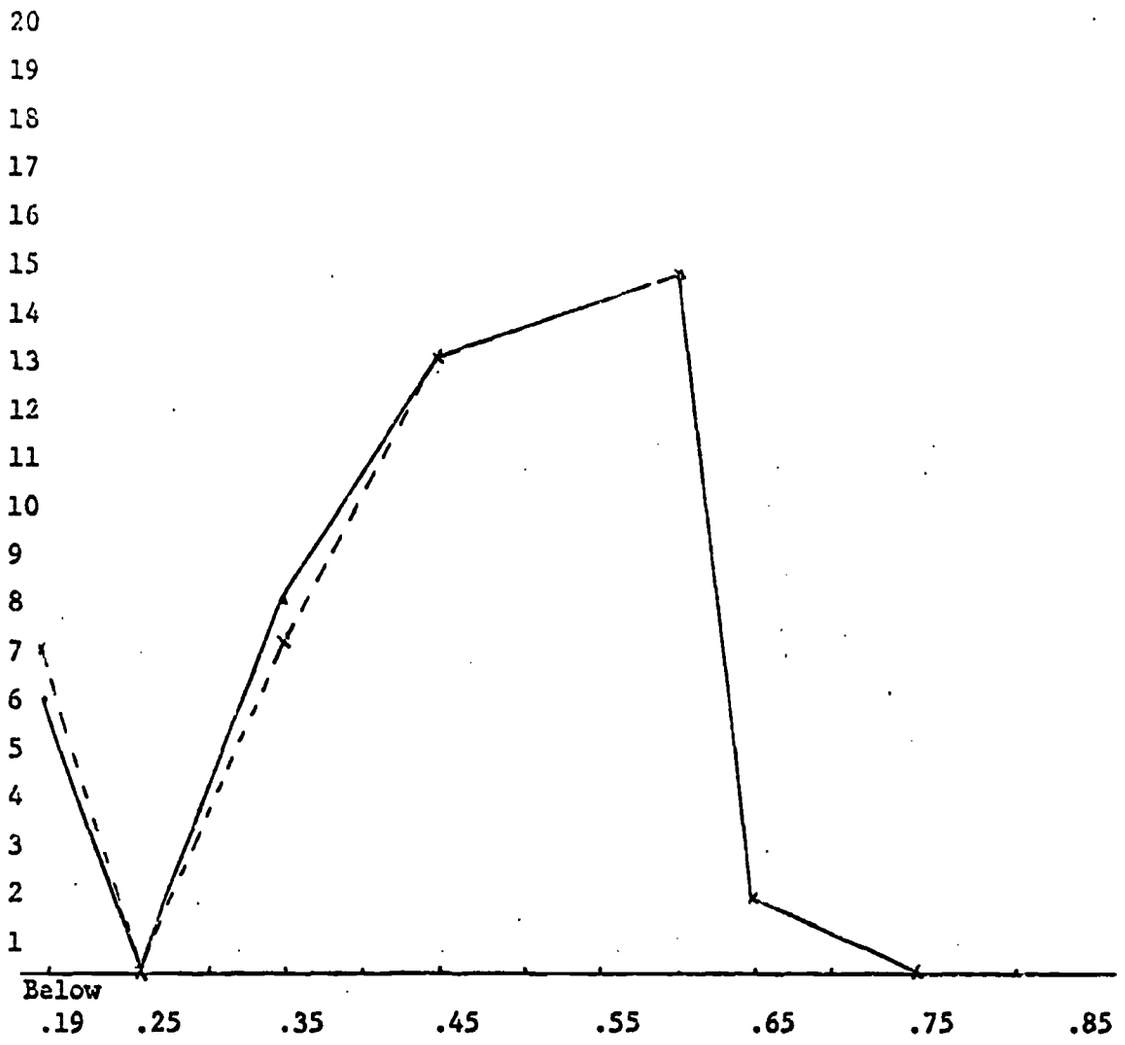

Fig. 3 Validity coefficients after 6 weeks of training in eleven languages.

. ____ AFLAAT Part 3

x ----- All subtests of the AFLAAT

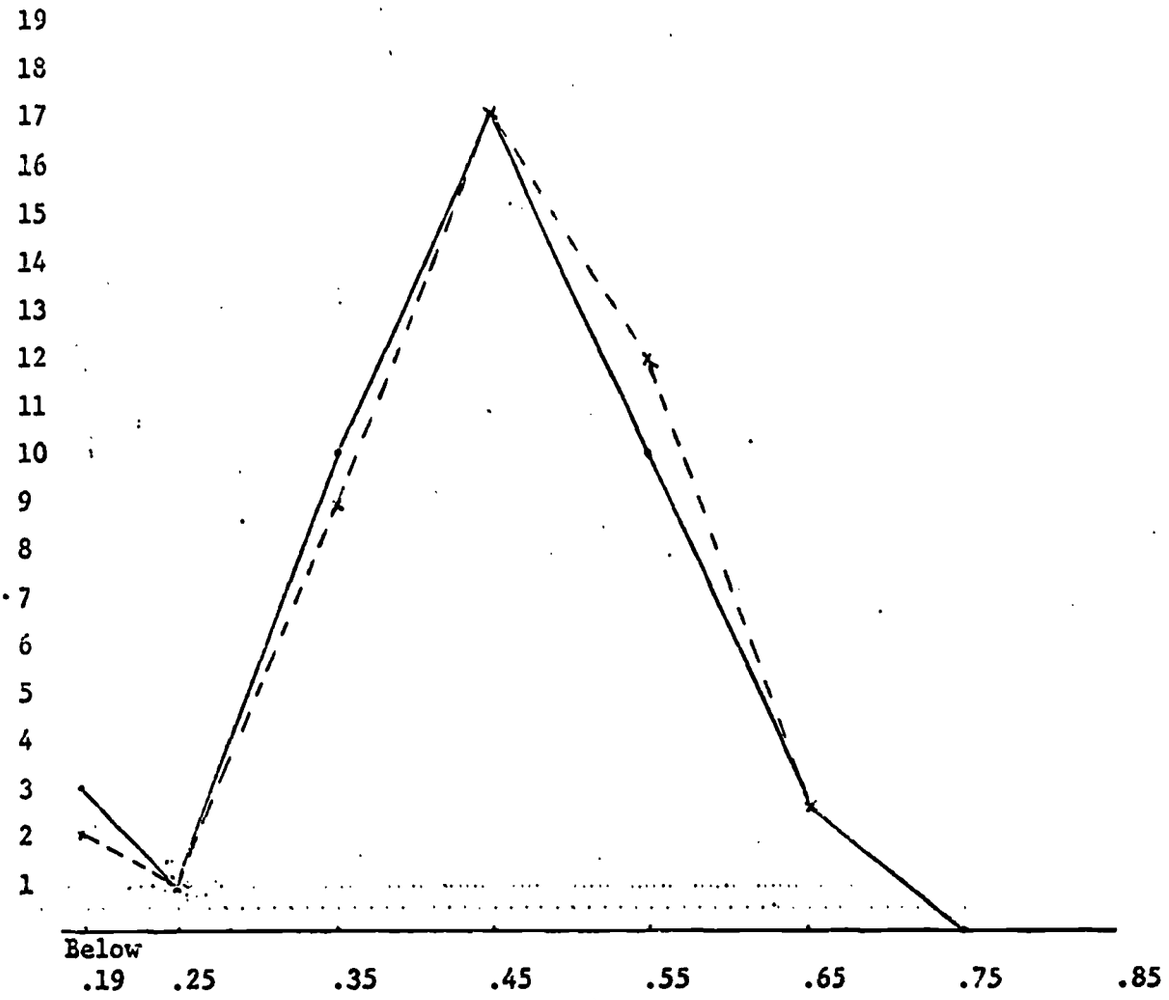

Fig. 4 Validity coefficients after 12 weeks of training in eleven languages

. _____ AFLAAT Part 3

x ----- All subtests of the AFLAAT

only exception was Turkish in which the most effective subtest after six weeks of training was Part 1. However, after 12 weeks of training in Turkish, Part 3 was the best predictor.

The Best Subtests

The "best" subtests from the experimental aptitude tests were inserted into a multiple regression analysis. These were Part 3 from the AFLAAT, HABLA Part 2 - Section 1, and HABLA Part 2 - Section 2.

As seen in Figure 5, most of the validity coefficients (about

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Insert Figure 5 About Here

69%) using multiple correlation were in the range of .40 to .60. Even though we would expect some shrinkage on cross-validation, the "best" subtests from the experimental measures performed at a level comparable with established measures of second language aptitude.

The validity coefficients in Figure 5 were based on these language samples: Arabic N = 121, French N = 70, German N = 89, Korean N = 69, Russian - Basic N = 119, Russian (ACC) N = 39, Spanish N = 95, Turkish N = 46, Vietnamese N = 85, and the total group N = 859.

ITEM ANALYSIS

Horne Assessment of Basic Linguistic Abilities (HABLA)

Each item of the HABLA was analysed with biserial correlation in which each predictor item was bifurcated into a "correct" or "incorrect" response and the criterion was on a continuous scale. Each item was correlated with proficiency measures after six weeks of training. The

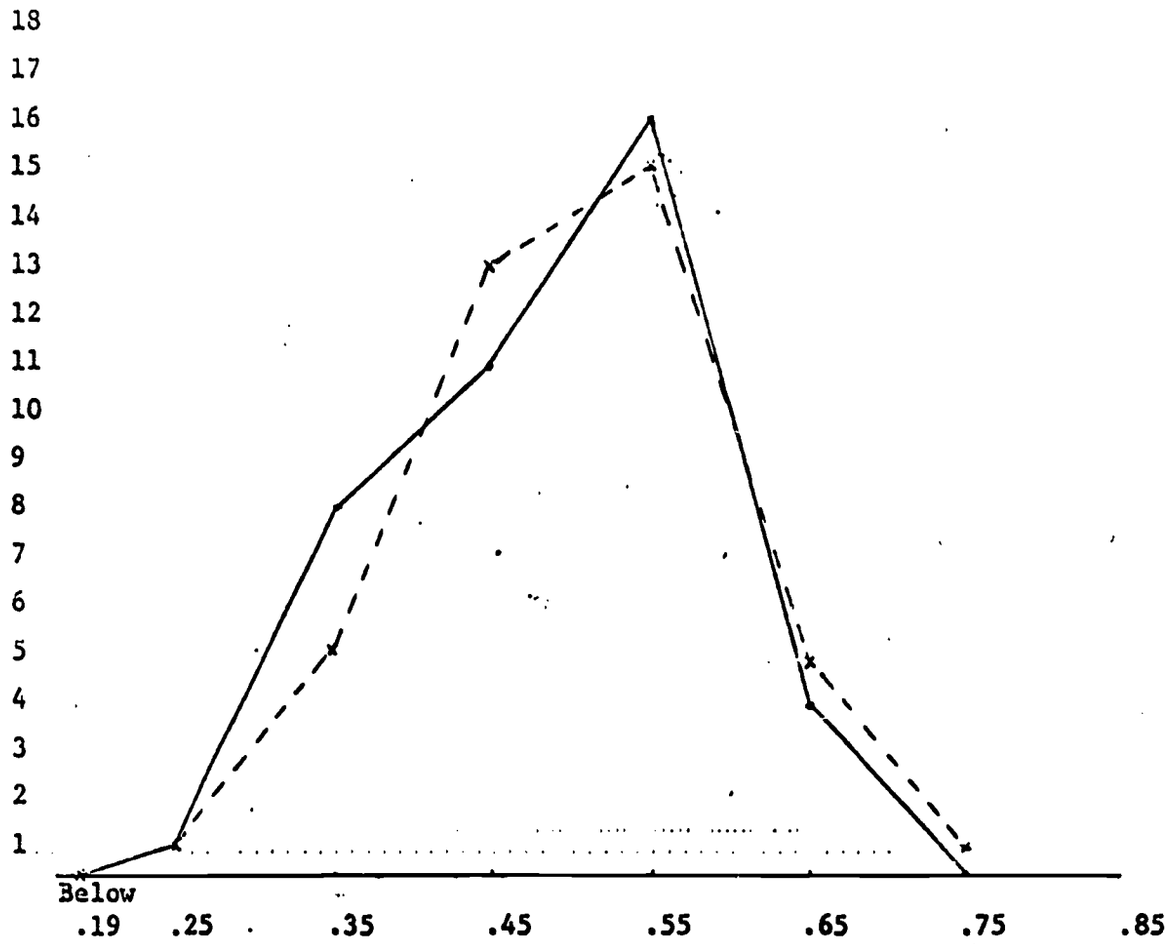

Fig. 5 Validity coefficients for the "best" subtests taken from nine languages and the total group

. ____ After six weeks of training

x ----- After twelve weeks of training

item validities were obtained from these language samples. Arabic N = 32, Spanish N = 52, and Russian - Basic N = 73.

The results as seen in Table 1, show that about half of the

Insert Table 1 About Here

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items in subtests Part 2 - Section 1 and Part 2 - Section 2 had item validities of .20 or higher. In a revision of the HABLA, about 25% of the items in Part 3 would be useful.

Al-Haik Foreign Language Auditory Aptitude Test (AFLAAT)

The results of the item analysis for the AFLAAT may be seen in Table 2. About 60% of the items in Part 3 had validity coefficients

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Insert Table 2 About Here

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of .20 or higher. In Part 2 about 40% of the items would be useful in a revision and in Part 1, the proportion of effective items was about 25%.

RECOMMENDATIONS

First, any attempt to identify unique ability patterns associated with successful mastery of different foreign languages will require random assignment of students to each language program, at least for the duration of the study. Unless there is random placement, a clear-cut test of the unique ability hypothesis will not be possible. Without

Table 1

HABLA Item Analysis: Proportion of items in subtest that had a biserial validity of .20 or higher.

		Arabic (N=32)		
	Part 1	Part 2, Section 1	Part 2, Section 2	Part 3
Criteria				
6 Wk. Oral	.20	.20	.33	.33
6 Wk. Written	.28	.57	.60	.27
6 Wk. Total	.20	.53	57	.27
6 Wk. Overall Grade	.24	.23	.47	.40
		Spanish (N=52)		
6 Wk. Oral	.60	.47	.30	.40
6 Wk. Written	.56	.30	.17	.47
6 Wk. Total	.24	.43	.13	.07
6 Wk. Overall Grade	.52	.47	.20	.40
		Russian, Basic (N=73)		
6 Wk. Oral	.12	.23	.23	.07
6 Wk. Written	.24	.43	.07	.07
6 Wk. Total	.56	.43	.23	.47
6 Wk. Overall Grade	.20	.50	.17	.07

Table 2

AFLAAT Item Analysis: Proportion of Items in Subtest that had a biserial validity of .20 or higher.

Criteria	Part 1	Part 2	Part 3
	Arabic (N=32)		
6 Wk. Oral	.38	.25	.51
6 Wk. Written	.41	.35	.58
6 Wk. Total	.33	.30	.60
6 Wk. Overall Grade	.29	.40	.58
	Spanish (N=52)		
6 Wk. Oral	.41	.55	.71
6 Wk. Written	.36	.35	.63
6 Wk. Total	.23	.40	.47
6 Wk. Overall Grade	.38	.50	.74
	Russian, Basic (N=73)		
6 Wk. Oral	.20	.35	.44
6 Wk. Written	.23	.40	.47
6 Wk. Total	.41	.45	.69
6 Wk. Overall	.23	.40	.46

random placement, it will be difficult to make meaningful comparisons of student ability patterns from language to language.

Secondly, research with the two experimental aptitude measures, the HABLA and the AFLAAT, should be continued. The present study was the first trial for these new predictors. It is rare that any predictor can be developed into a final form in one trial. These two new aptitude measures had predictive validity which was comparable with established aptitude measures for second language learning. For instance, with only 3 in 7 subtests operating, the predictive validity for the three "best" subtests was in the range of .40 to .60.

Even though more than half of the new aptitude tests was non-functional, the remaining portion had extraordinarily high validity. This suggests that the measures should be revised, expanded, and applied again. It will probably require several revisions before the final form can be evolved.

The final recommendation is that this project should be continued to completion. The initial plan was for a three year study. In the first year, the issues have been clarified, procedural difficulties have been resolved, and the project is not "tooled up" for an efficient level of productivity.

SUMMARY

This report summarizes the results from the first year of a proposed three year study into ability patterns for learning second languages in intensive training. The languages sampled were Arabic, Chinese Mandarin, German, French, Korean, Russian, Spanish, Turkish, and Vietnamese.

Before training, the students were administered these predictor measures: The Modern Language Aptitude Test, The Pimsleur Language Aptitude Battery, The Army Language Aptitude Test, The Horne Assessment of Basic Linguistic Abilities, the Al-Haik Foreign Language Auditory Aptitude Test, the Foreign Language Interest Inventory, the

Otis - Lennon Quick - Scoring Mental Ability Test, the Need for Social Approval, and the Taylor Manifest Anxiety Scale. In addition, certain biographical items were used as predictors such as age and education. Some of the students in the sample were also assessed for motivation with the Q by Q Interview.

The criterion measures were instructor ratings for different language skills collected at six week intervals during training.

The results were as follows:

1. The data indicated that students were not assigned randomly to different language programs. The condition of non-random assignment precluded a clear-cut exploration of unique ability patterns associated with student success in different languages.
2. The principal components analysis of the predictors and criterion measures showed remarkable similarity from language to language. The factors identified were (1) Language Analysis, (2) Sound Discrimination, (3) Sound-Symbol Association, (4) Grade Point Average in Academic Areas other than FL, (5) Interest or Motivation, (6) Personality, (7) Biographical Information, and (8) the Criteria. Most of the nineteen subtests from the five aptitude measures clustered into the first three factors.
3. The Multiple Regression Analysis showed that 3 in 7 subtests from the experimental aptitude measures, the HABLA and the AFLAAT, were doing most of the work.

The three "best" subtests when combined together had predictive validity in the range of .40 to .60 for eleven different language

samples. It was strongly recommended that these measures be revised, expanded, and applied again in several cycles before a final form is evolved.

4. Item analysis of the experimental aptitude measures showed that about 25% to 40% of the items in the non-functional subtests would be useful in future revisions.

APPENDIX A

Principal Components Analysis of the Total Group (Except Turkish) N=813

Variables	Factors						
Predictors	1	2	3	4	5	6	7
1. Age (Biographic)				.75			
2. Education (Biographic)				.75			
3. DLAT: Paper & Pencil	.57						
4. MLAT pt. 1 (Number Learn.)	.55				.30		
5. " pt. 2 (Phonetic Script)	.31				.62		
6. " pt. 3 (Spelling Clues)	.30				.47		
7. " pt. 4 (Words in Sent.)	.65						
8. " pt. 5 (P-A)	.48						
9. PLAB pt. 1 Grades	.34			.35			
10. " pt. 2 Interest			.84				
11. " pt. 3 Vocab.	.35			.47			
12. " pt. 4 Lang. Analysis	.68						
13. " pt. 5 Sound Disc.					.67		
14. " pt. 6 Sound-Symbol					.63		
15. Otis-Lennon	.77						
16. HABLA pt. 1					.46		-.38
17. " pt. 2 sec. 1	.72						
18. " pt. 2 sec. 2	.69						
19. " pt. 3							.87
20. AFLAAT pt. 1					.72		
21. " pt. 2					.57		
22. " pt. 3	.56	.37			.41		
23. FLII (Interest)			.80				
24. NSA (Personality)						-.82	
25. TMAS (Personality)						.81	
Criteria							
26. 6 Wk. Oral		.74					
27. " Written		.79					
28. 12 Wk. Oral		.80					
29. " Written		.77					
% of variance accounted for	.26	.07	.06	.05	.05	.04	.04

Note: - [1]Only loadings of .30 or higher are reported.

[2]The Turkish sample was omitted because this group was not given the Otis-Lennon Mental Ability Test.

ARABIC

N= 121

Variables	Factors								
Predictors	1	2	3	4	5	6	7	8	9
1. Age (Biographic)				.85					
2. Education (Biographic)	.30		-.30	.49				.33	
3. DLAT: Paper & Pencil					-.39				.51
4. MLAT pt. 1 (Number Learn.)	.37		.39					.36	
5. " pt. 2 (Phonetic Script)			.72						
6. " pt. 3 (Spelling Clues)			.48	.39	-.36				
7. " pt. 4 (Words in Sent.)	.44							.35	.52
8. " pt. 5 (P-A)	.51			-.35					
9. PLAB pt. 1 Grades								.87	
10. " pt. 2 Interest		.86							
11. " pt. 3 Vocab.					-.77				
12. " pt. 4 Lang. Analysis	.75								
13. " pt. 5 Sound Disc.	.32		.61						
14. " pt. 6 Sound-Symbol			.55				-.30		
15. Otis-Lennon	.70								.30
16. HABLA pt. 1						.83			
17. " pt. 2 sec. 1	.77								.39
18. " pt. 2 sec. 2	.71								
19. " pt. 3					.38	-.69			
20. AFLAAT pt. 1	.34		.63						
21. " pt. 2			.69						
22. " pt. 3	.65		.37						.31
23. FLII (Interest)		.79					-.34		
24. NSA (Personality)				-.35			-.66		
25. TMAS (Personality)							.77		
Criteria									
26. 6 Wk. Oral			.37						.68
27. " Written	.31								.72
28. 12 Wk. Oral									.80
29. " Written									.69
% of variance accounted for	.28	.08	.06	.06	.05	.05	.04	.04	.04

Chinese-Mandarin (Basic)

N = 77

Variables	Factors							
Predictors	1	2	3	4	5	6	7	8
1. Age (Biographic)		-.91						
2. Education (Biographic)		-.79						
3. DLAT: Paper & Pencil	.67				.37			
4. MLAT pt. 1 (Number Learn.)	.58	.34		.33				
5. " pt. 2 (Phonetic Script)		-.31		.73				
6. " pt. 3 (Spelling Clues)				.39	.41			-.56
7. " pt. 4 (Words in Sent.)	.56				.52			
8. " pt. 5 (P-A)	.43	.33			.43			
9. PLAB pt. 1 Grades	.36							-.50
10. " pt. 2 Interest						.80		
11. " pt. 3 Vocab.	.31	-.40		.35	.30		.35	
12. " pt. 4 Lang. Analysis	.69						-.31	
13. " pt. 5 Sound Disc.				.59				.51
14. " pt. 6 Sound-Symbol				.76				
15. Otis-Lennon	.63						.47	
16. HABLA pt. 1						-.44		-.45
17. " pt. 2 sec. 1	.69							
18. " pt. 2 sec. 2	.70							
19. " pt. 3							.77	
20. AFLAAT pt. 1				.61			.36	
21. " pt. 2	.31			.65				
22. " pt. 3	.52			.43	.36		.39	
23. FLII (Interest)			-.32			.76		
24. NSA (Personality)			-.81					
25. TMAS (Personality)			.81					
Criteria								
26. 6 Wk. Oral		-.43		.40	.41			
27. " Written					.80			
28. 12 Wk. Oral					.72			
29. " Written					.78			
% of variance accounted for	.30	.09	.03	.04	.05	.05	.04	.03

Chinese-Mandarin (MAFAC)

N= 49

Variables	Factors						
Predictors	1	2	3	4	5	6	7
1. Age (Biographic)				.75			
2. Education (Biographic)				.75			
3. DLAT: Paper & Pencil	.57						
4. MLAT pt. 1 (Number Learn.)	.55				.30		
5. " pt. 2 (Phonetic Script)	.31				.62		
6. " pt. 3 (Spelling Clues)	.30				.47		
7. " pt. 4 (Words in Sent.)	.65						
8. " pt. 5 (P-A)	.48						
9. PLAB pt. 1 Grades	.34			.35			
10. " pt. 2 Interest			.84				
11. " pt. 3 Vocab.	.35			.47			
12. " pt. 4 Lang. Analysis	.68						
13. " pt. 5 Sound Disc.					.67		
14. " pt. 6 Sound-Symbol					.63		
15. Otis-Lennon	.77						
16. HABLA pt. 1					.46		-.38
17. " pt. 2 sec. 1	.72						
18. " pt. 2 sec. 2	.69						
19. " pt. 3							.87
20. AFLAAT pt. 1					.72		
21. " pt. 2					.57		
22. " pt. 3	.56	.37			.41		
23. FLII (Interest)			.80				
24. NSA (Personality)						-.82	
25. TMAS (Personality)						.81	
Criteria							
26. 6 Wk. Oral		.74					
27. " Written		.79					
28. 12 Wk. Oral		.80					
29. " Written		.77					
% of variance accounted for	.26	.07	.06	.05	.05	.04	.04

French N=70

Variables	Factors								
Predictors	1	2	3	4	5	6	7	8	9
1. Age (Biographic)	-.30								-.69
2. Education (Biographic)		.37							-.63
3. DLAT: Paper & Pencil	.58	.34			.30				
4. MLAT pt. 1 (Number Learn.)							.52		
5. " pt. 2 (Phonetic Script)		.31					.63		
6. " pt. 3 (Spelling Clues)	.45				-.33		.60		
7. " pt. 4 (Words in Sent.)	.48	.46					.30		
8. " pt. 5 (P-A)							.84		
9. PLAB pt. 1 Grades				.30		.65			
10. " pt. 2 Interest				.81					
11. " pt. 3 Vocab.									-.64
12. " pt. 4 Lang. Analysis	.69								
13. " pt. 5 Sound Disc.								.82	
14. " pt. 6 Sound-Symbol					.40		.43	.43	-.31
15. Otis-Lennon	.71								
16. HABLA pt. 1					.78				
17. " pt. 2 sec. 1	.71								
18. " pt. 2 sec. 2	.74								
19. " pt. 3			-.80						
20. AFLAAT pt. 1							.37	.58	
21. " pt. 2						-.83			
22. " pt. 3	.46		-.34				.31	.46	
23. FLII (Interest)				.79					
24. NSA (Personality)			-.48	.32					
25. TMAS (Personality)			.67						.32
Criteria									
26. 6 Wk. Oral		.80							
27. " Written		.83							
28. 12 Wk. Oral		.87							
29. " Written		.81							
% of variance accounted for	.24	.09	.07	.07	.05	.05	.04	.04	.04

German

N=89

Variables	Factors						
Predictors	1	2	3	4	5	6	7
1. Age (Biographic)			-.75				
2. Education (Biographic)			-.74				
3. DLAT: Paper & Pencil	.55						
4. MLAT pt. 1 (Number learn)			.30				.69
5. " pt. 2 (Phonetic Script)	.30			.66			-.36
6. " pt. 3 (Spelling clues)	.41	.34		.58			
7. " pt. 4 (Words in Sent.)	.73						
8. " pt. 5 (P-A)	.36		.48				
9. PLAB pt. 1 Grades	.36				.32		
10. " pt. 2 Interest					.85		
11. " pt. 3 Vocab.	.67		-.48				
12. " pt. 4 Lang. Analysis	.51						.49
13. " pt. 5 Sound Disc.				.71			.35
14. " pt. 6 Sound-Symbol				.58			
15. Otis-Lennon	.73			.31			
16. HABLA pt. 1				.52			
17. " pt. 2 sec. 1	.66						.44
18. " pt. 2 sec. 2	.65		.38				
19. " pt. 3	.44			.45			
20. AFLAAT pt. 1				.85			
21. " pt. 2				.57			
22. " pt. 3	.59			.47			
23. FLII (Interest)					.82		
24. NSA (Personality)						-.83	
25. TMAS (Personality)			.40			.59	
Criteria							
26. 6 Wk. Oral		.89					
27. " Written		.91					
28. 12 Wk. Oral	.38	.75					
29. " Written		.81					
% of variance accounted for	.28	.11	.07	.06	.05	.05	.03

Korean

N = 69

Variables	Factors								
Predictors	1	2	3	4	5	6	7	8	9
1. Age (Biographic)							.86		
2. Education (Biographic)							.68		
3. DLAT: Paper & Pencil	.64								
4. MLAT pt. 1 (Number learn)			.83						
5. " pt. 2 (Phonetic script)		.73							
6. " pt. 3 (Spelling clues)							.30	.44	.30
7. " pt. 4 (Words in sent.)	.80								
8. " pt. 5 (P-A)	.32		.30		-.45				
9. PLAB pt. 1 Grades									.85
10. " pt. 2 Interest				.85					
11. " pt. 3 Vocab.			.39				.42		.42
12. " pt. 4 Lang. Analysis	.64		.31						
13. " pt. 5 Sound Disc.		.52			-.64				
14. " pt. 6 Sound-Symbol		.64			.31				
15. Otis-Lennon	.32		.73					.36	
16. HABLA pt. 1					-.84				
17. " pt. 2 sec. 1	.49								
18. " pt. 2 sec. 2	.34		.56						
19. " pt. 3								.66	
20. AFLAAT pt. 1		.79							
21. " pt. 2								.66	
22. " pt. 3	.76	.39							
23. FLII (Interest)				.85					
24. NSA (Personality)						-.74			
25. TMAS (Personality)						.84			
Criteria									
26. 6 Wk. Oral		.66							.36
27. " Written	.39	.35							.55
28. 12 Wk. Oral		.44					.37		.30
29. " Written	.41	.39					.48		.44
% of variance accounted for	.24	.08	.08	.06	.06	.06	.05	.04	.04

Russian (Basic)

N=119

Variables	Factors								
Predictors	1	2	3	4	5	6	7	8	9
1. Age (Biographic)							.77		
2. Education (Biographic)		.54					.47		
3. DLAT: Paper & Pencil	.42							.31	
4. MLAT pt. 1 (Number Learn)					-.62	.43			
5. " pt. 2 (Phonetic script)	.60								
6. " pt. 3 (Spelling clues)				-.37	-.30				
7. " pt. 4 (Words in sent.)		.30		-.63					
8. " pt. 5 (P-A)					-.80				
9. PLAB pt. 1 Grades								-.83	
10. " pt. 2 Interest					-.33	-.64			
11. " pt. 3 Vocab.				-.40			.57		
12. " pt. 4 Lang. Analysis		.33		-.40					
13. " pt. 5 Sound Disc.	.34								.66
14. " pt. 6 Sound-Symbol	.37								.55
15. Otis-Lennon				-.77					
16. HABLA pt. 1								-.31	.69
17. " pt. 2 sec. 1				-.68					
18. " pt. 2 sec. 2	.39			-.51					
19. " pt. 3	.50			-.46	.30				
20. AFLAAT pt. 1									.77
21. " pt. 2	.49		.35						.43
22. " pt. 3		.44		-.54					.36
23. FLII (Interest)						-.79			
24. NSA (Personality)			-.76	.35					
25. TMAS (Personality)			.79						
Criteria									
26. 6 Wk. oral	.38	.68							
27. " written		.84							
28. 12 Wk. oral		.82							
29. " written		.89							
% of variance accounted for	.24	.08	.07	.06	.05	.05	.04	.04	.03

Russian (ACC)

N =39

Variables	Factors								
Predictors	1	2	3	4	5	6	7	8	9
1. Age (Biographic)			.70						
2. Education (Biographic)			.70				.33		
3. DLAT: Paper & Pencil			.77						
4. MLAT pt. 1 (Number Learn)					-.53	.44			
5. " pt. 2 (Phonetic script)								.77	
6. " pt. 3 (Spelling clues)				.76					
7. " pt. 4 (Words in sent.)						.54	.38		
8. " pt. 5 (P-A)			.41		-.45			.38	
9. PLAB pt. 1 Grades							.56		-.61
10. " pt. 2 Interest						-.75			
11. " pt. 3 Vocab.				.87					
12. " pt. 4 Lang. Analysis				.66					.33
13. " pt. 5 Sound Disc.		.87							
14. " pt. 6 Sound-Symbol		.56		.49				.30	
15. Otis-Lennon			.30	.39				.57	
16. HABLA pt. 1							.75		
17. " pt. 2-sec. 1				.31		-.37		.65	
18. " pt. 2-sec. 2	.35		.70						
19. " pt. 3									.73
20. AFLAAT pt. 1		.70							
21. " pt. 2		.49					.43	.38	
22. " pt. 3	.51							.61	
23. FLII (Interest)			.42		-.44	-.58			
24. NSA (Personality)					-.69				
25. TMAS (Personality)					.84				
Criteria									
26. 6 Wk. oral	.83			.34	-.30				
27. " written	.90								
28. 12 Wk. oral	.90								
29. " written	.94								
% of variance accounted for	.24	.12	.08	.06	.07	.05	.05	.04	.03

Spanish N= 95

Variables	Factors						
Predictors	1	2	3	4	5	6	7
1. Age (Biographic)	.48					-.58	
2. Education (Biographic)					-.70		
3. DLAT: Paper & Pencil	-.70						
4. MLAT pt. 1 (Number Learn.)	-.38			.35		.39	
5. " pt. 2 (Phonetic Script)	-.35	.32		.64			
6. " pt. 3 (Spelling Clues)				.72			
7. " pt. 4 (Words in Sent.)	-.71	.32					
8. " pt. 5 (P-A)	-.47			.37			.49
9. PLAB pt. 1 Grades	-.35				-.49	-.32	
10. " pt. 2 Interest						-.74	
11. " pt. 3 Vocab.		.41		.31	-.64		
12. " pt. 4 Lang. Analysis	-.66	.34					
13. " pt. 5 Sound Disc.				.43	.50		
14. " pt. 6 Sound-Symbol				.63			
15. Otis-Lennon	-.75				-.32		
16. HABLA pt. 1				.41		-.34	-.58
17. " pt. 2 sec. 1	-.71						
18. " pt. 2 sec. 2	-.67						
19. " pt. 3	-.62						
20. AFLAAT pt. 1	-.31			.67		-.31	
21. " pt. 2			-.33	.66			
22. " pt. 3	-.70			.43			
23. FLII (Interest)		.30	-.30			-.75	
24. NSA (Personality)			-.78				
25. TMAS (Personality)			.80				
Criteria							
26. 6 Wk. Oral		.85					
27. " Written		.83					
28. 12 Wk. Oral	-.31	.83					
29. " Written		.84					
% of variance accounted for	.32	.10	.08	.06	.05	.04	.03

Vietnamese N=85

Variables	Factors						
Predictors	1	2	3	4	5	6	7
1. Age (Biographic)	.30		.78				
2. Education (Biographic)			.76				
3. DLAT: Paper & Pencil	.51	.36					.35
4. MLAT pt. 1 (Number Learn.)	.84						
5. " pt. 2 (Phonetic Script)	.67		.34			.31	
6. " pt. 3 (Spelling Clues			.44			.48	
7. " pt. 4 (Words in Sent.)	.54						.55
8. " pt. 5 (P-A)	.64	.30					
9. PLAB pt. 1 Grades	.35		.43				.58
10. " pt. 2 Interest					.85		
11. " pt. 3 Vocab.	.49	.57					
12. " pt. 4 Lang. Analysis	.72						
13. " pt. 5 Sound Disc.	.66						
14. " pt. 6 Sound-Symbol	.65		.41		.30		
15. Otis-Lennon	.80						
16. HABLA pt. 1	.67		.42				
17. " pt. 2 sec. 1	.64						.30
18. " pt. 2 sec. 2	.55	.31					.41
19. " pt. 3	.46				-.34	.41	
20. AFLAAT pt. 1						.78	
21. " pt. 2						.63	
22. " pt. 3	.35	.55				.43	
23. FLII (Interest)					.70		
24. NSA (Personality)				.78			
25. TMAS (Personality)				-.84			
Criteria							
26. 6 Wk. Oral		.70					-.41
27. " Written		.83					
28. 12 Wk. Oral		.67					
29. " Written		.84					
% of variance accounted for	.31	.12	.07	.06	.05	.04	.04

Turkish

(N=46)

Variables	Factors							
Predictors	1	2	3	4	5	6	7	8
1. Age (Biographic)				-.87				
2. Education (Biographic)							-.88	
3. DLAT: Paper & Pencil			.67				-.37	
4. MLAT pt. 1 (Number learn)	.85							
5. " pt. 2 (Phonetic script)	.62		.38					-.35
6. " pt. 3 (Spelling clues)			.48			.63		
7. " pt. 4 (Words in sent.)			.73					
8. " pt. 5 (P-A)	.46	-.48		.37				
9. PLAB pt. 1 Grades			.40					.66
10. " pt. 2 Interest		.88						
11. " pt. 3 Vocab.	.69							
12. " pt. 4 Lang. Analysis		.34	.37	.70				
13. " pt. 5 Sound Disc.								-.77
14. " pt. 6 Sound-Symbol	.72							
15. Otis-Lennon	-	-	-	-	-	-	-	-
16. HABLA pt. 1	.50				.32			
17. " pt. 2 sec. 1			.72		.33			
18. " pt. 2 sec. 2			.69		.33			
19. " pt. 3					.84			
20. AFLAAT pt. 1	.48		.41					-.54
21. " pt. 2			.42	.33		.32	.45	
22. " pt. 3	.31		.65					
23. FLII (Interest)		.80						
24. NSA (Personality)		.48		.54				
25. TMAS (Personality)		.48		.54		.80		
Criteria								
26. 6 Wk. Oral	.32		.70					
27. " Written	.47		.48				.30	
28. 12 Wk. Oral	.30		.80					
29. " Written			.71		-.32			
% of variance accounted for	.30	.11	.08	.06	.06	.05	.04	.04

Note: The Otis - Lennon was not administered to students studying Turkish.

SELECTED REFERENCES

Asher, J. J. and Banathy, B. H. Differential prediction for eight foreign languages, unpublished paper, San Jose State College, 1966.

Asher, J. J. The reliability of a novel format for the selection interview. Psychological Reports, 1970, 26, 451-456.

Asher, J. J. How the applicant's appearance affects the reliability and validity of the interview. Educational and Psychological Measurement, 1970b, 30, 687-695.

Asher, J. J. Q by Q interview as a predictor of success in second language learning. Psychological Reports, 1971, 29, 331-337.

Banathy, B. H. The factor "S: model language predictor, unpublished paper, Defense Language Institute, West Coast, 1962.

Carroll, J. B. and Sapon, S. M. Prediction of success in a work-sample course in Mandarin Chinese. American Psychologist, 1955, 10, 492.

Carroll, J. B. A factor analysis of two foreign language aptitude batteries. The Journal of General Psychology, 1958, 59, 3-19.

Carroll, J. B. The prediction of success in intensive foreign language training. In Training Research and Education, University of Pittsburgh Press, 1962.

Carroll, J. B. Research on teaching foreign languages. In Handbook of Research on Teaching, Rand McNally and Company, 1963.

Carroll, J. B. The prediction of success in intensive foreign language training. Harvard University Graduate School of Education. Laboratory for Research in Instruction, (mimeo).

Dexter, E. S. Pitch discrimination and French accent on the high school level. Journal of Applied Psychology, 1934, 18, 717-720.

Fiks, A. I. and Brown, G. H. Student attitudes and foreign language learning, HumRRO Technical Report 69-2, March 1969.

Guttman, L. Some necessary conditions for common factor analysis. Psychometrika, 1954, 19, 149-162.

Pimsleur, P. A study of foreign language learning ability, Parts I & II. Report of the Twelfth Annual Round Table Meeting on Linguistics and Language Studies. (Ed) Zarechnak, Washington, D.C,Georgetown University Press, 1961, 57-72.

Pimsleur, P., Mosber, G. L., & Morrison, A. L. Student factors in foreign language learning. Modern Language Journal, 1962, 46, No. 4, 160-170.

Pimsleur, Paul Predicting achievement in foreign language learning. International Journal of American Linguistics, April 1962, 29, 129-36.

Pimsleur, Paul Predicting success in high school foreign language courses. Educational and Psychological Measurement, 1963, 23, No. 2, 349-357.

Pimsleur, Paul Testing foreign language learning. In Trends in Language Teaching (Ed. A. Valdman), McGraw-Hill Company, New York, 1966a.

Pimsleur, Paul Manual for form S of thePimsleur Language Aptitude Battery, Harcourt, Brace, and World, Inc., 1966b.

Pimsleur, Paul Aptitude testing. Language Learning Journal, Special Issue No. 3, August 1968, 73-77.

Vicory, A. C. and Asher, J. J. The paired associate task as a predictor of foreign language fluency. The Journal of Psychology, 1966, 64, 29-32.