THE APPLICATION OF PROGRAMMED INSTRUCTION
THE APPLICATION OF PROGRAMMED INSTRUCTION
TO A FRENCH LANGUAGE COURSE

by

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SCOPE AND CONTENTS: The purpose of this paper is to study various problems which arise in applying programming principles to a French language course. While developmental reports of various programmes will be considered, this is essentially an investigation of internal aspects of programmes. Linguistic pedagogical and programming problems will be discussed in relation to specific French programmes.
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INTRODUCTION

In recent years there has been much emphasis on the psychological foundations of foreign language teaching. New insights into the acquisition of foreign language skills have enabled educators to utilize more effectively the findings of structural and descriptive linguists. The linguists' reliance on authentic target language speech as the authority and source of language, and research in the field of psychological learning theories have necessitated revisions in traditional foreign language teaching concepts. One particular educational development based on behavioral science research is programmed instruction, and its application to foreign language teaching problems presents some interesting theoretical and methodological departures from the traditional grammar-translation method or the newer "linguistic method" (sometimes referred to as New Key or Audio-Lingual method).

Programmed instruction has often been associated with the idea of "automation" and many "teaching machines" do utilize programmed materials as a basic core of instruction. There is a tendency among educators to react adversely to new technological devices on the grounds that the educational process is being dehumanized. Joseph S. Roucek begins his book on programmed teaching "A specter is haunting the
United States - the Specter of automation.¹

However, the use of technology for the advancement of teaching and learning is not really new. One of the most important steps in this process occurred five hundred years ago, with the invention of the printing press and the subsequent introduction of the printed book into the classroom. We are so accustomed to using books in the educational process that it is difficult to imagine a school that does not have the benefits of the printed book. Five hundred years from now it may be equally difficult to conceive of schools that do not utilize mechanical and electronic devices for communicating, storing and retrieving information in the interests of achieving a more effective educational programme.

Marshall McLuhan has pointed out that a new technology will gradually create a totally new human environment. In the electric age, data classification will yield to pattern recognition (key phrase at IBM), and to studies of configurations:

The young student today grows up in an electrically configured world. It is a world not of wheels but of integral patterns. The student today lives mythically and in depth. At school, however, he encounters a situation organized by mean of classified information. The subjects are unrelated.

They are visually conceived in terms of a blueprint. The student can find no possible means of involvement for himself, nor can he discover how the educational scene relates to the "mythic" world of electronically processed data and experience that he takes for granted. As one IBM executive put it, "My children have lived several lifetimes compared to their grandparents when they begin grade one".  

In another book McLuhan emphasizes the disparity between the home and school environment:

There is a world of difference between the modern home environment of integrated electric information and the classroom. Today's television child is attuned to up-to-the-minute "adult" news -- inflation, rioting, war, taxes, crime, bathing beauties -- and is bewildered when he enters the nineteenth-century environment that still characterizes the educational establishment where information is scarce but ordered and structured by fragmented, classified patterns, subjects, and schedules. It is naturally an environment much like any factory set-up with its inventories and assembly lines.

The utilization of technological devices is especially important in the field of language instruction.

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Films can introduce the student to the culture of the country and allow him to experience the language in a natural and meaningful situation. Tapes and records facilitate the drill and practice necessary for the acquisition of new language habits, and the teacher is freed for more creative and individualized teaching. In the language laboratory the student is exposed to a variety of native speakers, and can intensify, individualize and internalize his practice of the spoken language. However, it must be emphasized that these devices are teaching tools and only in the hands of skillful teachers using appropriate instructional materials will they produce any appreciable results. It is evident that many language courses are taught with twentieth-century technological devices and nineteenth-century content.

With the passage of the National Defense Education Act in 1958 in the United States there was a dramatic increase in the number of language laboratories in educational institutions. From a few dozen language laboratories in the secondary schools the number grew to almost 10,000 in 1964 and from 250 in the universities and colleges to well over 1,000.4 There are some indications, however, that through misunderstandings of its function and inappropriate

instructional materials, the potential of the language laboratory is not being realized. The introduction of programmed instruction materials may hasten a more genuine incorporation of the language laboratory in the foreign language teaching process.

While recent technological devices are especially useful in the field of foreign language instruction, it should be emphasized that programmed instruction materials are not limited to any particular medium of presentation. A programme is a type of teaching based on a carefully integrated psychological rationale and may be presented in the form of textbook, tapes, records, television, filmstrips, or materials for a language laboratory. What is important in all these devices is the programme itself, for the most complex machinery could be rendered ineffectual with a poorly developed programme. Unfortunately the uncritical and too-ready acceptance of programmed instruction materials has resulted in the marketing of programmes that have not been adequately evaluated.

Programmed instruction materials differ from standard textbooks in several respects. A successful programme will "shape" or modify the students' behavior in a specified area. Sapon distinguishes between a programme and a text:

A teaching program is... an aid to the teacher's goal, but the goals are somewhat different from those involved with the use of a textbook, and aid is
different, not only in magnitude, but in kind. A program purports to do a stated amount of actual teaching, and leaves the student with a demonstrable degree of control of either a skill or a body of knowledge.5

The development of the programme tends to be empirically guided, and in contrast to textbooks, emphasizes the goal of maximum efficiency. Fernand Marty has described the programming of a foreign language course as the following:

the process of organizing the material in such a way that the student acquires the desired linguistic skills (terminal behavior) in a minimum of time. The programmer's goal is maximum efficiency. If we accept this definition of programming, we must conclude that the present textbooks are not programmed since their authors did not make an avowed or consistent effort to maximize efficiency.6

While a prospective purchaser of a programme may be able to evaluate the contents of the programme in terms of whether the proposed terminal objectives of the course are congruent with his own and if the materials are at an

5 S. M. Sapon and John B. Carroll, "Discriminative Perception of Speech Sounds as a Function of Native Language", General Linguistics, III. (Spring, 1958), 104.

appropriate level for the intended age-group, developmental research reports are necessary to determine the scientifically demonstrated effectiveness of a programme. The quality of programmes available in foreign languages varies greatly and it is the responsibility of the purchaser to collect from the publisher or other sources relevant data as to the actual effectiveness of the programme.

Dr. J. B. Carroll, Harvard University, a specialist in the psychology of language, has listed what he regards as the essential characteristics of programmed instruction materials:

(1) Programmed instruction must be based upon an adequately detailed specification of the "terminal behavior" (that is, new skills, knowledge, or response tendencies) which the programmer desires to produce in students taught by the programme.

(2) The material of instruction must be organized and presented in a carefully designed sequence of steps. As a corollary to this requirement, the steps must also be of an appropriate size for the student to master readily: a student may be ready to take a larger step if he has been properly prepared for it, and thus the programme can lead to more efficient learning if sequencing and step-size have been properly attended to in preparing the programme. In practice, it is found that the optimal size of step is considerably smaller than is usually assumed by inexperienced programmers.

(3) The student must have an opportunity to test his mastery of each critical step as he proceeds through the programme. The programme is so constructed that correct responses are promptly confirmed and the student is led to understand and correct wrong responses. When
the material is properly programmed, simply exhibiting the correct answer will usually enable the student to do this.  

Two optional characteristics are that the student may proceed at his own rate (through individualized or self-instruction), and the programme may be incorporated into some type of presentation device.

There is nothing unusual or fundamentally new in these principles. They have much in common with the Socratic Dialogues, where learning was produced by making the students respond actively to questions and by guiding their discovery of the answers. However, this interaction of student and teacher has been severely limited by the demands of mass education. Even using his method, few teachers could rival Socrates, and the conditions under which the Athenian taught could hardly be produced in contemporary schools.

The breaking down of a complex body of knowledge into its smallest components is at least as old as Descartes and is implicit in his Discours de la Méthode:

\[
\begin{align*}
\text{Mais je ne craindrai pas de dire que je pense avoir eu beaucoup d'heur,} \\
\text{de n'être rencontré dès ma jeunesse en certains chemins, qui m'ont conduit à} \\
\text{des considérations et des maximes, dont j'ai formé une méthode, par laquelle il}
\end{align*}
\]

---

me semble que j'ai moyen d'augmenter par degrés ma connaissance, et de l'élever peu à peu au plus haut point, auquel la médiocrité de mon esprit et la courte durée de ma vie lui pourront permettre d'atteindre. ...je crus que j'aurais assez des quatre suivants, (préceptes dont la logique est composée) pourvu que je prisse une ferme et constante résolution de ne manquer pas une seule fois à les observer.

Le premier était de ne recevoir jamais aucune chose pour vraie, que je ne la connusse évidemment être telle; c'est-à-dire, d'éviter soigneusement la précipitation et la prévention;

Le second, de diviser chacune des difficultés que j'examinerais, en autant de parcelles qu'il se pourrait, qu'il serait requis pour les mieux résoudre.

Le troisième, de conduire par ordre mes pensées, en commençant par les objets les plus simples et les plus aisés à connaître, pour monter peu à peu, comme par degrés, jusques à la connaissance des plus composés; et supposant même de l'ordre entre ceux qui ne se précèdent point naturellement les uns les autres.

Et le dernier, de faire partout des dénombrements si entiers, et des revues si générales, que je fusse assuré de ne rien omettre. 8

The central psychological concept of programmed instruction, however, is not just a division of the subject matter into small steps or questions, but a manipulation and control of student behavior. As Waldman comments:

...to equate programmed learning merely with the division of the subject matter into small steps and the immediate confirmation of the learner's response

is to fail to recognize that the central concept of that approach is the definition of the teaching process in terms of control of student behavior through proper reinforcement.

The fundamental psychological theory of programmed instruction is that a description and classification of an individual's behavior is possible, and that by a certain definite procedure (contingency of reinforcement) consistent modifications in that behavior can be developed. Whether this theory is adequate for the complex process of foreign language acquisition will be discussed later in this paper.

While some of the principles of programmed instruction have been used intuitively by good teachers, programmed materials differ from former methods in the scientific rigour with which these principles are applied and tested on a particular subject. Since a requirement of a programme is frequent student response, a source of data is available which can be useful for detailed revision of the programme. The effects of a revised programme can be empirically tested in terms of specified behavioral outcomes. There has been little control, however, in the evaluation of various programmes and their quality varies greatly. The Joint Committee on Programed Instruction has issued the following statement:

Experimentation conducted thus far supports the expectation that good programs, carefully developed, can significantly improve both the quality and the economy of instruction. Whether any particular program will do so is subject to question until established by adequate tests of that program. Unfortunately, programs may be offered for sale that will fall short of the potential value of programmed instruction—for example, because they have not been carefully developed through procedures that include sufficient tryout and revision to assure their effectiveness.  

The construction of a foreign language programme has become an inter-disciplinary endeavor and often involves the co-operation of several experts. These would include the teacher, with experience in the problems encountered in teaching the foreign language to students of the appropriate level, an expert on the construction of programme sequences and programming techniques who is also well-acquainted with the foreign language, a subject matter expert such as a specialist in linguistic science (supplying contrastive, structural and transformational analysis of the language), and an expert in the newer discipline of psycholinguistics, who would have insights in the control of verbal behavior. While programming variables and techniques may be discussed, this study will be primarily concerned with the linguistic and pedagogical aspects of programming a foreign language. The particular difficulties involved in programming a French course will be discussed in relation to the specific

programmes that are examined. Various aspects of the French programmes will be discussed in the areas of phonology, morphology and syntax.

In examining these programmes, it is necessary to make a distinction between external and internal aspects of the programme. "Internal" characteristics refer to features of a programme which can be revealed through inspection of the programme itself. This might include subject matter content, technical construction (branching or linear, frames, prompts, etc.), organization and relative emphasis given to various topics, appropriateness of the programme in relation to the intended age group, and the terminal objective of the programme. "External" characteristics of a programme would include information which cannot be observed merely by inspecting the programme itself, such as the history of the development of the programme and its empirically validated effectiveness as a teaching instrument.

It is not within the scope of this paper to determine empirically the effectiveness of various programmes, but to examine their internal characteristics. These internal features will be viewed mainly in a descriptive sense and are not assumed to be predictive of the effectiveness of the programme. This emphasis on external criteria for assessing programme effectiveness is consistent with the position of the Joint Committee on Programmed Instruction:
External evidence is recommended as the main basis for the evaluation of program effectiveness - in particular, test data obtained from using a program under specified conditions which provide dependable measures of gains produced in student achievement and of the time students require to achieve these gains.\footnote{Joint Committee on Programed Instruction and Teaching Machines, \textit{Audio Visual Instruction}, p. 87.}

The purpose of this thesis will be to investigate, not to advocate. Whether programmed instruction is an efficient and effective method of teaching foreign language skills has yet to be conclusively proven. Controversy is currently concerned with whether the psychological theory of programmed instruction can adequately account for the complex process of foreign language acquisition, and experimental research on language acquisition will have significant pedagogical implications. While there are few proven theories in this field, the questions which arise upon investigation of French programmed materials are provocative and provide stimulus for further research.
CHAPTER I

THE DEVELOPMENT OF PROGRAMMED INSTRUCTION

As early as 1912 the psychologist, Edward L. Thorndike, in his book *Education*, outlined a blueprint for a programmed learning device:

A human being should not be wasted in doing what forty sheets of paper or two phonographs can do. ...If, by a miracle of mechanical ingenuity, a book could be so arranged that only to him who had done what was directed on page one would page two become visible, and so on, much that now requires personal instruction could be managed by print. ...The improvement of printed directions, statements of facts, exercise books and the like is as important as the improvement of the powers of teachers themselves to diagnose the condition of pupils and to guide their activities by personal means. ...Just because personal teaching is precious and can do what books and apparatus cannot, it should be saved for its peculiar work. The best teacher uses books and appliances as well as his own insight, sympathy and magnetism.¹

With the experimental objective of studying the learning process, Thorndike was one of the first to introduce animals into psychological laboratories. His first laboratory experiments were performed with cats, fish, chickens, dogs

and monkeys. However, he was concerned with all types of learning situations, and eventually moved to the study of human learning. An interesting series of experiments challenged the commonly held view that practice and repetition will "fix" or "stamp in" material. He found that simple practice and repetition does not necessarily strengthen behavior, increase efficiency, or eliminate errors, unless the responses are constantly reinforced. Repetition had little effect unless the "law of effect" were operable in the situation. The "law of effect" stated that if an act was followed by some sort of satisfying consequence, the probability of its recurrence in a similar situation increased. These experiments have relevance in language learning today, where practice and repetition are stressed without adequate reinforcement. Reinforcement, any event that increases the probability of responses on which it is made dependent, could be a material satisfaction such as food or candy, or in a school situation approval, praise, or knowledge of the correctness of an answer usually have a reinforcing effect.

In the middle 1920's Dr. Sidney L. Pressey, of Ohio State University, designed the first mechanical teaching

machine, primarily for testing and scoring.\(^3\) This instrument was first exhibited at the Washington, D.C., meeting of the American Psychological Association, December 1924, and an improved version in 1925. The early Pressey experimental device used multiple choice principle with scoring mechanism. Material was presented on a roller with a viewing slot, and a gum-drop reward fell from a slot in the center when the correct series of answers was made. Dr. Pressey's device was primarily used for testing, but he later discovered that the device also had definite instructional possibilities.

However, Dr. Pressey was too far ahead of his time and there was little enthusiasm or response to his experiments. It was not until thirty years later that these devices and programmed materials began to excite public interest. In 1954 Dr. B. F. Skinner, a Harvard psychologist, published a report on scientific investigations on the learning process.\(^4\) He described techniques used in the laboratory to produce modifications in the behavior of experimental subjects, and the principles involved in such modifications. He also discussed the direct application of these principles to classroom learning and teaching.

\(^3\) Sidney L. Pressey, "A Simple Apparatus Which Gives Test and Scores -- And Teaches", *School and Society*, XXIII, No. 586 (March 20, 1926), 373-376.

Dr. Skinner is a behaviorist in the tradition of John Watson and Ivan P. Pavlov. Behavior is explained as "a series of physiological responses to environmental stimuli". While Skinner studied overt, or observable behavior, he believed that the principles underlying this type of behavior were also applicable to forms of covert behavior such as "thinking", "understanding" or "imagining".

Skinner distinguished between two types of overt behavior: respondents and operants. Respondents are largely involuntary reflexes which are elicited by specific stimuli. These responses, which are subject to the laws of classical conditioning, were studied extensively by the Russian physiologist, Pavlov. In a classical experiment Pavlov conditioned a dog to salivate at the sound of a bell by ringing it every time the dog was about to be fed.

The second type of response, which is more important to Skinner, an operant response, actively operates on the environment which in turn affects the individual or animal. In respondent behavior, a known stimulus elicits a response, but in operant behavior, a spontaneous response is emitted for which the stimulus is either unknown or not under the control of the experimenter. If this response is rewarded or "reinforced" there is greater likelihood of its recurring. There is, then, in operant conditioning, a dependent relationship between the reinforcement and the response of the
organism. The relation which prevails between behavior on the one hand, and the consequences of that behavior on the other is known as the "contingencies of reinforcement". An example is an animal in a cage who accidentally presses a lever which releases food. The animal soon learns to press the lever whenever he is hungry. The "reinforcing stimulus" i.e. the appearance of food, is dependent on the action of the animal, the "conditioned response".

Skinner describes some of the techniques used in conditioning pigeons in the laboratory:

Recent improvements in the conditions which control behavior in the field of learning are of two principal sorts. The Law of Effect has been taken seriously; we have made sure that effects do occur and that they occur under conditions which are optimal for producing the changes called learning. Once we have arranged the particular type of consequence called a reinforcement, our techniques permit us to shape up the behavior of an organism at will. It has become a routine exercise to demonstrate this in classes in elementary psychology by conditioning such an organism as a pigeon. Simply by presenting food to a hungry pigeon at the right time, it is possible to shape up three or four well-defined responses in a single demonstration period -- such responses as turning around, pacing the floor in the pattern of a figure - 8, standing still in a corner of the demonstration apparatus, stretching the neck, or stamping the foot. Extremely complex performances may be reached through successive stages in the shaping process, the contingencies of behavior. The results are often quite dramatic. In such a demonstration one can see learning take
place. A significant change in behavior is often obvious as the result of a single reinforcement.⁵

By the slow but sure accumulation of successive and related motions a relatively complex performance was achieved. Pigeons were taught to discriminate among playing cards, peck out tunes on a toy piano, and play a kind of table tennis. This process of rewarding responses that approximate the desired response and proceeding by successive approximations to the desired terminal behavior is known as "shaping" behavior. Skinner's most significant psychological work has been the investigation of schedules of reinforcement. He has experimented with different rates and intervals of reinforcement and found that if you reinforce intermittently the behavior is more stable and maintained for much longer periods once reinforcement stops than is the case in continuous reinforcement.

He makes the following comment:

A second important advance in technique permits us to maintain behavior in given states of strength for long periods of time. Reinforcements continue to be important, of course, long after an organism has learned how to do something, long after it has acquired behavior. They are necessary to maintain the behavior in strength. Of special interest is the effect of various schedules of intermittent reinforcement. Charles B. Ferster and the author are currently preparing an extensive report of a five-year research program, sponsored by the Office of Naval Research, in which most of the important types of schedules have been investigated and in which the effects of schedules in general have been reduced to a few principles. On the theoretical side we now have a fairly

⁵Skinner, Programmed Learning, p. 19.
good idea of why a given schedule produces its appropriate performance. On the practical side we have learned how to maintain any given level of activity for daily periods limited only by the physical exhaustion of the organism and from day to day without substantial change throughout its life. Many of these effects would be traditionally assigned to the field of motivation, although the principal operation is simply the arrangement of contingencies of reinforcement.⁶

Although the principles of "operant conditioning" were derived from laboratory observations of animals, Skinner felt that they were also applicable to human verbal behavior. It was not until he turned from training rats and pigeons to teaching children that the teaching profession and the public became seriously interested. Skinner's theoretical position led him to the following teaching procedure:

1. Complex learning is broken down into very small steps, each step building on the preceding one. For example, in presenting the structures of a foreign language, a monostructural approach would be used. Structures would be presented only one at a time and each structure must be fully mastered before the next one is introduced. The monostructural approach could be contrasted with the polystructural approach of the Glastonbury materials, now called A-LM, or the "New Key" materials, where many completely different structures are presented together in the same unit.

⁶Skinner, Programmed Learning, p. 19.
2. The student is led by questions that are equally constructed and arranged so he will make correct responses to increasingly complex questions.

3. In order to insure the students' active participation in the learning cycle and to have the student recall rather than just recognize the correct response, Skinner prefers the "constructed response" to the multiple-choice method. He makes the following comment:

The student must compose his response rather than select if from a set of alternatives, as in a multiple-choice self-rater. One reason for this is that we want him to recall rather than recognize - to make a response as well as see that it is right. Another reason is that effective multiple-choice material must contain plausible wrong responses, which are out of place in the delicate process of "shaping" behavior because they strengthen unwanted forms. Although it is much easier to build a machine to score multiple-choice answers than to evaluate a composed response, the technical advantage is outweighed by these and other considerations.7

4. In an effective programme, there must be immediate reinforcement of student response, in this case consisting of the knowledge of the answer. Ideally, the student should know whether he is right or wrong within seconds. The usual quiz paper or exercises, even when corrected the next day, are far too slow. Since people learn at different rates of speed, only a tutor can give immediate satisfaction. In a normal classroom, the most skilled teacher cannot do it

consistently, for forty or even for four students. While it would be impossible to supply the millions of school-age children with tutors, programmed instruction materials attempt to approximate the tutorial process in the sense of providing immediate reinforcement and forcing the student to actively participate in the learning process. Skinner comments on this aspect of programmes:

This may suggest mass production, but the effect upon each student is surprisingly like that of a private tutor. The comparison holds in several respects: (a) There is a constant interchange between programme and student. Unlike lectures, textbooks, and usual audio-visual aids, the machine induces sustained activity. The student is always alert and busy. (b) Like a good tutor the machine insists that a given point be thoroughly understood, either frame by frame or set by set, before the student moves on. . . (c) Like a good tutor the machine presents just that material for which the student is ready. It asks him to take only that step which he is at the moment best equipped and most likely to take. (d) Like a skillful tutor the machine helps the student to come up with the right answer. . . (e) Lastly, of course, the machine, like the private tutor, reinforces the student for every correct response, using this immediate feedback not only to shape his behavior most efficiently but to maintain it in strength in a manner which the layman would describe as "holding the student's interest."

Skinner's learning theory is essentially performance-oriented and to the criticisms that it is "mechanistic" or "positivistic" he answers:

Contrary to frequent assertions, a behavioristic formulation of human behavior is not a crude positivism which rejects mental processes because they are not accessible to the scientific public. It does not emphasize the rote learning of verbal responses. It does not neglect the complex systems of verbal behavior which are said to show that a student has had an idea, or developed a concept, or entertained a proposition. It does not ignore the behavior involved in the intellectual and ethical problem solving called "thinking". It does not overlook the value judgements said to be invoked when one thing is taught rather than another or when the time and effort given to education is defended. It is merely an effective formulation of those activities of teacher and student which have always been the concern of educational specialists.

Not all behavioristic theories of learning are relevant, however. A distinction is commonly drawn between learning and performance. Learning is said to be a change in some special part of the organism, possibly the nervous system, of which behavior is merely the external and often erratic sign. Performance is the observed, and usually much less orderly, effect of learning on behavior. With modern techniques, however, behavior can be much more successfully studied and manipulated than any inner system, even when inferences about the latter are drawn from the behavior with the help of sophisticated statistics. An analysis of learning which concentrates on the behavior applies most directly to a technology, for the task of the teacher is to bring about changes in the student's behavior. His methods are equally conspicuous: he makes changes in the environment. A teaching method is simply a way
of arranging an environment which expedites learning.⁹

As a consequence of the first Soviet success with space flight in 1958, the American public became aware of the need for better, more efficient instruction. With the passage of the National Defense Education Act (1958), funds became available for educational research and for more complex educational apparatus. Sufficient interest was aroused to stimulate the development of machines and programmes and to experiment with traditional ideas of education. Within the last decade many variables involved in a programmed learning situation have been investigated and data is available for the programmer and for those interested in the general learning process.

There are two main schools of thought in programming. The first, most popular, is that of Dr. Skinner at Harvard. Dr. Skinner's programmes are constructed by atomizing a discipline into its smallest units to form incremental learning steps. The questions contain single-sentence statements with an integral word or words left out which the student must supply. One of the important features of this type of programme is the "constructed response". Skinner believes that the student is forced to think more

and learn more rapidly, when he has to write in the responses rather than choose from a series of alternative answers. In other words, the programme does not test but rather teaches by requiring a positive effort. Also, effective multiple-choice material would contain plausible wrong responses, which Skinner feels are out of place in the delicate process of "shaping" behavior as they could strengthen unwanted forms.

The Skinner type programme is generally referred to as the "linear style" because each student goes through the entire programme in the same sequence as every other student. Student behavior is molded or "shaped" with the aid of "prompts" (some sort of visual, verbal or symbolic cue which facilitates the desired response from the subject) until it meets the specified goals of performance. The prompts are gradually eliminated in a process called "fading" or "vanishing". Active responding is required of the student after very small amounts of information have been given and reinforcement, or knowledge of results is immediate. One of the assumptions of this type of programme is that students do not learn through making mistakes. Through experimentation Skinner arrived at the conclusion that the student learns most efficiently by being correct, and a well-constructed "linear programme" would decrease the probability of student errors.

The second school of thought in programming is
represented by Norman Crowder, and Dr. Sidney L. Pressey. This group believes that a programme need not be completely broken down, but should be presented in larger logical units of a paragraph or more, each of which would explain some principle in its entirety. By this more classical method of teaching, a rule could be stated followed by a series of examples of this rule. The student would be tested by a series of questions on the preceding materials.

In a Crowder programme, the response takes the form of multiple-choice answers. Crowder also uses a technique known as "branching". For the student who does not at first understand a particular point, there is the backward branching technique. The student who selects a series of incorrect answers will be referred by the programme to a remedial sequence of steps which will give him fresh approaches to the explanations of the material he is trying to understand. The brighter student is allowed to skip over additional steps covering material that he has already mastered. Crowder's plan is as follows:

... the student is given the material to be learned in small logical units and tested on each unit immediately. The test result is used to automatically conduct the material that the student sees next. If the student passes the test question, he is automatically given the next unit of information and the next question. If he fails the test question, the preceding unit of information is reviewed, the nature of the error is explained to him, and he is retested. The test questions are multiple choice questions and there is a
separate set of correctional materials for each wrong insert that is included in the multiple choice alternative. The technique, ...is called "intrinsic programming".10

Crowder feels that linear and intrinsic programming are basically different in approach:

In linear programming, the student's response is considered an integral part of the learning process; the response is induced in order that it may be rewarded and learning thus occur. ... In intrinsic programming the questions serve primarily a diagnostic purpose, and the basis of the technique is the fact that the diagnosis so made can be promptly utilized to furnish specific remedial material to the student.11

Most foreign language programmes use the linear approach to programming, though some language programmes do make some sort of provision for a student who does not understand a particular series of steps. The only way to distinguish between these alternative positions is to consider relevant experimental data; unfortunately there is none.

Skinner's principles on learning theory were mainly derived from laboratory studies of animal behavior. However, he asserts that these principles are applicable also to human


verbal learnings:

The basic processes and relations which give verbal behavior its special characteristics are now fairly well understood. Much of the experimental work responsible for this advance has been aired out on other species, but the results have proved to be surprisingly free of species restrictions. Recent work has shown that the methods can be extended to human behavior without serious modifications. 12

Serious criticism of this assumption has come from psychologists who feel that Skinner has extrapolated too liberally from behavioral experiments performed with rats and pigeons to the uniquely human behavior of language. In particular, a group of Soviet psychologists completely disagree with Skinner's view that verbal behavior does not differ in any significant way from other behavior.

O. K. Tikhomirov, of the Department of Psychology at the University of Moscow, points out that Pavlov, himself, did not believe that the results of his classical conditioning experiments with dogs could be applied to the speech functions of man:

The impression may arise that Skinner's approach to the analysis of human behavior from the point of view of so called "conditioning" is analogical to I. P. Pavlov's doctrine of conditional reflexes. However, this is not the case. Pavlov, in passing to the investigation

of the higher neutral activity of man, repeatedly stressed its qualitative particularity in comparison with the higher neutral activity of animals. A concrete manifestation of his qualitative distinction was Pavlov's doctrine of the interrelation of signal systems. In all the diversity of stimuli acting on man, Pavlov distinguished two systems of signals. The first system includes all conditioned stimuli (the objects of the surrounding world and their features) which directly act on man. This is the first signal system of reality, which man shares with animals. Words, word groups, and connections arising on the basis of them constitute the second signal system, which only man possesses. Pavlov called this second signal system "an extra-ordinary addition" to the mechanisms of higher neural activity, and said that "it was the word which has made men of us".13

For these Soviet psychologists, language behavior not only differs from other forms of behavior, but the acquisition of speech has a directive effect on other behavior and qualitatively transforms it. Citing the work of A. R. Luria, Tikhomirov concludes:

As this research has shown, speech restructures the cognitive processes of man, enabling him to get a profound orientation in surrounding reality, to distinguish essential features and relations, and to systematize his accumulated experience. ... speech activity does not follow the basic regularities of conditioning, as Skinner asserts, but quite the contrary; the intervention of speech transforms these

regularities and makes them qualitatively different.\textsuperscript{14}

Harlan Lane, a psychologist involved with problems of second language learning, feels that the techniques of operant conditioning are especially valid and suitable in second-language learning:

\ldots The techniques of the laboratory analysis and control of behavior, upon which programing is based, are more literally applicable to the conditioning of second-language behavior than to most of the other repertoires that programing has confronted. The objectives of most programs are restricted to changing the written, verbal behavior of a student in response to textual stimuli. The prerequisite motor responses and discriminations among orthographic stimuli already have been conditioned and are taken for granted. The behaviors involved in reading and understanding English and in writing at least a "reasonable" answer are also assumed. As Gilbert has put it: "Our student is not a master of the subject because he cannot make the mastery responses on the right occasions, not because he is unable to make those responses at all. \ldots The responses of mastery are there. \ldots " This type of verbal conditioning, involving a restructuring of the student's highly articulate first-language repertoires, has a limited resemblance to laboratory research on the control of behavior. Transitional behavior affected by shifting contingencies of reinforcement, patterns of discriminative stimuli, or both, is little studied and poorly understood in comparison with the shaping, maintenance, and extinction of behavior in initially naive organisms.

The programing task of restructuring an extant verbal repertoire may be contrasted to that of conditioning second-language fluency.

\textsuperscript{14} Tikhomirov, \textit{Word}, p. 366.
In the latter case, there is nothing extrapolative in the application of laboratory techniques and nothing metaphorical in the use of concepts gained from a functional analysis of behavior in the laboratory. New discriminations (auditory, textual) must be conditioned, new forms of response (vocal, written) must be differentiated, concurrent responses of differing topography each must be brought under the control of appropriate discriminative stimuli, novel chains of topographically novel responses must be established, and so forth.

These behaviors must be conditioned largely "de novo", although it is never possible, as this chapter will point out, to overlook sources of interference and enhancement from the first-language repertoires.\(^15\)

Other objections to Skinner's work on verbal behavior have come from generative-transformational grammarians like Noam Chomsky, who feel that Skinner's characterization of language fails to give sufficient emphasis to the contribution of the internal processes of the speaker:

One would naturally expect that prediction of the behavior of a complex organism (or machine) would require, in addition to information about external stimulation, knowledge of the internal structure of the organism, the ways in which it processes input information and organizes its own behavior. These characteristics of the organism are in general a complicated product of inborn structure, the genetically determined course of maturation, and past experience.

Insofar as independent neurophysiological evidence is not available, it is obvious that inferences concerning the structure of the organism are based on observation of behavior and outside events. Nevertheless, one's estimate of the relative importance of external factors and internal structure in the determination of behavior will have an important effect on the direction of research on linguistic (or any other) behavior, and on the kinds of analogies from animal behavior studies that will be considered relevant or suggestive.16

Chomsky has suggested that the ability to generate novel utterances may indicate that there are internal processes at work which are independent of environmental feedback and conditioning. He comments that, "The fact that all normal children acquire essentially comparable grammars of great complexity with remarkable rapidity suggests that human beings are somehow specially designed to do this, with data-handling or 'hypothesis-formulating' ability of unknown character and complexity". The child appears to be functioning as an implicit inductive scientist; collecting data (linguistic utterances), classifying this data into different categories and constructing rules to account for underlying regularities. These rules are then used to produce novel utterances. The child seems to be endowed with an innate mechanism for language analysis and Chomsky feels

that research should be directed towards discovering how this mechanism works.

One must always face the truism that an engineering technique of the sort that Skinner has proposed may work very well even though the theoretical justification that he has proposed for this technique is completely wrong. The ultimate justification for any practical method of this sort is whether it works or not. It would be, of course, anti-intellectual to be satisfied with a method for controlling behavior without attempting to understand how it works. Therefore, it is necessary to consider the theoretical basis of these programmed instruction techniques. However, it seems wiser to wait until more data on their efficacy and how they work is available before plunging into the treacherous waters of theory.

Another question of importance is whether current research on young children is relevant to adult second language learning since the ability to acquire a language seems to atrophy with adolescence and adulthood. Nelson Brooks has made a necessary distinction between the behaviors involved in a child learning his native language and an adult learning a foreign language.
Language learners divide themselves into two main classes, those who as infants are learning the mother tongue, or learning another as a second language or, in some cases, an additional one. There are many important comparisons and distinctions to be made between these two groups of learners.

In the case of the infant, there is a fascinating contrast between his inborn potential for the use of parole and the community's highly systematized practice of langue. Of course, the latter always wins and imposes its will upon the loser almost completely. This outcome has long obscured the arresting significance of what the infant brings to this struggle. For within the newborn baby there is a vital force that finds delight in incessant verbal play, with the result that within a matter of months he "breaks the code" of the language being used about him, and within a few years he has completely mastered it in its spoken form.

The individual who already possesses a mother tongue brings to the learning of a second language a very different set of physical and mental capacities. Partial, if not complete, command of one linguistic code has already been attained, and it can be both a help and a hindrance in learning the second. The conditions for learning, almost identical for all learners of the mother tongue, differ widely for the second-language learner. The greatest single difference is whether or not he finds himself in the "cultural field" of the language in question, by being either geographically within its borders or in direct contact with it in an authentic "cultural island" transplanted to a distant place. Another difference of great importance is the age of the learner, for this largely determines the extent to which he still retains the faculties that made it possible for him to learn his mother tongue.17

Programmed instruction material in foreign languages may prove to be more valuable in the area of research than as a pedagogical device. The emphasis placed on revision and validation of programmes based on direct observation of student behavior can provide empirical data as to how second languages are acquired by adults and adolescents. A programmer of a language is essentially interested in the presentation and organization of materials in a manner which will most effectively and efficiently facilitate learning, and his experimental investigations may provide insights into the process of adult second language acquisition.
CHAPTER II

TRENDS IN FOREIGN LANGUAGE TRAINING AND LINGUISTICS

While the application of programmed instruction to foreign language training presents some interesting conceptual and methodological problems, it is necessary to stress that this study was undertaken with an awareness that research in foreign language learning is in its initial stages. Programmed instruction may prove to facilitate certain aspects of foreign language instruction; however, there is as yet no proven theory which completely or adequately explains language behavior or the acquisition of foreign language competence. J. B. Carroll comments:

... We are at such a really rudimentary stage in the development of theory in the behavioral sciences that there is enormous scope for theoretical developments. This is true not only for learning theory in general but also for the theory of foreign language learning. That is, we do not yet have either a good general theory concerning the conditions under which learning takes place or a general theory of language behavior that would enable us to select optimal components of a foreign language teaching system for any given case. This is not to say that we know nothing about learning — I would hold that we know a good deal about it on a descriptive, functional level, for we can state quite a number of generalizations and principles that, if followed, will help the teacher or learner improve the course of learning. My point is that no proved theory now exists to account for all the phenomena we can observe or even the phenomena that we can predict.
and control. We are in the stage in the history of our science that chemistry was in before molecular theory was well developed. The lack of a proved theory becomes particularly acute when we try to understand the process of learning a second language.  

Since a foreign language programme will necessarily reflect much of the programmer's conception of language and the process of language acquisition, it is useful to review the approaches to language which have been prevalent within the last two decades. An examination of current grammars in North America and teaching practices of foreign language teachers would seem to indicate that there are two major approaches to foreign language learning - the "traditional" eclectic approach (or the more recent cognitive-code learning theory) and the audio-lingual habit theory (sometimes referred to as "New Key" or Linguistic Method).

During the nineteenth century the predominant mode of foreign language instruction in American education was the grammar-translation method, with an almost exclusive emphasis on reading and writing skills. Modern foreign languages were taught as classical languages had been, with the memorization

of grammar rules and paradigms and the main emphasis on translation. There was some revolt against this method even in the early 1900's (for example, the "direct method" and the "phonetic method" of Paul Passy). However, after the First World War there was a decline in language study in America, probably due to the isolationist mood of the 1920's and '30's. The amount of school time spent on foreign language instruction was sharply curtailed by unsympathetic administrators, and a cursory reading ability became the objective of foreign language courses. It was not until the United States entrance into World War Two that a renewed interest was taken in foreign languages. The Intensive Language Programme of the 1940's was an attempt to apply the findings of linguistic science to foreign language teaching and the principles of this programme were used by the Army Specialized Training Programme of 1943-44 to produce the audio-lingual fluency required of language trainees.

The current cognitive-code learning theory or the "traditional" approach have certain similarities to the grammar-translation method. The structure of the foreign language, the phonological, lexical and grammatical patterns are studied and analyzed as a body of knowledge. The emphasis is placed on a conscious control and understanding of the structures of the foreign language rather than on the student's facility in using those structures. According to this theory,
if the student has a thorough conscious control of the language's structure, he will automatically develop facility when the language is used in a meaningful situation.

Most of the precepts and theories of the audio-lingual habit method were formulated by the linguist, Leonard Bloomfield, while working with the Intensive Language Programme of the 40's. In an early work of Bloomfield, *The Study of Language* (1914) he criticizes the "traditional" approach to foreign language learning and though reflecting the attitudes of that time (regarding the exclusive concern of the 20's and 30's with reading objectives), he predicts the change of emphasis to audio-lingual skills which is realized in the 40's, 50's and 60's. He makes the following observations:

Our fundamental mistake has been to regard language-teaching as the imparting of a set of facts. The facts of a language, however, are, as we have seen, exceedingly complex. To explain to the student the morphology and syntax of a language, be it his own or a foreign one, would require a long time, and, - even if it were done correctly by linguistically trained teachers, - would be of little or no value. . . . Language is not a process of logical reference to a conscious set of rules; the process of understanding, speaking and writing is everywhere an associative one. Real language-teaching consists, therefore, of building up in the pupil those associative habits which constitute the language to be learned. Instead of this we try to expound to students the structure and vocabulary of the foreign language and, on the basis of this, let them translate foreign texts into English. Such translation is a performance of which only
people equipped with a complete knowledge of both languages and with considerable literary ability are ever capable. As a method of study, moreover, it is worthless, for it establishes associations in which the foreign words play but a small part as symbols (inexact symbols, of course) of English words.

The excuse usually given for this practice is that American conditions make only a "reading knowledge" of the foreign language, especially, if ancient, of importance, that it is not our purpose to enable pupils to order a meal in the foreign language. Reading, however, is no different from the other phases of using a language: the expressions of the language are not the given members of mathematical equations or puzzles, but must enter into a set of rapidly and easily functioning associative habits. Correct methods of language-teaching differ from those which we are at present unsuccessfully using not in aim, any aim can here be attained by good as surely as it missed by bad teaching, but in adaption to the mental conditions underlying the activities of speech. In what follows I shall naturally speak of American conditions and assume that the ability to read rather than to speak is aimed at: needless to say that even here the desired associations cannot be formed without much oral and auditory practice. I believe, moreover, that American conditions are coming to make a "speaking knowledge" more and more desirable and that the time is not far off when here as well as abroad the ability to converse in one or two foreign languages will be looked upon as one of the ordinary marks of education.2

Almost thirty years later, after experience with the description of languages of preliterate American Indians, Bloomfield, in conjunction with the Intensive Language Programme postulated the primacy of speech as a language universal with the corollary of the separation of audio-lingual skills from reading and writing. In Outline Guide for the Practical Study of Foreign Languages, Bloomfield formulated the ideas upon which most audio-lingual materials are based. Only relentless repetition would lead to audio-lingual fluency "Language learning is overlearning. Anything else is of no use". ³

Though now challenged by the findings of generative-transformational grammarians, structural linguists today still conceive of language as an intricate system of habits. Robert Hall comments:

"Languages are systems of habits. The habitual nature of language is, in general, insufficiently realized in our normal thinking on the subject; especially philosophers and aestheticians tend to treat language as if it were wholly the product of conscious reflection and purposive behavior. In fact, we acquire very extensive linguistic patterns when we are children, and use them in adult life, without becoming aware of their almost wholly habitual nature." ⁴


Charles Hockett, another linguist observes:

16.1 A language is a complex system of habits.

16.3 The summary of language design in 16.1 states that a language is a set of habits. An act of speech, or utterance, is not a habit, but a historical event, though it partly conforms to, reflects, and is controlled by the habits. Acts of speech, like other historical events, are directly observable. Habits are not directly observable; they must be inferred from observed events, whether the inferring agent is a child learning a language or an analyst seeking to describe one. 5

The Intensive Language Programme used in the Army Language School and the Foreign Service Institute was successful in producing students with high proficiency in the use of a foreign language. With the increasing emphasis on audio-lingual skills in the next two decades, foreign language teachers began utilizing the model of learning associated with the Intensive Method. Albert Valdman has described the following characteristics for "New Key" materials:

(1) an emphasis on audiolingual skills, i.e., comprehension and speaking ability;
(2) the assimilation of conversational-style target language texts through mimicry and memorization; (3) the presentation of authentic target language samples by the use of live native speakers in class or recordings in the language laboratory;
(4) the learning of pronunciation and

grammar through pattern drills; and (5) a claimed application of structural (or scientific) linguistics to language teaching problems.  

While the Intensive Language Programme did have considerable success with the objective of producing students fluent in a second language, there are indications that this was more probably due to the conditions of instruction than the model of learning or the instructional materials used. Language teachers are currently using audio-lingual materials developed for a context of instruction radically different from the typical high school or university situation. The classes of the Intensive Language programme or the Foreign Service Institute were small enough (not more than six students per class) to insure active participation and practice of the target language, and the students were provided with more than 450 hours of instruction. This could be contrasted with a high school or college class of twenty-five students (though many high schools operate with thirty-five or forty students per class) who receive fifty minutes of instruction five days a week. Half of that time is usually reserved for the teacher's lecture or instructions. If each student were allowed to participate during each class period, his active participation would be

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limited to one minute. Total participation time for each student would be less than twelve hours in two years.

There is reason to believe that the linguists associated with the Intensive Programmes produced effective foreign language programmes through massive student exposure to the target language rather than through the instructional materials used. It is doubtful that a scientific, descriptive analysis of a language will necessarily be the most effective teaching device. While an efficient, effective method might utilize the findings of linguistic field work, the materials must be organized for pedagogical expediency. Sol Saporta comments:

A central question in the application of linguistics to the teaching of foreign languages involves the conversion of a scientific grammar into a pedagogical grammar. What form the pedagogical grammar takes, whether drills or rules or some combination of the two, is presumably determined by some assumptions about the nature of learning in general, that is, by principles which are not primarily linguistic. On the other hand, the content of the grammar, that is, a specification of what it is that is to be learned, is narrowly linguistic.\(^7\)

The objection to current audio-lingual materials is

that the teacher is operating with a simplistic "sunburn" method of learning without the concurrent expansion of exposure time implicit in the Linguistic Method. Harlan Lane, a Skinnerian psychologist involved in problems of language acquisition, comments:

The language teacher has operated frankly with a sunburn model of learning and his techniques are as inefficient as this characterization of learning is inappropriate. The teacher, prime source of knowledge and light (and occasionally, heat), "exposes" students to the language and its principles. He is aided in this endeavor by the language laboratory, now commonplace in secondary education, which also exposes the students to the material in limited doses; twenty minutes is generally considered the maximum safe exposure in one treatment. When classroom practice permits active participation by the student at all, it is usually in the form of repetitive drills which are presumed to "fix" or "stamp in" the material through repetition alone. The "brighter" students "soak up" the material and become "enlightened". Dull students, who fail to learn, are simply not "sensitive" or "receptive".

The remarkable plasticity of behavior is ignored by this model. Instead of acknowledging that the inadequacies of the students are the product of inadequate technique, and then spending all effort to improve technique, teachers often assign the key role in language learning to ability or endowment, and thus place the process beyond their control - and responsibility. 8

The foreign language teacher was more influenced by the linguists teaching materials, pattern-practice exercises,

8 Lane, Teaching Machines and Programed Learning, Volume II: Data and Instructions, p. 586.
grammar by induction and basic conversational sentences for memorization, than by the realization of the necessity of intensive contact and active participation as essential to the acquisition of audio-lingual skills. Unfortunately, in the context of the traditional classroom, the emphasis on drills and mechanical manipulation of linguistic features tends to produce students fluent in producing rehearsed utterances, but unable to generate novel sentences. Storage of a large number of sentences cannot be equated with having learned a language, but the audio-lingual habit method maintains that by generalization and analogy a student will be led to generate novel sentences based on the stored material. However, the materials are not presented in a way which would facilitate the formation of analogies. Many utterly different structures are presented together within one lesson and no attempt is made to have the student understand how these structures operate.

Fernand Marty (1962) has listed eleven completely different structural types presented in the first unit of the Glastonbury materials (renamed A-LM). The failure to explain how these various structures operate leads the student into difficulties when he attempts to analyze or draw analogies from these memorized sentences. Marty comments:
1. If the student attempts, on his own, to compare and analyze the structures, he finds himself running into dead ends of this type:

**Sentences he has been taught:**

Je voudrais te présenter Paul Martin. Présente-nous, veux-tu?

Il s'appelle Jean. Elle s'appelle Marie. C'est un ami. C'est Marie Leblanc.

**Dead ends he is led into:**

Where do the French place the object pronoun?

When do you use il, elle, ce?

How would you say "She is a friend"?

2. If the student proceeds by analogy and tries to make up some sentences he runs into traps of this type:

**Verb forms he has been taught:**

Je fais  
Tu fais  Tu vas
Il fait  Il va

**Wrong analogy he is liable to make:**

Since in je fais, tu fais, il fait, the verb forms sound alike, I can also say *Je vas, tu vas, il va, and I can answer je *vas bien, je *vas au cours de français.*

The most serious criticism of the audio-lingual habit method, then, is that the materials constitute a closed system. A student will, of necessity, only meet a

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*Nonce or ungrammatical form.*
finite number of sentences in a course. However, the learning of a language is not just the mimicking of these sentences, but rather, the ability to produce and understand novel sentences. Therefore, the most important skill to develop in a language programme would be the ability to solve linguistic problems automatically as they arise.

The basic objection to the audio-lingual habit method is that it often produces robot-like parroting of the language where the students are able to use the dialogues and patterns only in the context which they have been memorized. This criticism has also been raised against the programming method. However, as has been said earlier, a programme will reflect the views of the programmer. If a programmer relies too heavily on current textual materials or methodology, he may produce a programme which is merely an up-dated version of the grammar-translation method or the audio-lingual habit method and which is susceptible to their flaws. Too rigid adherence to Skinnerian psychology or the structural linguists conception of language may produce a programme which has little use as a pedagogical device. Several programmes currently available in foreign languages are mere translations of traditional textbooks and as such, offer no real insight into course analysis or the learning process.
Some Relevant Research

An area of particular controversy in foreign language teaching is the dispute between the adherents of the audio-lingual habit method and those of the more traditional grammar-translation (or cognitive-code learning) approach. Characteristic of this dispute is a lack of rigorous experimental research which would conclusively prove either method superior. Research in foreign language learning has generally been inadequate because much of the work of psychologists has little relevance to foreign language teaching, and experiments performed by linguists or foreign language teachers often lack necessary controls and scientific rigour.

Due to the climate of the times which enthusiastically and uncritically accepted any method which emphasized verbal skills, many aspects of the audio-lingual method have been accepted as valid without adequate investigation. In 1962 George Scherer and Michael Wertheimer summarized the problem:

Inherent in the assumptions underlying an audio-lingual approach to foreign language learning is that students trained only audio-lingually at the beginning will subsequently reach, and perhaps surpass, in reading and writing ability, students who have been trained in the more conventional manner, while exhibiting a far higher level of achievement in auditory comprehension and speaking; advocates of the traditional multiple approach, with its heavy emphasis on grammar and reading, are of a contrary opinion. Little evidence based on
controlled experimentation exists.\textsuperscript{10}

Even when certain aspects of audio-lingual techniques are investigated the results of the studies are often equivocal. The audio-lingual method prescribes that a student should read only what he has spoken.\textsuperscript{11} As Lane has pointed out, when an audio-lingual method was compared with a sight method producing speed and retention in reading, all four possible outcomes were reported.\textsuperscript{12}

In a study by J. J. Asher it was found that "subjects who learned visually and relearned aurally achieved superior performances in comparison with performances of subjects who learned aurally and relearned visually".\textsuperscript{13} However Pimsleur and Bonkowski report the opposite: "Aural learning facilitates visual relearning; this facilitation is greater than the facilitation of aural relearning by visual learning".\textsuperscript{14}

Carroll feels that reading and oral-aural skills are distinct

\textsuperscript{10}George A. C. Scherer and Michael Wertheimer, "The German Teaching Experiment at the University of Colorado", German Quarterly, XXXV (May 1962), 298.

\textsuperscript{11}Brooks, Language and Language Learning, p. 52.

\textsuperscript{12}Harlan L. Lane, "Acquisition and Transfer in Auditory Discrimination", American Journal of Psychology, LXXVII (June 1964), 620.

\textsuperscript{13}J. J. Asher, "Sensory Interrelationships in the Automated Teaching of Foreign Languages", Perceptual and Motor Skills, XIV (August-December 1958), 38.

and their development is mutually exclusive: "Oral-aural and reading proficiency constitute separate, independent skills which do not develop one from the other". 15 In an experiment comparing a traditional with an audio-lingual method, Scherer and Wertheimer found that the students' reading and writing ability were almost comparable. They concluded that "students taught by the audio-lingual method...were almost on the same level with students taught by the traditional method in new-type reading and writing tests". 16

A particularly interesting study is one conducted by Scherer and Wertheimer and described in their book published in 1964. 17 In a rigorous and highly controlled experiment performed at the University of Colorado, they compared a traditional and an audio-lingual approach to the teaching of German. The audio-lingual group were not given any reading material until the twelfth week of the experiment while the "traditional" group received reading materials immediately. By the end of the first year the audio-lingual students were superior in listening and speaking, and almost


16 Scherer and Wertheimer, German Quarterly, 302.

17 Scherer and Wertheimer, A Psycholinguistic Experiment in Foreign-Language Teaching.
comparable to the "traditional" group in tests in reading and writing. It was not possible to continue separate training in the second year of the experiment and by the end of the year the "traditional" group was still somewhat better in writing skills and the audio-lingual group were slightly better in speaking. However the groups were now comparable in reading and listening.

While there are many variables which might govern the results of this experiment (such as the quality of teaching in each group, the specific formulation of each method, etc.) it would seem to suggest that there is not a tremendous difference in the amount of learning acquired from either method. That audio-lingual methods do not produce the dramatic superiority that their adherents claimed could also be explained by the concept of language, not primarily as a system of habits, but as rule-governed behavior, and language learning as the internalization of these rules. Sol Saporta summarizes the deficiencies of both methods:

We see that we have not come full circle. The impact of modern linguistic theory must be to improve the content of pedagogical grammars. In this sense the traditional grammarians were on the side of the angels. Postwar linguists focused on the fact that ability to verbalize even adequate rules did not ensure performance and argued for the importance of practice. But the practice which has been devised is of two kinds, one of which can be performed automatically and hence may have only a
minimal effect on the learner's competence and another which presupposes precisely the competence to be learned. The drill which serves as input to a native student and which is somehow converted into command of precisely the appropriate rule is an illusion. 18

While in the past there has been a dearth of research in foreign language learning, recently quite a few experiments have been undertaken in this area. The results of these studies are often conflicting, but the very fact that rigorous experimental data will be available is promising for the future.

Since most of the programmed French courses have utilized linguistic or frequency studies as an aid to subject matter analysis, it is interesting to look briefly at the trends influencing the linguistic studies of French. Certain philosophical ideas were to play an important part in the direction of thought in France during the second half of the twentieth century. In particular the pre-eminence placed on the "totality" or whole which manifested itself most clearly in Gestalt psychology, led to the development of the structural approach to linguistics. Another important trend was modern phenomenology which had certain similarities to pragmaticism and behaviorism and led to a more functional

18 Saporta, Trends in Language Teaching, p. 91.
approach to linguistics. Kukenheim describes the philosophical developments in France which were to have significant influence on the direction of French linguistic studies:

De nos jours, la langue est redevenue un des principaux sujets de réflexion philosophique. Deux grands principes dominent la pensée du second tiers de notre siècle: d'abord celui de la priorité et de la prééminence de la totalité: "il faut voir le tout ou l'on ne voit rien". Ce ne sont pas les éléments, les parties qui font le "tout", mais c'est le "tout" qui est décomposable en parties. De même qu'une mélodie peut se décomposer en notes, mais n'est pas composée par elles, la langue peut être décomposée, mais n'est pas construite à l'aide de certains éléments qui la composeraient. La théorie de la "totalité" ne permet pas de séparer, elle admet tout au plus de distinguer et s'oppose nettement à l'atomisme, préconisé par exemple, par les sensualistes du XVIIIe et, en matière linguistique, par les néogrammairiens.

Les philosophes néopositivistes font observer que certaines idées ont la vie dure seulement à cause des mots qui les propagent, par exemple les concepts "corps" et "âme": le "moi" est un "corps-âme". En médecine ce principe se retrouve dans la psychosomatique (ou psychosomatologie), qui considère le malade comme un tout et s'applique à guérir le corps en guérissant les psychoses: "Non pas guérir les corps, mais les malades!". Du même ordre sont, en matière linguistique, les considérations sur le signe linguistique: le mot est un "signifiant-signifié".

La théorie de la totalité se manifeste en psychologie sous la forme de la "Gestalt-psychologie", "gestaltisme" ou "psychologie de la forme" et trouve en linguistique son application dans le structuralisme, qui souligne, lui aussi, la priorité des ensembles. Ainsi l'on revient à l'ancien adage: Totum est prius partibus".

Le second courant important est celui de la phénoménologie moderne, qui, se tenant à l'écart de la marche de la pensée - celle-ci se soustrait à notre observation - s'intéresse...
aux manifestations extérieures et revient aux choses elles-mêmes, au solide, au concret. De fait, les néopositivistes du "Wiener Kreis" (cénacle philosophique né à Vienne en 1925) et de la "Berliner Gruppe", qui comptent parmi leurs membres Reichenbach, Rudolphe Carnap et R. von Mises, admettent que la pensée n'a rien d'intérieur, qu'elle est inexistante en dehors des mots; niant l'opposition traditionnelle des sciences de la nature et des sciences humaines, ils ne reconnaissent que l'empirisme en psychologie comme en linguistique. Leurs conceptions sont voisines de celles du pragmatisme et du behaviorisme, mais ce qui caractérise surtout leur philosophie, c'est la critique de la langue, dont les imperfections nous induisent en erreur: ce qui est réel, ce sont les sensations, non pas les abstractions: "le rouge n'existe pas, ce qui existe ce sont des objets rouges." Ce qui reviendrait à dire qu'il faudrait abolir de nombreux termes qui ne correspondent à rien du tout.

La philosophie néopositiviste est représentée aussi par E. Husserl (1859-1938), mais il l'a approfondie en soulignant que les objets sont toujours des objets de la conscience; sa phénoménologie est la science de la "conscience dans son rapport avec les choses", de la "conscience intentionnelle"; la "relation" y est, par conséquent, la donnée fondamentale. Des idées analogues ont été exposées par Heidegger, H.-J. Pos, Merleau-Ponty, auteur de la Structure du comportement (1942) et de la Phénoménologie de la perception (1945) et par Sartre. Au lieu de rechercher les concepts de "causes finales", de buts ou d'intentions, sur le plan linguistique, ces conceptions amènent les idées de "relations" et d'"échanges" (structurales), de "rendement", d'"économie" du langage, d'"automatisme" et d'"efficacité", par opposition à celles de "causalité" ou d'"histoire". Ainsi l'objet central de la linguistique devient le fonctionnement du langage.

These philosophical trends were curiously paralleled by similar attitudes in North America. They were to have a profound influence on linguistic studies and language training. Kukenheim comments:

Ces courants a-historiques, sinon anti-historiques, coïncident avec l'état d'esprit des philosophes et linguistes américains: avec le pragmatisme de William James, avec le "behaviorisme" de Watson et avec l'œuvre de Sapir, qui, dès 1921, proclame l'indépendance de la langue à l'égard de la psychologie: il analyse la langue en partant des éléments que celle-ci nous procure. En même temps, Leonard Bloomfield (1887-1949), après avoir débuté par une thèse d'indo-germanistique et une Introduction to the study of language (1914) tout imprégnée des idées de Wundt, se détourna, dans sa fameuse publication Language (1933), des "mentalistes", adhérants de spéculations psychologiques, pour défendre l'étude de la langue du point de vue "mécaniste". Prenant comme point de départ la théorie du comportement (behaviorisme), Bloomfield exposa dans Language, le mécanisme de la communication: négligeant à dessein la "conscience", domaine inaccessible, et évitant à tout prix de parler de "l'introspection", méthode impraticable, Bloomfield n'admet chez l'individu que des stimulus et des réactions: ceux-ci peuvent être de nature non-linguistique quand l'individu agit sans se servir de la langue, mais dès qu'une deuxième personne entre en jeu, la langue peut intervenir: la première personne peut éprouver un stimulus qui le fait parler, et la seconde personne pourra, à son tour, subir ce stimulus linguistique qui provoquera une réaction, parfois de nature linguistique. Les idées de Bloomfield devaient avoir un grand retentissement, surtout en Amérique, où les adhérents de l'"école de Yale", les "mécanistes" s'opposaient aux psychologues, les "mentalistes".20

20 Bruneau, Petite histoire de la langue française, p. 113.
In France, however, the main impact of these philosophical ideas was felt in literature and the theatre. E. Knight, in the introduction to his book, *Literature Considered as Philosophy: The French Example* makes the following comment:

The fear of the traditionalist that the existentialist heresy may eventually lead to the disappearance of philosophy as a separate discipline is perhaps ill-founded, but the very essence of philosophy may well be transformed. For if truth is part of existence itself and not the distillation of some complex scientific or logical apparatus, then it is accessible to all of us; it becomes, par excellence, the domain of literature.

We have said that existentialism is not an idea, but a movement. If this is true, there must be evidence of it everywhere in the thought and art most characteristic of our age, and as we shall see this is the case. In this matter of the present-day fusion of literature and philosophy, we are too often content to note simply that Sartre, Simone de Beauvoir, Gabriel Marcel; Brice Parain, etc., are novelists or playwrights as well as philosophers. It is more important to recognize that there exists a literature, of which no one speaks in connection with existentialism, which, nevertheless, is existentialist in that it is *literature as philosophy*, its authors being as much philosophers as the above-mentioned philosophers are novelists and playwrights. 21

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Knight examines the works of Gide, Malraux, Saint-Exupéry, and Sartre as examples of this fusion of philosophy and literature. The plays of Camus and Sartre and, to a lesser extent, the Theatre of the Absurd also exhibit this dual quality of being both works of art and philosophy.

In the United States the direction of linguistics and education was strongly affected by these philosophical ideas. Education has become increasingly goal-and performance-oriented and the emphasis in the universities is on description rather than prescription or participation. Knight notes the influence of the philosophical currents in France:

The existentialist movement constitutes an unprecedented re-orientation of human thought in that it denies existence to everything of which we are not immediately and indubitably aware. To philosophize will no longer be to deduce or to analyse, but simply to describe what exists, and that not in view of establishing an eventual synthesis or hierarchy but to enable us to distinguish what really is from what through the centuries, human ingenuity has created to explain the nature of the universe and to justify man's presence in it. Existentialism reduces life from what we would like it to be, to what it is; and the instrument employed is not this or that method, but lucidity [emphasis mine]. The writer who refuses to allow a faith, a hope or a theory to interfere with his work, who has the courage to confront existence itself, is also a metaphysician, because existence is Reality and not merely its outward form.22

22 Knight, Literature Considered as Philosophy: The French Example, p. 16.
Lucidity has been underlined in this quote because it is the quality which is most blatantly lacking in the educational system of North America. The emphasis on methodology in the universities, rather than any conception of "lucid choice" has led to a complacent conformity which results in the alienation of the "intellectual" from the rest of society.

While French linguists were eventually influenced by the "structural approach", they were not initially receptive. In 1928 the first Congrès International des Linguistes was held at La Haye, and despite the introduction of new approaches to language study, most French scholars continued the historical or psychological linguistic methods - methods which were in "la grande tradition française". Among some of the historical works were the monumental work of F. Brunot, *L'Histoire de la langue française* which was continued after his death in 1938 by Ch. Bruneau, the *Petite histoire de la langue française*, of Ch. Bruneau, the *Histoire de la langue française* of A. Dauzat (1930), A. François's *Histoire de la langue française cultivée des origines à nos jours*, and several works of W. von Wartburg.

Some publications with a psychological approach were Henri Frei, *Grammaire des Fautes*, Georges Galichet, *Essai de Grammaire psychologique* (1947), the works of Gustave Guillaume, and the works of Edouard Pichon.
Kukenheim comments on the various conceptions of the relation of thought and language and he compares several works which present divergent views:

De la collaboration d'un linguiste, Jacques Damourette, et d'un médecin aliéniste, Edouard Pichon (1940), est née une œuvre magistrale en sept volumes, intitulée "Des mots à la pensée - Essai de Grammaire de la langue française", fondée sur des milliers d'exemples...

Il est intéressant de comparer la méthode de cet "Essai" avec la conception de Brunot, dont "La pensée et la langue" se trouve être l'antipode de "Des mots à la pensée"; de fait, il convient de songer à la découverte récente qui a révélé que la marche ne va pas seulement de la pensée à l'expression linguistique, mais que ce sont aussi les mots qui font la pensée. Voilà une vérité dont n'ont tenu compte ni Félix Boillot, dans sa "Psychologie de la construction dans la phrase française moderne" (1930) ni G. et R. Le Bidois dans leur "Syntaxe du français moderne" (sous-titre "Ses fondements historiques et psychologiques"; deux vol., 1935 et 1938) ni Georges Galichet dans son "Essai de grammaire psychologique" (1947). Le dernier distingue deux espèces grammaticales essentielles (le "nom" qui exprime l'être, et le "verbe" qui exprime le processus), des espèces jointes (l'"adjectif" déterminant le nom, l'"adverbe" déterminant le verbe) et des espèces de relations (prépositions, conjonctions, qu'il appelle "mot-chaînées"); ensuite il traite des "catégories grammaticales" (genre, nombre, temps, voix mode, etc.) pour finir par les "rapports ou fonctions grammaticales" (épithète, sujet, complément, etc.), s'efforçant de "faire crouler la fausse barrière traditionnelle entre analyse logique et analyse grammaticale". Convaincu que ce ne sont pas les mots qui gouvernent la langue mais que celle-ci est gouvernée par des valeurs psychologiques, Galichet nous présente en même temps qu'une
analyse du français, une espèce de "grammaire générale". 23

The second half of the twentieth century in France was characterized in linguistics by specialization in the areas of phonology, morphology, syntaxe, lexicologie, etc. Examples of this trend towards specialization are the works of F. Saussure, M. Grammont or P. Fouché in phonetics and phonology. Despite frequent international contact, French scholars were slow to adopt a structural approach to linguistics. Among the first to do so were Georges Gougenheim, Système grammatical de la langue française (1938), and A. Martinet, Éléments de linguistique générale

Conclusion

An effective analysis of French programmes necessitates a study of the current trends in language teaching and linguistics. A programme does not prescribe any view of the subject matter but is only a reflection of the programmer's conception of the language. It will be seen in the following pages in an actual examination of French programmes that course objectives and the presentation of materials vary greatly. However, most programmers have been influenced by the audio-lingual method or the grammar—

translation method and have often used linguistic techniques for the presentation of materials. It is only very recently that any of the assumptions made about foreign language teaching have been tested, and many aspects of previous methods have been accepted without adequate evaluation.

What may prove to be the most important feature of the programming method is its emphasis on empirical evidence of course effectiveness as a basis for revisions and validation of the programmes. A rigorously constructed programme is tested and revisions are made on the basis of direct observation of student behavior. This will not only encourage a thorough course analysis and more effective organization of materials, but it will also provide research data on second language learning for future investigations.
CHAPTER III

THE APPLICATION OF PROGRAMMING PRINCIPLES TO FRENCH:

PRELIMINARY PROBLEMS

Two immediate problems arise in programming a foreign language and are evident from an initial review of French programmed materials:

(1) How are programming principles applied to the foreign language?
(2) How is the subject matter analyzed?

The first problem is especially important, for critics are now questioning whether, in fact, it is possible to programme a foreign language. Programming requires that an analysis be made of the students' initial behavior, followed by a specification of the terminal behavior expected upon completion of the programmed materials. At first, this would appear to be no more than what a competent teacher would do in preparing a lesson plan. After considering what the students can already do, the teacher outlines what new things he wants them to do. However, if these principles are applied with scientific rigour certain distinct difficulties arise. The difficulties will be examined with special attention given to the problem of determining the terminal objectives of a French course.

The second problem which is immediately apparent upon investigation of a French programme is the method by
which the language has been analyzed. If the materials are well-programmed, the language will not only be analyzed in terms of linguistic elements to be learned, but will also present these elements in relation to different behaviors. Vocabulary and grammar are only tools which enable one to read, write, speak, and listen. If the materials are thoroughly programmed, the emphasis will be placed on the development of skills and the language will be analyzed in terms of behaviors expected of the student.

It is necessary to look more closely at some of the principles involved in programming and to see how these can be applied to a French course. Robert Glaser, co-editor of the first comprehensive compilation of research material in programming, has analyzed the instructional system into the following components:

(a) Instructional Goals - the System
Objective (b) Entering Behavior - the System
Input, (c) Instructional Procedures - the
System Operator, (d) Performance Assessment -
the Output Monitor, and (e) Research and
Development Logistics...

The development of the system is initiated with the specification of the goals of instruction. These goals constitute the objective to be accomplished and the purpose for which the system is to be designed. The main input into the system, upon which it is designed to operate, consists of the entering behavior of the student. This consists of the initial repertoire, aptitudes, and prior educational background with which the instructional process begins. The next phase constitutes the actual instructional procedures and experiences which are employed to guide and modify behavior. The final phase in an instructional situation is some sort of
"quality control", that is, assessment of the extent to which the end-of-course behavior has been achieved by the student in the light of the kind of performance required by the specified instructional goals. These phases are the main flow of the instructional system, but it has many feedback loops and subsidiary inputs. The information obtained in each phase supplies data which are useful for monitoring and correcting the output of the preceding phase; for example, measurement of the kind of performance achieved can provide information for redesign of instructional procedures, and information on instructional procedures can interact with the characteristics of the entering behavior. Feeding in to all phases are the results of research and development. The implementation of these results and the fruitful interplay between research and development, on the one hand, and the operating aspects of the system, on the other, involve important logistical considerations.1

The development, then, of a French programme involves four steps:

1. an analysis of initial behavior;
2. the determination of the terminal objectives of the course;
3. the procedure leading to the terminal objectives;
4. the revision and validation of the programme.

Each of these steps is influenced by current research in the fields of psycholinguistics, programming, linguistic science

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and learning theory. Because language behavior is so complex, programmers often have difficulty with the first two steps, the analysis of initial behavior and the determination of the terminal objectives of the course.

**Analysis of Initial Behavior**

In analyzing a student's initial behavior, language programmers are confronted with theoretical questions as to the nature of language and language acquisition. Is language a set of habits amenable to operant conditioning techniques, or is it the result of an internal "data-processing mechanism" as Chomsky and others suggest? As has been seen earlier in this paper, a major difficulty in determining the initial or entering behavior of an individual is a lack of basic knowledge and research on the process of language acquisition. There is very little laboratory research as to how a child acquires a first language and even less research material in regard to second language learning. An important distinction must also be drawn between the behaviors involved in a child learning a native language and those of an adult learning a second language. Current research involving young children may not be relevant to adult second language learning because there is some evidence that the mechanism for language acquisition may atrophy as a person grows into adolescence and adulthood. This seems to be suggested by Masson's observations that pre-teen-age Anglo-Saxon children
learn French faster and better than teen-agers of similar background.\textsuperscript{2}

Generative-transformational grammarians argue that language is an abstract system which only relates indirectly to observable behavior. If the internal language system can be modified without any observable manifestation, it is difficult to adequately measure or observe language acquisition. Valdman has raised doubts as to whether, in fact, it is possible to programme a foreign language.\textsuperscript{3} If we are to accept, along with Chomsky, that there is only a partial relationship between observable responses and basic linguistic competence, then it would be difficult to specify the initial and terminal behaviors of a foreign language programme.

**Specification of Terminal Objectives**

Difficulties also arise in programming a French course in determining the objectives or instructional goals of the course and in the specification of terminal behaviors. It is necessary to distinguish between a content description


\textsuperscript{3}Albert Valdman, Problems in the Definition of Learning Steps in Programmed Foreign Language Materials, paper delivered at the Kentucky Foreign Language Conference, April 29, 1967.
and a description of the behaviors expected of a student who has completed the course. A thorough and rigorous specification of terminal objectives would include both types of description. Valdman criticizes a phonetics programme written by Elaine Burroughs because it lacks a behavioral description of the objectives of the course:

The course has presumably been tested as auxiliary materials for first year and "review" French courses and is suggested as syllabus for a First Course in French phonetics but the terminal behavior of the subject who completes the 1000 frames is nowhere stated in the objective terms Marty and this reviewer would require. Is the subject merely expected to transcribe French in the International Phonetics alphabet - a dubious achievement per se - to convert IPA symbols to the conventional orthography, to hear and produce French sounds well enough to meet Marty's minimum requirement, or to approximate the native model?4

From a careful linguistic analysis of the language, a programmer would select those phonological, syntactical and lexical aspects which were most important for a command of the language. A behavioral description might specify whether the student was expected to have both written and oral command of a particular structure, whether he was expected to passively comprehend or to actively produce this

structure and under what conditions. An even more rigorous description might specify the time allowed for response reaction and rate of phonation.

Different types of behavior might be required of a student in relation to different styles of speech. While a student might be expected to understand a variety of styles of speech in French, he would only be expected to produce the speech of the educated Parisian. Pierre Léon suggests that different models of speech might be used in teaching pronunciation and conversation — one for recognition and one for production:

Most languages, at least the so-called "languages of culture", are spoken in several levels of style. This raises the thorny problem of the selection of a suitable model for student imitation: the uninhibited pronunciation of the man in the street or that of the careful diction teacher? The final objective would probably be the former for audio-comprehension and the latter for sound production. In French a group of words like je ne sais pas would have to be taught for audio-comprehension as:

1.  zaw se pa
2.  se pa:
3.  se pa
4.  pa

but only the first form would be taught for the students' oral use. Even now, however, too many phonograph records present slow, emphatic models instead of natural speech. 5

The preparation of a programme would entail a detailed analysis of the language to be learned (the target language) and also a contrastive analysis between the target and native language which would identify those areas that would interfere with learning. The programmer would also need to locate those areas within the language which might cause difficulties to the student (such as in French, the sound contrasts in minimal pairs: roue/rue, chou/chaud or different verb forms such as fut/fût which might be confused).

Within the last two decades the objectives of foreign language study have changed from exclusive concern with reading-translation to emphasis on audio-lingual skills. However, a language programme will reflect the programmer's view of the language and is not inherently an audio-lingual method. Some programmes will have as a basic objective the teaching of the spoken language while others will adhere to a more traditional teaching of reading, translation and vocabulary. A programme may include all materials necessary to a first or second year course or it may cover a specific skill such as spelling, phonetics or review materials.

Once the general instructional goals of a programme are determined, a programme should specify in behavioral terms (observable and quantifiable behaviors) what the student will do as a result of completing the programmed sequences. As Albert Valdman has pointed out problems arise in programming
a French course in finding practical, principle and consistent bases for the specification of terminal behavior. Several different approaches have been used in audio-lingually oriented courses.

Fernand Marty gives a detailed description of the terminal objectives desired in the area of pronunciation. In general, the goal is sufficient speed and fluency to be acceptable to a French listener. In oral production and listening comprehension fluency is stated as a function of length of utterances and time needed to produce them and decoding defined in syllables per second with a reaction speed of less than three seconds.

8. Pronunciation. The pronunciation is taught within the morphological and syntactical frameworks of the language. The voices heard by the students are native French voices and the training in the programme is, indeed, aimed at giving a native pronunciation, but we cannot reasonably expect that all the students will acquire it. It is a pronunciation which is sufficiently accurate to handle effectively the morphological and syntactical contrasts of the language. A few of these essential contrasts are:

/\y/ - /u/ inability to make this contrast leads to gross semantic errors (ils se disent tout / ils se disent tu).

/\e/ - /\en/ inability to make this contrast renders the speaker unable to express satisfactorily some of the masculine/feminine oppositions (italien/italienne) or some of the singular/plural oppositions (il vient/ils viennent).

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\(/r/ - /rr/\) inability to make this contrast leads to misunderstanding (vous courez / vous courrez).

Determining whether the student has acquired the required accuracy is done by having him select and read one sentence from sets of two contrasting sentence (such as ilvje:\_dine / ilvje:\_ddine) and having the teacher write the one he understands. By comparing what the student intended to say and what was understood by the teacher, we know whether the required minimum has been met.

9. Oral expression. The natives vary considerably in the rate at which they express themselves. We ask that our students be able to express themselves at a rate which is found acceptable by natives. We consider that a student has acquired a given structure only when he can use this structure correctly at a rate not under 150 syllables per minute.

10. Audio comprehension. Native facility includes the ability to understand a high number of syllables per minute and also the ability to understand the language spoken in unfavorable conditions such as against background noise (street noises, other conversations going on at the same time, not being able to see the speaker's face, and loss of fidelity (telephone conversations, movies, radio and T.V. programs). During the recorded practice drills (not the presentation), we speak at a rate oscillating between 200 and 240 syllables per minute. We require that our students achieve a minimum comprehension ability of 200 syllables per minute.

11. Reaction speed. When a native is asked a question, his reaction speed is usually very rapid (less than one second), provided - of course - that he knows the answer and is willing to give it. We require our students' reaction speed be less than three seconds.7

7 Marty, Programing a Basic Foreign Language Course: Prospects for Self-Instruction, pp. 2-3.
Valdman objects to this definition of terminal behavior in terms of rate of phonation and speed of identification of phonic signals because these aspects of language performance are often dependent on nonlinguistic factors, such as the emotional state of the speaker and listener, the context of the situation and individual differences among speakers. He maintains that speed of phonation is a meaningless criterion unless it is specified that the utterances meet certain standards of well-formedness and appropriateness at higher levels of language behavior.\(^8\)

Some programmes approach the problem of the definition of terminal behavior by the establishment of a repertoire of responses to specific stimuli. This is apparent in the courses which emphasize the conversational aspect of the language. The content of a course by Paul Pimsleur, *Speak and Read Essential French* is informal, conversational French and he describes the terminal objectives of the programme:

> You will have at your command a 200-word vocabulary. . . In addition you will know how to pronounce written French. Your knowledge of the spoken language will enable you to cope with situations of travel, restaurant ordering, directions,

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hotel accomodations, and simple social encounter. You will also be able to give information about yourself, your family, your home and friends... you will be able to extend your knowledge of the language on the basis of what you have already learned.9

The learning of a finite stock of utterances which can be produced as the response to specific stimuli is feasible in a short (the completion time for Pimsleur's programme is estimated at about 15 hours), specialized programme, but might have the same shortcoming as the "New Key" materials if the course were more extensive.

Another approach to the definition of terminal objectives is the discrimination and production of French sounds with an emphasis on intonation patterns. Timothy F. Regan and Juan Estarellas describe the objectives of their courses:

The student will achieve 80% of the following, Given: 1) an aural stimulus of twenty French words, the student will be able to fill in the blanks with the correct vowel or consonant grapheme, 2) the aural stimulus of twenty French words, the student will be able to circle the stressed syllable, 3) the aural stimulus of twenty French sentences, the student will be able to demonstrate recognition of the intonation pattern of each sentence by checking the appropriate symbol, and 4) the written stimulus of twenty French words.

9 Paul Pimsleur, Speak and Read Essential French (Columbus, Ohio: Tapeway, 1964), Introduction.
sentences, the student will be able to pronounce them in a manner in which the meaning would be understood by a native.  

**Subject Matter Analysis**

In a subject matter oriented analysis of a language, such terms as "content" and "subtopic repertoire" would be relevant and the subject matter expert would divide his subject on the basis of the logic and interrelationships of content. Programmes which are only based on a subject matter analysis of the language appear to be adaptations of textbooks rather than presenting any new insights into an effective organization of language facts. A course by M. J. Collett is designed to review French grammar learned in the first two years of a secondary school. Part I of the course covers the present tense of regular verbs, preceding direct object pronouns, and a review of pronouns, while Part II contains the perfect tense and some irregular verbs. Both books include vocabulary sections. A programme produced by Universal Electronics Laboratories Corporation, has the course description: "This Course includes: Articles, present indicative of first conjugation verbs, interrogative

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and negative forms, ajectives, partitives, irregular verbs.".  

A more extensive programme by Elaine Burroughs is also organized according to various topics of content:

The three books of the course are divided into 25 chapters, each dealing with specific new structural patterns, vocabulary, and cultural items. Early chapters familiarize the student with the geography of France and the way of life in French cities, towns and villages; later units deal with French history and literature.

Objectives of Book I - The student learns to read and write simple French prose. At the end of the first book, he has an active vocabulary of 550 words which he can recall and spell. He has a passive vocabulary of 250 additional words. He is familiar with basic French structural patterns.

Each of these courses is organized around a content analysis of the language. A Skinnerian psychologist, however, would be less interested in the content-orientation of the subject matter and more concerned with the behavior expected of the learner and the stimulus-response situations involved. In a behavioral analysis of language such terms as "component behavioral repertoire" or more simply "component repertoire" would be used. From a pedagogical


13 Elaine Burroughs, Modern French (French A & B) (Behavioral Research Laboratories, Palo Alto, California, 1966), Introduction.
point of view, the practical requirement of a behavioral analysis of language would be to identify the type of behavior involved in different component repertoires so that the student can be provided with environmental conditions and teaching methods which best facilitate the acquisition of that type of behavior.

The assumption that is made in a component repertoire analysis of language is that the learning of different kinds of behavioral repertoires requires different kinds of instructional procedures. Harlan Lane, following Skinner's formulations, distinguishes between formal repertoires (in which the stimulus and response are directly related in a one-to-one fashion) and thematic repertoires (corresponding more closely to the ability to form meaningful utterances).  

Formal repertoires would involve such behavior as imitating, copying, and reading, and have been categorized as echoic behavior - when both the stimulus and response are spoken; textual behavior, - when a spoken response is controlled by a written stimulus; transcription - when both stimulus and response are written; and dictation - when the stimulus is spoken and the response is written. Most

14 Lane, Teaching Machines and Programmed Learning, Volume II: Data and Directions, p. 589.
research and experimentation have been on formal repertoires as they are less complex and it is easier to control the variables. However, purely formal repertoires are of minimal value. It is the combination of thematic and formal sources of strength which determine whether a response can be considered meaningful.

A thematic repertoire would involve such behavior as responding appropriately to a question with a meaningful answer and the ability to manipulate the grammatical structures and syntactic sequences in an appropriate and meaningful way. There is very little applicable research on thematic repertoires, though some research and experimentation in this direction is currently in progress. Since one of the most important aspects of language behavior is the ability to respond appropriately to the nature of the environmental conditions, this research will have important implications for language instruction.

In developing echoic behavior and the ability to pronounce French sounds most audio-lingual programmes use discrimination and differentiation training. The student would be taught to discriminate between a French sound and a similar English sound (such as English day contrasted with French des). Mueller describes the discrimination portion of his programme:
In the discrimination portion the student learns to differentiate automatically between the French phonetic features and those of the English counterpart. This ability to discriminate is taught in individual syllables and in sequences of up to five syllables. The student is taught the discrimination skill to enable him to monitor his own speech for purposes of self-correction.15

In the following section of his programme (which Mueller calls transformation) the student is required to transform initial, internal, and terminal sounds such as chou-chaud, and basse-base, to emphasize the phonetic contrasts within the language. Fernand Marty also begins his programme with discrimination training, but he has not separated various aspects of the language as rigidly as Mueller and many phonological problems are taught along with structural and morphological aspects of the language.

Marty emphasizes the following contrasts within the French language:

a. The student must be made aware of the contrasts which are essential for effective communication. These contrasts can be of a morphological, structural, or semantic nature. They should be taught along with the structure, the morphology, and the vocabulary. Examples:

<table>
<thead>
<tr>
<th>French</th>
<th>English</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Il vient.</td>
<td>Il est brun</td>
<td>These morphological contrasts require a satisfactory pronunciation of the oppositions /ɛ-ɛn/, /ɛ-ɛη/.</td>
</tr>
<tr>
<td>Il viennent.</td>
<td>Elle est brune.</td>
<td></td>
</tr>
<tr>
<td>Il vient dîner.</td>
<td>Il a dit.</td>
<td>These structural contrasts require a satisfactory pronunciation of the oppositions /d-dd/, /l-ll/.</td>
</tr>
<tr>
<td>Il vient de dîner.</td>
<td>Il l'a dit.</td>
<td></td>
</tr>
<tr>
<td>Il me dit tu.</td>
<td>Il sent bon.</td>
<td>These semantic contrasts require a satisfactory pronunciation of the oppositions /y-u/, /ã-3/, /e-ə/, /s-z/.</td>
</tr>
<tr>
<td>Il me dit tout.</td>
<td>Ils sont bons.</td>
<td></td>
</tr>
<tr>
<td>J'écris</td>
<td>Vous savez</td>
<td></td>
</tr>
<tr>
<td>Je crie</td>
<td>Vous avez.16</td>
<td>Albert Valdman teaches discrimination and differentiation of phonological features in meaningful utterances and does not favor the formal separation of components:</td>
</tr>
</tbody>
</table>

In SEF French the presentation of the phonology is gradual, and the order of presentation of phonological features determines the introduction of grammatical structures and lexical items. After the student has been presented with a complete base sentence, he is led to discriminate.

---

and differentiate a small number of French phonemes and to produce them with accurate control of secondary articulatory features, particularly those that differ markedly from features of American English. Criterion frames require the student to produce the phonemes under consideration within complete sentences used in meaningful situations; in other words, new pronunciation habits must be so thoroughly acquired as to resist deterioration under the interference of higher levels of language structure.17

Much research in the psychological laboratory has been conducted in the area of discrimination training and several studies are relevant to second language teaching.18 Since much language training takes place in the language laboratory, it is often necessary for the student to judge the accuracy of his pronunciation by comparing it with a tape-recorded native speaker. Paul Pimsleur points out:

"The popular notion is that the student who is able to compare his pronunciation with that of a native speaker will acquire native-like speech. Many teachers have already realized that this hope is far too optimistic. It is

17Valdman, Trends in Language Teaching, p. 149.

evident that students are rather poor judges of their own pronunciation. They are prone to think their pronunciation is "good enough" when actually it is not acceptable. They are unable to note which features are relevant and which are not.19

The research and experiments study such questions as whether, in fact, students are capable of judging their own pronunciation and whether discrimination and differentiation training are effective in producing accurate echoic behavior.

CHAPTER IV
PHONOLOGY

The two most important problems that emerge from a study of the pronunciation section of French programmes are in the area of behavior and content. In the area of content, a programmer must decide what a student is to learn and in the area of behavior, he must decide how he is to learn it. In describing the terminal behaviors desired of a student in the area of pronunciation, most programmers expect the student to be able to discriminate and differentiate a certain finite number of phonemic contrasts. It was seen in the preceding section of this paper that in most French programmes the student is taught how to pronounce French sounds by a process of discrimination and differentiation training.

An important requirement in shaping behavior is the reinforcement of correct responses and the correction of wrong responses. In the standard conditions of a university or high school classes are so large that a teacher cannot possibly hear and correct student pronunciation, and there is no practical, mechanical device which can do this. Therefore, the student must learn to evaluate his own response. This, however, implicitly assumes that a student can, in fact, successfully compare and judge his own
pronunciation. Several programmers who have developed audio-lingual programmes have found that a student is often not automatically a good evaluator of his own response. One of the terminal behaviors of an audio-lingual programme, then, must be to explicitly teach the students how to correctly evaluate his response because this is necessary for effective reinforcement.

Pronunciation behavior has been analyzed into two components. Discrimination between French sounds and English near equivalents or distinction within the French language itself are essentially a sensory (auditory) component, while the motor component, (the vocalization of sounds) involves differentiation of a particular response or sound out of all the sounds it is possible for the student to make. For example, a student would discriminate between the French c'est and the English say and then he would learn to discriminate sounds within the French language such as c'est /se/ from se /sə/. The student would then attempt to imitate and produce this sound and compare his own pronunciation with that of the speaker on the tape. It must be pointed out that most New Key materials do not explicitly train the student to discriminate sounds, but seem to assume that this ability will develop as the by-product of a great deal of practice and imitation. However, this assumption is contradictory because if the ability to discriminate is
developed as a by-product of training, then self-evaluation is impossible except at a stage when it is no longer needed. Programmers seem to doubt that the cumulative effect of practice and repetition is the ability to make relevant discriminations and they feel that it is inefficient for the student to learn to evaluate his responses as an end result of training. If a student first learns to discriminate French sounds at the beginning of the programme, he can continuously evaluate his responses, and repetition becomes more meaningful. Various studies regarding the success of this type of training have been listed in the preceding section of this paper.

The second problem, that of content selection, would at first appear to be common to all authors of a language course, programmed or otherwise. However, because of the emphasis on scientific rigour in programming, the problem is given new significance. The French language is a living, evolving system, and as such, does not always lend itself to rigorous scientific regimentation. Most programmers expect a student to be able to discriminate and differentiate a finite number of phonemic contrasts. However, depending on the geographical region and the style of speech, French exhibits from seven to sixteen vowel phonemes. Even limiting the language model to that of a cultivated Parisian, it is sometimes difficult to apply programming principles to the French language. A programmer
must attempt to be logical and consistent, yet, French is often inconsistent (verbs that have the highest frequency such as être and avoir are quite irregular) and illogical. (If we can say d’aujourd’hui en huit or Qui Jean regarde-t-il par la fenêtre? why can’t we analogize *d’aujourd’hui en cinq or *Que Jean regarde-t-il par la fenêtre? If we can translate The money was given to the boss as L’argent a été donné au patron why can’t we translate The boss was given the money as *Le patron a été donné l’argent?) Also, even in Paris, French speakers are not always consistent in the liaisons they will make or their treatment of the unstable /ə/. Sounds are not always constant and certain sound distinctions such as /œ/ seem to be disappearing. This section will not treat the programmers’ selection of linguistic elements extensively, but will point out some areas which might exemplify the nature of the problem.

In an amusing introduction to a book sponsored by the Association Phonétique Internationale, Paul Passy comments on the difficulties in pronunciation which a foreigner encounters when trying to master French. In particular he mentions instances where the foreigner’s native tongue produces areas of interference with French, or where a characteristic distinction does not occur in the native tongue:

*Unacceptable grammatical constructions, or nonce forms.
Tout le monde a pu entendre des Anglais, qui connaissent très bien notre langue, et sont incapables d'articuler d'une manière intelligible un petit mot comme vu ou été. Un Allemand du Nord dira: **Il faut mettre du zèle dans les aliments** (du sel). Un Allemand du Sud ne manque pas de dire, quand il commence à pleuvoir: **Il pleut des chats** (déjà), ou encore: **Il tombe des petits couteaux** (des petites gouttes d'eau). Un Italien nous apprend qu'il a été un âne en France et un âne en Angleterre (un an). Ces sortes de bévues, enjolivées par une imagination railleuse, prêtent des plaisanteries sans fin; ainsi on fait dire à un Espagnol: **Depuis que ma femme est morue, j'ai fait un vœu, de rester toujours bœuf et andouille** (morte, vœu, veuf, en deuil); — un Allemand: **Tous mes brochets sont des truites** (projets, détruits).

Du reste, nous n'avons guère le droit de nous moquer des étrangers sous ce rapport, car nous écorchons leurs langues d'une manière tout aussi ridicule.

Le professeur répète à un jeune Anglais: "**Il faut dire une rue, comme moi**"; et son élève impatiente s'écrie: "Mais je dis comme vous; je dis youne roue".

Or, si nous essayons de prononcer un son qui n'existe pas dans notre langue, il est très rare que nous y arrivions du premier coup; généralement nous le remplaçons par un son qui nous est familier et qui lui ressemble plus ou moins. C'est ainsi que l'Anglais, qui n'a pas notre voyelle _u_, la remplace généralement par le groupe _you_; et que l'Italien prononce âne pour _an_. Le plus souvent, ils n'entendent même pas la différence, ou l'entendent en tout cas fort mal: Les Allemands du Sud sont incapables de savoir si vous dites _pain_ ou _bain_, et les Espagnols, de savoir si vous dites _bœuf_ ou _veuf_.

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In each of these examples that Passy gives, it is not just a case of phonetic distortions, (an "accent"), but of phonemic errors which lead to a distortion in meaning.

The necessity of a functional approach to linguistic description in the teaching of a language is, especially evident in the area of pronunciation, and is discussed by Pierre Léon:

Auditory considerations are found everywhere in classical handbooks of pronunciation, but they are not utilized from a pedagogical point of view. On the contrary, they are generally approached scientifically, using the same procedure as phoneticians did when noting all possible realizations of sounds in dialectal studies. As a result, Jones (1937) gives for English a system of twenty-one vowels and diphthongs; and Navarro Tomás (1932) proposes for Spanish a twenty-vowel system, including four i, three e, five a, three o, four u and one nasal a. (Indeed he could also have added other nasal vowels like [õ] in corazon, etc.) Fouché (1952, p. 77) quotes R. de Souza as finding five different colors for the French E: acute e in poupée, grave e in péril, middle e in pèlerin, acute open e in belle, and open grave e in père. All these variations are indeed attested, but they are determined by the phonetic environment. Thus before a vowel is likely to be more open than before k, in French père, as in Spanish pero or in German gern. These variations may also be individual or regional. Going further in more precise phonetic description would lead us to posit about fifty vowels for French, whereas from a functional point of view French dialects show a basic system of ten vowels expanded to a larger system of fifteen in standard speech.²

Utilizing the findings of structural and descriptive linguistics, a programmer must isolate the more important language facts from secondary ones. However, special problems arise in programming a French course even if phonetic considerations are placed secondary to phonemic distinctions. French speakers vary in the number of phonemic contrasts they maintain, according to style or region. Thus in 1932 Paul Passy describes the existence of four nasal vowels in French but remarks that these distinctions are not always maintained:

163. - Le français nasale quatre voyelles, toutes ouvertes: (ɔ), (a), (ɛ), (œ), ou plus exactment (ɔ̃), (ã), (ɛ̃), (œ̃).3

Nous représentons ces voyelles nasalées par (ɔ̃), (ã), (ɛ̃), (œ̃); on les entend dans bon, banc, bain, un.

-- Nos habitudes d'orthographe nous font facilement croire que les voyelles des mots pin, un, sont (i) et (y) nasales. Mais si on s'exerce a prononcer (a-ā), (ɛ-ɛ̃), (œ-œ̃), (ɔ-ɔ̃), on se rendra bientôt compte du mécanisme de la nasalation: dès lors on pourra facilement former toutes les autres voyelles nasalées, et on reconnaîtra que (i), (y) n'existent pas en français. On les trouve dans d'autres langues, notamment dans certains dialectes de l'Est de la France.

164. - A Paris, on confond souvent les voyelles (a) et (ɔ); alors il n'y a plus de différence entre les cheveux blanc et les cheveux blonds. Dans la prononciation populaire, on confond aussi (ɛ) et (œ).4

1 = bouche plus fermée, Τ = bouche plus ouverte.
4Ibid., p. 84.
In preparing a French audio-lingual course, the programmer would have to specify which phonemic contrasts the student would be expected to discriminate and differentiate upon completion of the course because as Valdman points out:

Depending on the speaker's geographical and social provenience, the style used, and position in the phonological phrase, French exhibits from seven to sixteen vowel phonemes (Table I).

Table I

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<td>i</td>
<td>ü</td>
<td>u</td>
</tr>
<tr>
<td>ê</td>
<td>ë</td>
<td>ë</td>
</tr>
<tr>
<td>a</td>
<td>â</td>
<td>â</td>
</tr>
</tbody>
</table>

Vowels separated by solid lines constitute the minimum inventory; the nasal vowels separated by -- broken lines do not occur in Southern French; vowels separated --- broken lines are in free alternation or complementary distribution in many dialects; vowels to the left of dots (•••) occur only in formal style.5

In selecting phonemic distinctions most programmers use the speech of the educated Parisian as their model. Fernand Marty bases his selection of phonemic elements for a

French programme on a linguistic study he has made of the French language (this study was designed for pedagogical purposes and was not intended to be comprehensive). He distinguishes sixteen vowel phonemes and emphasizes the vowels /i/, /y/, /u/, /ɛ/, /ʊ/, /ɔ/ because no matter where these phonemes appear (final or non-final, checked or open syllable) a Frenchman's ear is very sensitive to them and any variation is non-standard. He also discusses the vowels /œ/, /œ/ in final or non-final positions and checked or open syllables, the unstable vowel /ə/, the vowels /e/ - /ɛ/, /a/ - /a/ and the nasal vowel /œ/ which some Frenchmen have replaced with /ɛ/.

However, in actually selecting elements for his French course, Marty does not present a comprehensive description of French vowel phonemes in paradigm form, but chooses to emphasize the areas which are essential for a mastery of the language. While certain areas of student difficulty in pronunciation are taught at the same time as the morphology, the structures, and the vocabulary, Marty begins his programme by conditioning a core of phonemic distinctions:

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Our experiments have shown that students have difficulty in distinguishing between /e/ and /ɛ/; /ø/, /œ/, and /œ;/ /o/ and /ɔ/; /a/ and /ʌ/; /ɛ/ and /œ/. Since these contrasts are not phonemically important enough to justify long drills, we have decided to teach only /i/, /y/, /u/, /e/, /o/, /ɛ/, /ʌ/, /œ/ in this unit and to postpone the study of the other vowels.7

For example, in his French programme Marty does not teach the French nasal vowel /œ/ until unit five, page 78, and then it is to emphasize the contrast in the quantity articles un and une.8

Marty bases his selection of phonemic contrasts for a French course on the areas where difficulties are likely to occur and where these difficulties will cause serious problems in communication.

Some errors of pronunciation lead to gross difficulties of communication; for example, a student who does not know how to make a clear contrast between /y/ and /u/, /œ/ and /ʌ/, etc. might be understood as saying Mettez-le dessous and Il sent mauvais when actually he is trying to say Mettez-le dessus and Ils sont mauvais. Contrasts such as these are therefore essential since meaning depends on them. They are called phonemic contrasts; the vowel sounds /œ/, /ʌ/, /y/, /u/ represent different phonemes.

7 Marty, Linguistics Applied to the Beginning French Course, p. 4.

On the other hand, a student who speaks French with an American /r/ may experience no difficulty in communication. The contrast between French /r/ and American /r/ is of a phonetic nature. From the communication point of view, phonetic contrasts are less important than phonemic contrasts. 9

The student is not presented with phonetic or phonemic symbols in the belief that the use of such transcription would confuse him when conventional spelling is introduced. The phonemic symbols are only presented in the discussions for the teacher.

A course which attempts to programme a limited, specialized area is that of Elaine Burroughs, A Programmed Course in French Phonetics. 10 With the consideration of integrating the course into the general framework of a school curriculum, the programming of specialized skills such as spelling or phonetics may prove to be more expedient than the programming of an entire course. However, this particular course was one of the first attempts at programming and Valdman has raised some valid criticisms as to an artificiality of language — slow, monosyllabic

9 Marty, Linguistics Applied to the Beginning French Course, p. 3.

utterances, and the lack of a thorough specification of desired terminal behaviors.

The general content and goals of the course are:

To perfect a native or near native pronunciation of French sounds. . . and to achieve a firm grasp of (a) syllabication, (b) elision, (c) liaison, (d) the loss of the weak vowel in rapid speech.11

The model of speech used in the programme is that which is characteristic of a cultivated Parisian (the author). Nowhere are the terminal objectives of the programme stated in the rigorous, objective method which characterizes Fernand Marty's course. While the description of the specific behavior expected of a student upon completion of the course is vague, a more important objection raised by Valdman concerns the linguistic content of the course.

A course in French phonetics should be based on an up-to-date model of language design and contain accurate facts about the structure of the language. While the material contains such terms as "graphemes", i.e., letters, and claims to present a brief introduction to the "linguistic approach" the author does not seem to be aware of the now widely accepted notion of the phoneme, nor does he make significant use of contrasts both French/French and French/English in the teaching of sound perception and imitation. French linguists and phoneticians would find objection to such statements as: "the vowel

11 Burroughs, A Programmed Course in French Phonetics, Introduction.
sound [ɛ] is always followed by a consonant sound. Thus, it never appears at the end of a syllable" (p. 25). How then do Frenchmen realize the contrasts imperfect/past definite, e.g., je donnais versus je donnai or conditional/future, e.g., j'irais versus j'irai? It would indeed be neat if the opposition /ɛ/ versus /ɛ/ were neutralized everywhere by everyone and the above rule applied, but the fact that /ɛ/ does occur in items like met, baie, is precisely what characterizes "le parler des Parisiens cultivés". The following excerpts are not only grossly inaccurate but constitute poor pedagogy to boot: (1) French [u] is similar to the vowel in the English word FLUTE, but again, it is shorter (How about tension and non-gliding?) (2) [o] is formed in the front of the mouth with the lips rounded and tense. In rapid speech it is barely audible. (When mute - E is retained it is a full vowel, when it is deleted it is zero.) (3) [ɔ] is similar to the vowel sound in the English word "tote" but shorter. Remember that all French vowels are short. (How about peur, pause, pêse, rage?).12

Since a phonetics course would probably be used in a more advanced class, one that had already mastered the minimal sound elements, it is phonetic considerations which would be important. A course which presents only those sound elements which are necessary for a basic comprehension of the language might be justified on an elementary level, but in a programme which deals with phonetic elements of the language, this is an oversimplification. It is unfortunate that this programme has not presented a more careful and accurate linguistic description of the phonological aspects of the language. It is currently the only programme dealing with French phonetics commercially available.

12 Valdman, French Review, p. 421.
The development of an audio-lingual programme by Mueller and Niedzielski has been particularly interesting. The programme was first constructed under Project ALLP II, directed by F. Rand Morton, and the first trial test for feasibility and revisions was conducted at the University of Akron in 1963-64. Mueller had analysed the language into four subsystems: phonemic, intonational, morphemic and syntactic, and the student was to acquire automatic control over these systems - "acoustic-mechanical" linguistic habits. The emphasis was placed on habit-forming responses and operant conditioning schedules.

The original ALLP French programme consisted of four parts: phonology, basic vocabulary, syntactic structures and conversations. Mueller describes the section on phonology:

Part I consists of 500 frames, totalling 30 hours of recorded materials, and subdivided into 25 problems. Each problem centering around a sound or a group of sounds is subdivided into discrimination frames, vocalization frames, phonemic symbol frames and syntax frames. 

The traditional method of teaching pronunciation was to present an utterance in which the meaning was the

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13 Mueller, Trial Use of the ALLP French Program at the University of Akron, 1963-64.

14 Ibid., p. 4.
essential factor. Mueller, however, in this early version of the programme felt that the student should not have to contend with both lexical meaning and sound patterns. He separated the two and in the first part of the programme which deals with phonology, lexical meaning is reduced to an absolute minimum:

During the entire Part I lexical meaning is withheld from the student. The student learns to discriminate and to mimic without knowing the meaning of what he is saying. 15

Based on the results of the trial testing of the French programme, various revisions are suggested by Mueller in Part I in the areas of length, discrimination, and the sequencing of sounds. In the separation of lexical meaning from sound patterns, Mueller found that student attitude might necessitate changes in the programme. He comments:

Merits of withholding lexical meaning:
During Part I lexical meaning is withheld. This total absence of meaning contributes largely to the feeling of discouragement on the part of the students. On the other hand it does permit total concentration on pronunciation and probably speeds the formation of the new speech habits. Whether a very small amount of meaningful utterances added

15 Mueller, Trial Use of the ALLP French Program at University of Akron, 1963-64, p. 4.
to each problem, particularly useful phrases, would tend to deteriorate their pronunciation has been questioned. It is suggested that the addition of a moderate amount of lexical meaning will serve to motivate the student. 16

In the second trial use of the ALLP French Programme in 1964-65 Part I has been completely rewritten and vocabulary frames have been added. Lexical meaning of whole utterances is introduced, rather than of individual words. Mueller summarizes the revisions:

The changes and additions alter Part I of the original program and provide some major additions to Parts III and IV. One of the basic concepts according to which the original Program was constructed, namely the total separation of the various elements constituting the ability to speak (Tasks I through V) is affected. The distinctions between the original "tasks" are further reduced and a much more tightly organized program results from it. In the original proposal for the ALLP II Program in French, 1962, the term "spiral construction" was used to describe the grouping of the original tasks. In the Revised French Program, this concept is further expanded to include vocabulary with its lexical meaning in Part I and further reduces the distinction between the original "tasks". Reading is introduced at the end of Part I and is maintained throughout the rest of the Program. Writing is introduced at the end of each problem in Part III and maintained through the necessary exercises. There are a number of apparent adjustments made to the student's preferences:

explanations, earlier inclusion of lexical meaning, grammatical charts, and more formal testing. Such adjustments do not compromise the basic programming principles. They secure the student's cooperation and good will. The student's preconceived notions of language learning, which are deeply ingrained, cannot be changed overnight through a new learning concept.

Furthermore, some of the programming principles followed in the Revised French Program such as withholding explanations and lexical meaning for a major portion of the learning process, are still the subject of debate among several experts in the field. (See the work of Professor Stanley Sapon in his Spanish program).17

Most French programmes introduce lexical meaning from the beginning but Mueller initially chose to teach sounds without any reference to meaning. While theoretically he found it desirable to have the student master the phonological system of French before proceeding to vocabulary, syntax and conversation, in actual practice this first part of his programme was so long and dull that student motivation was low. Revisions in this area of the programme were based on student attitude. It remains to be shown by controlled experiments whether the introduction of lexical meaning does, in fact, impair the acquisition of phonetic habits.

In his books, Marshall McLuhan explores the implications of the spoken versus the written word. He emphasizes

the change from a "visual" world - the world of the printed or written word - to a sensory or "acoustic" world of electrical technology. He feels that this change will have definite significance on man's orientation to the world and his relations to other men. He comments on these changes:

The dominant organ of sensory and social orientation in pre-alphabet societies was the ear - "hearing was believing". The phonetic alphabet forced the magic world of the ear to yield to the neutral world of the eye. Man was given an eye for an ear.

Western history was shaped for some three thousand years by the introduction of the phonetic alphabet, a medium that depends solely on the eye for comprehension. The alphabet is a construct of fragmented bits and parts which must be strung together in a line, bead-like, and in a prescribed order. Its use fostered and encouraged the habit of perceiving all environment in visual and spatial terms - particularly in terms of space and of a time that are uniform,

\[ c,o,n,t,i,n,u,o,u,s \]

and

\[ c-o-n-n-e-c-t-e-d. \]

The line, the continuum - this sentence is a prime example - became the organizing principle of life. "As we begin, so shall we go". "Rationality" and logic came to depend on the presentation of connected and sequential facts or concepts.

For many people rationality has the connotation of uniformity and connectiveness. "I don't follow you" means "I don't think what you're saying is 'rational'". Visual space is uniform, continuous, and connected. The rational man in our Western culture is a visual man. The fact that most conscious experience has little "visuality" in it is lost on him.

Rationality and visuality have long been interchangeable terms, but we do not live in a primarily visual world any more. ..
Ours is a brand-new world of allatoningess. "Time" has ceased, "space" has banished. We now live in a global village. . . a simultaneous happening. We are back in acoustic space. We have begun again to structure the primordial feeling, the tribal emotions from which a few centuries of literacy divorced us. . . At the high speeds of electric communication, purely visual means of apprehending the world are no longer possible; they are just too slow to be relevant or effective. . .

Electric circuitry profoundly involves men with one another. Information pours upon us, instantaneously and continuously. As soon as information is acquired, it is very rapidly replaced by still newer information. Our electrically-configured world has forced us to move from the habit of data classification to the mode of pattern recognition. We can no longer build serially, block-by-block, step-by-step, because instant communication insures that all factors of the environment and of experience co-exist in a state of active interplay.18

What, then, does this have to do with foreign language teaching? In studying the recent trends in language teaching, it can be seen that there has been an increasing emphasis on the spoken language. Many linguists and language teachers consider the written language as a secondary form and feel that the primacy of speech should be emphasized. This does not mean that the literature of the language is placed on an inferior scale, but that the study of literature should be based on a firm knowledge of command of the spoken

18 McLuhan and Fiore, The Medium is the Message, pp. 44-45 and 63.
language. Literary problems of language instruction have not been discussed in this paper, but there seems to be validity in this viewpoint. Much of the beauty of French literature is lost if a student does not have an adequate knowledge of the sounds of the language. This is true for French poetry as well as prose.

In order to give equal importance to audio-oral and spelling-reading skills of the spoken and written language, it is necessary to re-analyze the language. Most language textbooks have based their analysis of the language on the written form of the language. As McLuhan notes:

> Most people find it difficult to understand purely verbal concepts. They suspect the ear; they don't trust it. In general we feel more secure when things are visible, when we can "see for ourselves". We admonish children, for instance, to "believe only half of what they see, and nothing of what they hear. All kinds of " shorthand" systems of notation have been developed to help us see what we hear.19

Since the analysis of the language in most textbooks is based on the written form of the language, the grammar which is presented is based on visual signs - e is the most usual sign for the feminine, nt is usually the sign for the third person plural, a is generally the sign for the plural. However, there is actually quite a difference between the grammar of spoken and the grammar of written French.

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19 McLuhan and Fiore, *The Medium is the Massage*, p. 117.
For example, the number and type of structural marks or "signifiers" will vary greatly in the spoken versus the written language. In the contrast between the singular and plural form there will be many visual clues but only a few acoustic differences. In the following sentence there are four visual signs which indicate the change from singular to plural:

Leur train principal marche bien. - Leurs trains principaux marchent bien.

However, in the spoken form there is only one acoustic change between the singular and the plural form; the adjective is modified:

singular - /lœʁтрɛprɛsɪpalmʁəbjɛ/.
plural - /lœʁтрɛprɛsɪpɔʁmaʁəbjɛ/.

In another example, Ma fille travaille - Mes filles travaillaient, there are three written changes from singular to plural, but only one acoustic change; the vowel sound of the determinative is modified. In the following sentences, Leur bateau est neuf - Leurs bateaux sont neufs there are four written changes, but only one audio change; the verb is modified.

There are many other examples of this type, while such languages as English or Spanish have many spoken

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20 See page 149.
indications as to whether the sentence is singular or plural, spoken French will often indicate the plural by only one sound change. This means that Mueller's technique of training the student to recognize "acoustic signifiers" \(^{21}\) - sounds or groups of sounds which carry grammatical meaning and can differentiate utterances from each other - has special relevance in teaching French. Before the student even knows the semantic meaning of the words in a sentence, Mueller trains him to recognize key sounds in the utterance which will distinguish one sentence from another. While the eye looks for visual signs, \(\text{er, x, or nt}\) endings, the ear must be trained to listen for audio, vocalic changes taking place in articles, adjectives, verbs, or liaisons between adjectives and nouns or nouns and verbs, etc.

It might be interesting, now, to compare the analysis and presentation of verbs in a more traditional programme such as Elaine Burroughs' *Programmed French: Reading and Writing* and a programme which emphasizes the spoken language, such as Fernand Marty's *Active French: Foundation Course*. Burroughs has used the traditional written French classification which divides the verbs into the following three categories in the present indicative:

1. **er** verbs such as *chanter*

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<tbody>
<tr>
<td>je chante</td>
<td>Nous chantons</td>
</tr>
<tr>
<td>Tu chante</td>
<td>Vous chantez</td>
</tr>
<tr>
<td>Il chante</td>
<td>Ils chantent</td>
</tr>
</tbody>
</table>

\(^{21}\)See page 149.
2. **ir** verbs such as *finir*

- **Je finis**
- **Tu finis**
- **Il finit**
- **Nous finissons**
- **Vous finissez**
- **Ils finissent**

3. **re** verbs such as *vendre*

- **Je vends**
- **Tu vends**
- **Il vend**
- **Nous vendons**
- **Vous vendez**
- **Ils vendent**

However, verbs of frequent use such as *mettre, venir, partir, sortir, vivre, dormir, écrire, sentir, lire, prendre* and others, cannot be included in this classification and must be taught as irregular forms.

Burroughs does not present verbs in a paradigm, but introduces the student gradually to the different forms (one objection to the programme is that the student learns these forms much too gradually). In the first book of the programme (400 pages) the student only learns the third person singular and plural of the present indicative and the infinitive. In the second book he is presented with the first person singular of the present indicative in Chapter II (page 43), and the first person plural in Chapter III (page 84). The second person singular of the present indicative is given in Chapter IV (page 133) and the second person plural is presented in Chapter V (page 184). The student must complete at least 600 pages before he knows the conjugation of verbs in the present indicative tense. This appears to be impractical, though the completion time has been averaged as only about thirty hours for each book.
Marty has classified verbs according to their spoken form and he feels his classification offers the advantage of including most of the frequently used verbs mentioned above, which the traditional written classification must exclude. Marty divides the verbs into three types in the present indicative tense. In Type I verbs, the third person singular and plural are identical:

/ilđăs/ /ilđăs/ il danse ils dansent
/ìl'ät/ /il'ät/ il chante ils chantent

Verbs of this type have only three spoken forms, but five written forms. Included in Type I verbs are chanter, manger, arriver, aimer, acheter and others.

In Type II verbs the difference between the third person singular and the third person plural is made by the addition of a consonant sound:

/ilfini/ /ilfinis/ il finit ils finissent
/ildör/ /ildörn/ il dort ils dormant

The verb has four spoken forms and five written forms. Some Type II verbs are finir, partir, dormir, lire, servir, écrire, devoir, vendre, vaincre and others.

Type III verbs form the third person plural by modifying the final vowel sound of the third person singular and adding a consonant sound:

/ilse/ /ilsav/ il sait ils savent
/ilvœ̃/ /ilvœ̃l/ il veut ils veulent
Some Type III verbs are savoir, prendre, craindre, joindre, apprendre, pouvoir, venir, vouloir, comprendre, and others. The written conjugation has five different forms while the spoken conjugation has only four. Marty also describes various vowel shifts which occur in verbs in each type. For example a Type III verb such as savoir has a vowel shift in its root from /e/ to /a/: /səvər/ je sais /nusəvɔ/ nous savons.

Marty makes the following comments on the presentation of his materials:

In most textbooks today, the "grammar" is presented either without any apparent logical order or in an order which is dictated by the cultural material on which each chapter is based. The result is that some important linguistic facts are omitted, some are presented in the wrong place, some are repeated uselessly, and some are separated when they should be grouped.

In a basic course, the system of classification must include only the most important structures and it must classify them in such a way that only one difficulty appears at a time; the easiest step is taught first, then it is used as a base for the second, and so on until all the basic structures have been taught.

Our forthcoming first-year text will use the order of presentation which we have developed after several years of experimentation. The easiest structure in spoken French is the type:

Chantez/Chantons/Chante Dormez/Dormons/Dors

The student then proceeds to sentences of the structural type:

Ne chantez pas, Ne dormez pas, N'entrez pas, etc., where the only morphological difficulty is the rule concerning the fall of /a/. The next few chapters are concerned with structures based only on verbs, adverbs, and interrogative combinations. Articles and nouns do not appear
until the seventh chapter.

This need for an orderly presentation of the structures can be expressed in a simpler — if somewhat naïve — manner. When building a house, it is not sufficient to know how to construct the walls, install the doors and windows, place the wiring, connect the plumbing, paint the walls, etc. These various operations have to be performed in an order which permits maximum efficiency. If this logical order is not respected, a brand-new wall may have to be demolished in order to do some work which should have been done before the wall was built.

We have to realize that the teaching of a foreign language is a complex undertaking which must be thoroughly planned. We have to achieve in a few hundred hours what the native child has achieved in over 50,000 hours of trial-and-error practice. Again we must state that our goal is TIME; every time he has to backtrack and group the linguistic facts differently, the students are confused and time is wasted. 22

It can be seen by Marty's treatment of verbs that an analysis based on the spoken form differs significantly from the traditional written classification. While he has re-classified the verbs according to their spoken form, Marty still presents the conjugation of the present indicative tense in a paradigm. In the second unit he introduces the student to the imperative form, the simplest French sentence, and he proceeds in Unit three to present the paradigm of a Type I and Type II verb. For example, on page nineteen he

presents the paradigm of a Type I verb, manger:

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Je</td>
<td>mangé</td>
<td>Nous mangeons</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tu</td>
<td>manges</td>
<td>Vous mangez</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Il</td>
<td>mange</td>
<td>Ils mangent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elle</td>
<td>mange</td>
<td>Elles mangent</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

On page twenty-three he presents the paradigm of a Type II verb, lire:

<p>| | | | | |</p>
<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Je</td>
<td>lis</td>
<td>The letter s does not</td>
<td>Vous lisons</td>
<td></td>
</tr>
<tr>
<td>Tu</td>
<td>lis</td>
<td>represent any sound.</td>
<td>Vous lisez</td>
<td></td>
</tr>
<tr>
<td>Il</td>
<td>lit</td>
<td>The letter t does not</td>
<td>Ils lisent</td>
<td>24</td>
</tr>
<tr>
<td>Elle</td>
<td>lit</td>
<td>represent any sound.</td>
<td>Elles lisent</td>
<td></td>
</tr>
</tbody>
</table>

Throughout the rest of the programme verb forms are presented in a paradigm. In Book One Marty presents the conjugation of the present indicative tense, the imperative, the immediate future (aller + infinitive), the immediate past (venir de + infinitive) and the emphatic present (être en train de). Completion time for Book One (409 pages) has been averaged by the author to be one hundred and twenty hours.

**Conclusion**

The construction of a French programme necessitates a rigorous linguistic and behavioral analysis of the terminal objectives of the programme. Various problems arise in French programmes in determining which elements and style


of the language should be taught. While many of the difficulties are not common only to programmes, the insistence in programming on a rigorous specification of terminal objectives emphasizes them.

In the area of phonology it would be necessary to select those sound features which are essential for an elementary understanding of the language. However, depending on the locality and style, French speakers will vary in the phonemic distinctions they maintain. For example, not all speakers will distinguish the four nasal voyels (ã), (ɔ), (œ), (œ). Passy has noted that even in Paris there is a tendency to confound (ã) and (ɔ) and (œ) and (œ), resulting in a confusion between such words as (blanc/blond), or (brin/brun), (emprunte/empreinte). Valdman also discusses some of the reasons for the tendency toward the loss of (œ).25

Different programmers have approached this problem in different ways. A majority of audio-lingual programmes will begin with distinctions of three nasals (ɔ), (ã), (œ) and much later in the programme introduce the fourth nasal (œ). The distinction between (ã), (ɔ), (œ) are emphasized throughout the programme but the late introduction and small amount of space devoted to (œ) minimizes its importance.

Some programmes appear to have eliminated the distinction (C - Æ) completely and present only (C).

Studies and experiments in the area of discrimination and differentiation training will be crucial in the field of language programming. A basic principle of programmed instruction is that student responses must be reinforced for effective learning. In the area of pronunciation, this reinforcement could be given by a teacher, by some mechanical device or by the student himself. In a typical language class in a high school or university, interaction between teacher and student is minimal, and it is unlikely that much active student participation or confirmation of responses could be expected in the classroom. Most of the students active responses will take place in the language laboratory and since a mechanical device for analyzing responses has not yet been sufficiently developed (at least one that is practical in a language laboratory) the student must compare and evaluate his own responses with that of a recorded native voice.

In a French programme the student would learn to discriminate between French sounds and English near equivalents, (bow/beau), (do/doux), to emphasize the necessity of vowel tension, lip-rounding and non-diphthongization in French sounds. He would also learn to differentiate between different French sounds (vu/vous), (chou/chaud).
The problem which arises is whether this type of training will enable a student to judge his own pronunciation. Numerous studies are now being conducted in this area. This is an essential question for the programming of audio-lingual language courses because if a student is unable to adequately compare and evaluate his pronunciation with that of the taped material his responses are not being reinforced and effective learning is not taking place.
CHAPTER V

STRUCTURE AND MORPHOLOGY

This section will be concerned with problems which arise in the programming of structural and morphological elements of French. In particular, difficulties in the selection and presentation of these elements will be discussed. Most programmers are aided in their selection of structure and vocabulary by linguistic and scientific studies of the frequency of linguistic elements. Current studies of the spoken language by such people as Georges Gougenheim enable a programmer of an audio-lingual course to select language elements which are essential to spoken French. The structures and vocabulary included in an audio-lingual course which has been based on an analysis of the spoken language will vary considerably from more traditional texts which have a literary emphasis.

Though most programmers depend on linguistic studies for their subject matter analysis, the presentation of linguistic elements is ultimately determined by student response. Programmes are continuously tested and revised and it is this empirical approach which makes programming research so valuable to the foreign language teacher. This aspect of programming is quite important because much New Key material has been accepted by teachers without adequate
evaluation. By their emphasis on testing and validation of language materials, programmers exhibit a healthy reaction to the previous attitudes of uncritical acceptance. However, a majority of the French programmes investigated in this paper do not go far enough in this direction. Most French programmes appear to be adaptations of traditional texts, or New Key materials, and only a few programmers (such as F. Marty, Th. Mueller, or A. Valdman) have undertaken serious research into the most effective and efficient presentation of language materials.

While much laboratory experimentation has been conducted in the area of phonology, programmers are hampered by the dearth of pertinent scientific data in syntax and morphology. Several experiments have been cited in this paper, and Berko's experiment in the child's acquisition of English morphology is particularly interesting because it emphasizes the importance of analogy in language learning. However, most scientific research has been in the area of the child's acquisition of a first language, and this may have only limited relevance to adult second language learning.

Lexical problems have not been treated under a separate heading because they generally occur in relation to phonological or structural difficulties. Mueller has been investigating the problem, as has been seen in the section on phonology, of whether the presentation of meaning and sound
patterns together impedes the acquisition of correct pronunciation habits. He feels that in the early stages, attention to lexical meaning is a hindrance in establishing the desired structural automaticity. Lexical and structural problems are also often inter-related. Certain French adjectives modifying particular nouns will change meaning according to their structural position in the sentence. These adjectives present the student with both lexical and structural difficulties simultaneously.

While actual classroom testing of a programme will determine its final form, programmers often turn to linguistic science to gain greater insight into the systematic structure of language. In constructing a programme and in determining learning steps, programmers often use linguistic techniques such as formal contrast, structural marking, transformation grammar and tagmemics. Each of these techniques will be investigated in relation to their application to French programmes.

Presentation of Language Materials

Foreign language teachers have in the past turned to linguistics for the specification of terminal behaviors. While the linguist might assume the role of subject matter expert in the construction of a programme, a scientific description and analysis of a language is not necessarily the most effective pedagogical presentation of materials.
In a conference of language programmers at Ann Arbor, Michigan, D. M. Brethower comments on the interdisciplinary nature of programming:

The participants in the present conference include linguists and psychologists --- objective evidence that members of the two disciplines have come together in the study of a common problem. Both linguists and psychologists can make, and have made definite contributions to the programming of language. To idealize for a moment, the contribution of the linguist is in the specification of what to teach, that of the psychologist is in the specification of how to teach it. To return to reality, linguists are not in complete agreement as to what to teach nor are psychologists in agreement as to how to teach it. Partly as a consequence of the interdisciplinary disagreement the language programmer -- be he linguist or psychologist finds himself concerned with problems in both areas. The linguist is wary of accepting what the psychologist tells him and the psychologist is wary of accepting the pronouncements of the linguist.1

Harlan Lane, a Skinnerian psychologist involved in problems of second language learning, has commented on "The good fortune of the language programmer because in the field of linguistics he finds an entire discipline devoted to the systematic specification of terminal behaviors".2


2 Lane, Teaching Machines and Programed Learning, Volume II: Data and Directions, p. 584.
This statement implies a confusion between the objectives of linguistic science and those of language teaching, between a scientific description and analysis and a pedagogical presentation of language materials. (Sol Saporta has made the distinction between a scientific grammar and a pedagogical grammar, p. 44). While studies of linguistic structure (contrastive, transformational, descriptive etc.) and phonetic descriptions will undoubtedly be essential to a programmer, the basic process in the development of a foreign language programme is the selection, organization and presentation of these materials in a pedagogically effective and efficient manner.

Linguistic descriptions often provide the programmer and teacher with insights into the structure of the language, but they may only serve to confuse the beginning language student. Valdman has given a generative-transformational characterization of the French est-ce que yes-no interrogative sentence by the following series of transformations: The question Est-ce qu'il est là? is shown to be derived ultimately from the declarative sentence Il est là. Beginning with Il est là, the "emphatic" transformation is applied which embeds this sentence in a C'est que main clause giving us - C'est qu'il est là. After applying the inversion series of transformations we obtain the nonce form *Ce est ce qu'il

*Nonce or grammatically unacceptable form.
Valdman feels that this series of transformations is necessary to adequately and sufficiently characterize the French est-ce que yes-no interrogative sentences. From a linguistic point of view this may be true, but it would be pedagogically inexpedient and confusing to present this series of transformations to an elementary French student. Most programmes will simply have the student prefix the est-ce que structure to the declarative base sentence - Il va là which gives - Est-ce qu'il va là? It would be a mistake to think that linguistic science has provided the specification of the terminal behavior of a language course. Linguistics will aid the programmer in presenting only correct models of speech and in determining areas of interference, but the programmer's main problem is the selection and presentation of these materials.

Selection of Linguistic Elements

In the selection of which lexical and structural elements are to be included in a French course, studies by Georges Gougenheim are especially useful. The studies were sponsored by the Ministère de l'Education Nationale Supérieure de Saint-Cloud in order to scientifically determine the linguistic elements necessary for a basic

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³Valdman, Problems in the Definition of Learning Steps in Programmed Foreign Language Materials, p. 16.
understanding of French. Using recordings and tapes Gougenheim made a statistical study of the frequency of words and structures used in spoken, Parisian French, with the objective of composing a French course based on those elements of the language which were most frequent and important to communication. He comments on his studies:

Il n'en est pas moins vrai que, si l'on veut établir sur des bases scientifiques un vocabulaire d'usage, il faut commencer par dresser une échelle des fréquences. En cette matière mon collègue et ami M. Aurélien Sauvageot, professeur à l'Ecole des Langues Orientales, et moi-même nous avons, croyons-nous, apporté une innovation fructueuse en prenant comme base de nos dépouillements non la langue littéraire ou la langue écrite comme avaient fait nos prédécesseurs américains et belges, mais la langue parlée. L'utilisation de la langue parlée, qui aurait paru chimérique il y a moins de cinquante ans, est devenue possible et même aisée grâce aux progrès des magnétophones.4

Central to most modern scientific work of language is the concept that human linguistic activity is first and foremost, spoken, and only secondarily written. Programmed instruction, however, does not prescribe any view of the language and the programmer's selection of linguistic elements will be determined by the aims of his course. If his goal is primarily audio-lingual control of the language, his selection of elements should be based on frequency studies

of the spoken, rather than, literary language. Gougenheim demonstrates the disparity between literary studies of frequency and those in his study of the spoken language:

I. - Entre plusieurs mots synonymes ou quasi-synonymes, celui qui est le plus employé dans la langue parlée ressort avec vigueur, tandis que dans la langue littéraire les fréquences tendent à se rapprocher, d'une part en raison d'un maniement plus raffiné de la langue, d'autre part parce que les écrivains cherchent à introduire dans leurs écrits une variété dont la langue parlée se soucie peu.

Voici quelques exemples:

Enquête du français fondamental (1er degré) Vander Beke

<table>
<thead>
<tr>
<th></th>
<th>quand</th>
<th>lorsque</th>
<th>maintenant</th>
<th>à présent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fréquence</td>
<td>143/964</td>
<td>23/43</td>
<td>125/391</td>
<td>5/5</td>
</tr>
<tr>
<td>Fréquence</td>
<td>79/1,116</td>
<td>74/395</td>
<td>74/509</td>
<td>22/42</td>
</tr>
</tbody>
</table>

In the literary study of frequencies, then, the range of quand is close to that of lorsque, while the frequency study of the spoken language shows it to have a range six times greater. While the difference between à présent and maintenant is considerable in Vander Beke's study, 1 to 3.5 in range and 1 to 12 in frequency, this difference is even greater in Gougenheim's study where it is 1 to 25 in range and 1 to 78 in frequency.

Gougenheim also finds important differences in frequency for common verbs:

> il existe des divergences importantes, en particulier en ce qui concerne des verbes à fréquence très élevée, comme le montre le tableau suivant où les données de notre liste sont confrontées avec celles d'Henmon:

<table>
<thead>
<tr>
<th>Fréquence fondamentale (1er degré)</th>
<th>Henmon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fréquence</td>
<td>Fréquence sur 10,000</td>
</tr>
<tr>
<td>être</td>
<td>14,083</td>
</tr>
<tr>
<td>avoir</td>
<td>11,529</td>
</tr>
<tr>
<td>faire</td>
<td>3,174</td>
</tr>
<tr>
<td>dire</td>
<td>2,391</td>
</tr>
<tr>
<td>aller</td>
<td>1,876</td>
</tr>
</tbody>
</table>

Le rapport de la fréquence de ces cinq verbes sur 10,000 mots dans l'enquête du français élémentaire à leur fréquence chez Henmon varie entre 1,8 (dire) et 2,7 (aller). Ces chiffres montrent que certains verbes très usuels ont une fréquence beaucoup plus grande dans la langue parlée que dans la langue écrite, celle-ci étant beaucoup soucieuse de la variété et de la propriété des mots. 6

With certain words of an abstract or literary nature the variations are even more striking. In Gougenheim's study the following words have a very low range and frequency:

larme = 4/6, pensée = 4/4, silence = 9/11, souffrir = 14/25. 7

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6 Gougenheim, et al, L'Elaboration du français fondamental (1er degré), p. 120.

7 Ibid., p. 121.
Vander Beke's list based on literary works presents quite a different range and frequency for the same words: larme = 48/108, pensée = 49/123, silence = 51/220, souffrir = 53/168.

From the numerous comparisons that Gougenheim gives, it is possible to see that there are great differences in the range and frequency of words between the literary and the spoken language. The selection of linguistic elements should not be an arbitrary task controlled by the whim of the programmer. If the course is audio-lingual, words and structures should not be selected from frequency studies of literary works or by the programmer's vague notion of what an educated Parisian might include in his vocabulary.

Gougenheim studied the frequency of structures as well as words and an example is his discussion of which interrogative structures to include in a basic French course:

I. - INTERROGATION PORTANT SUR L'ACTION VERBALE.
A) Le sujet est un nom:
   Type avec est-ce que (Est-ce que votre ami vient?): 33 exemples.
   Type avec reprise du nom par un pronom personnel (Votre ami vient-il?): 5 exemples.
   La Commission a donc adopté sans hésiter comme type unique: Est-ce que votre ami vient?

B) Le sujet est un pronom personnel (y compris on) ou le pronom ce.
Type avec est-ce que (Est-ce que tu viens?): 59 exemples.
Type avec inversion (Viens-tu?): 120 exemples.
Ici les chiffres sont beaucoup plus rapprochés.
Dans la première édition, seul le type avec est-ce que était enseigné.
Il a paru opportun d'y ajouter le type avec inversion.9

Besides the frequency of words, Gougenheim has found it necessary to form another category of word dependent on their "disponibilité". A word such as "fourchette" is known by any four year old French child, but though a fork is used three times a day, the word rarely occurs in everyday speech. In order to determine the "degré de disponibilité" of words, Gougenheim has had recourse to the method of "centre d'intérêt" such as clothing, parts of the body, food and drink at meals, and others. By testing and investigating the vocabularies of French school children he was able to determine which concrete nouns in each center of interest were most common and important to know.

With the current emphasis on the primacy of the oral language, ordinary everyday speech is considered fundamental. This does not mean that literature is neglected but it is felt that the student will develop a keener appreciation of literary works if they are presented against a background

of ordinary speech. Programmers have used different criteria in their selection of linguistic elements to include in an audio-lingual course. Mueller and Niedzielski\textsuperscript{10} have based their selection of structural elements on those listed in Gougenheim's "Le Français fondamental (1° degré)", and "Le Français élémentaire", also by Gougenheim.

Fernand Marty has made his own linguistic study of French, "Linguistics Applied to the Beginning French Course",\textsuperscript{11} and his selection of structural and morphological elements for his programme is largely determined by this study. The structural progression, size of steps, and the wording of the descriptive statements have been determined by testing student groups over a period of fourteen years:

The structures are so complex and so numerous that we cannot hope to teach them all in a basic course. By experimentation, we have eliminated the least important ones, and we now have a body of structures which are essential to basic communication and which can be acquired within the time limits of a basic course.\textsuperscript{12}

While a detailed discussion of each structural, morphological and phonological item can be found in Marty's linguistic study of French, it is interesting to see the


\textsuperscript{11}Marty, Linguistics Applied to the Beginning French Course.

\textsuperscript{12}\textit{Ibid.}, pp. 20-21.
general considerations which determined the inclusion of various items in his French course. In the selection of structures Marty comments:

This is where the greatest amount of selection can be made. For example, there is no need to teach our beginners all the different ways to ask a question; there are nine common ways to express *How long have you been here?*, but *Depuis quand êtes-vous ici?* will serve our basic needs. *Qui parle?*, *Qui connaissez-vous?*, *A qui pensez-vous?* are easier to learn than *Qui est-ce qui parle?*, *Qui est-ce que vous connaissez?*, *A qui est-ce que vous pensez?*. Thus our students can be taught to express a maximum number of concepts while learning a minimum of structures. They will express themselves more rapidly and more readily if they do not have to choose. SPEECH AUTOMATISMS ARE ACQUIRED MORE RAPIDLY IF NO CHOICE HAS TO BE MADE.

Later, when the students meet *Combien de temps y a-t-il que vous êtes ici?* or other synonymous structures of what they have learned, it will be simple to refer them to the structures they already know. It would be wise then to advise them to keep using the structures they are familiar with (*Depuis quand êtes-vous ici?*) and to store the synonymous structures in their passive knowledge of the language.13

In his selection of morphological elements for his course, Marty has eliminated certain forms which were generally included in a grammar-translation course:

We should teach only the forms that are frequently used in cultured speech. The following forms can be eliminated in the basic course:
- simple past
- imperfect and pluperfect subjunctive
- most optional liaisons. . .[Here Marty has included, however, all compulsory liaisons and the optional liaisons which are generally made in natural cultured speech (such as: Il est espagnol).]
- most difficulties created by hiatus words

Many rules about irregular feminine and plural forms can be simplified if rare words (landau, pou, joujou, etc.) are eliminated.14

In his selection of vocabulary words, Marty again avoids redundant elements:

1. The principle of no-choice is also applied here and synonyms are eliminated; the students must be able to express a maximum number of ideas while learning a minimum number of words; for example, there is no need to teach lorsque, de bonne heure, environ, aussitôt que, davantage, à côté de, etc. since quand, tôt, à peu près, dès que, plus, près de are words generally preferred in cultured natural conversation.15

The difficulties that Marty experiences in his choice of vocabulary for his programme are similar to those of Georges Gougenheim. Gougenheim found it necessary to supplement his frequency study with words grouped according to their "disponibilité", in various centres of interest.

14 Marty, Language Laboratory Learning, p. 20.
15 Ibid., pp. 20-21.
Marty comments on the problems of selecting vocabulary:

2. It is agreed that the selection of vocabulary should be made according to the frequency of use in cultured conversation, but this principle is extremely difficult to apply. There are some 500 words (for example, le, la, les, faire, être, avoir, mon, ton, son, etc.) which without doubt belong to this list, but our choice becomes increasingly difficult after that. Frequency depends on age, sex, occupation, social level, marital status, number of children, hobbies and friends, the seasons (mal de gorge is hardly ever used in the summer), the geographic location (mer is hardly ever heard among the inhabitants of Lyon, neige is rarely used in Bordeaux), etc.

Therefore, our basic vocabulary list should not be based only on a frequency count; it should be tempered with commonsense and adapted to the needs of the American student (to him, vitrail is more important than cave, even though a Frenchman goes down to the cellar more often than he goes to look at stained-glass windows).16

Marty also points out that while his list of words is short, it is not an oversimplification of grammar because most of the words presenting morphological difficulties (irregular verbs, irregular feminines and plurals, etc.) are high-frequency words which will appear even in a 1,000 word list. He emphasizes the necessity of teaching the student structures and forms, rather than vocabulary lists.

An important aspect of programming which has already been noted, is the emphasis placed on a description of the behaviors expected of a student. The distinction between active and passive knowledge has been discussed by Pierre

16 Marty, Language Laboratory Learning, pp. 20-21.
Leon in relation to various styles of speech. While a student might be expected to recognize /T as compris /
tak5pri/ as well as /tu as compris /tyak5pri/ and /isepaskidi/ as well as /iln@sepaskildi/ he would only be expected to produce the longer forms. Marty has applied the notion of active and passive behaviors to his selection of structural elements. He has found, through experimentation with student groups, that speech automatisms are best facilitated by the elimination of redundant structures. The students learn a core of material for active production and they later acquire the redundant structures as passive knowledge, for recognition.

Programmes which only teach reading and writing have also used the concept of active and passive behavior. Elaine Burroughs describes the following objectives for Book I:

The student learns to read and write simple French prose. At the end of the first book, he has an active vocabulary of 550 words which he can recall and spell. He has a passive vocabulary of 250 additional words. He is familiar with basic French structural patterns.17

It might be argued that this is not an especially thorough description of the terminal objectives of the course. The reader is referred to the Table des Matières for a more detailed breakdown of the contents but nowhere does he learn

what "familiarity with basic French structural patterns" means. Is the student merely supposed to recognize these patterns, or is he supposed to actively use them?

Current Research in Syntax and Morphology

Unfortunately, in the most important area of language instruction, the conditioning of syntactic responses, there is very little pertinent scientific data. The effect of the structure of the language on learning has been studied by Horowitz in 1955.\textsuperscript{18} He has shown that consistent language structures are easier to learn than inconsistent ones and that learners will tend to make errors by following analogic patterns. Thorndike also demonstrated in 1933 that a constructed language such as Esperanto, which showed great regularity, was easier to learn than a natural one.\textsuperscript{19} Experiments by Miller and Selfridge\textsuperscript{20} have described the powerful effects of patterning in recall, and Miller\textsuperscript{21} has investigated some psychological aspects of transformational grammar, and reports several experiments on the effects of


\textsuperscript{19}Thorndike, \textit{Language Learning: Summary of a Report to the International Auxiliary Language Association in the United States, Inc.}


\textsuperscript{21}G. A. Miller, "Some Psychological Studies of Grammar",
patterning on speech perception. Brown and Berko\textsuperscript{22} and
Brown and Fraser\textsuperscript{23} have described the patterning of linguistic
elements in the language of children.

Laboratory experimentation in the field of syntax
has been meager, and the most important area for a foreign
language programmer, the technique for conditioning and
maintaining syntactic sequences in a foreign language, has
only recently begun to be examined experimentally. Studies
undertaken by Saporta on the evaluation of three grammatical
models in the teaching of foreign languages will be of
special interest to the programmer and language teacher.\textsuperscript{24}
A series of experiments by Scherer and Wertheimer comparing
an audio-lingual course to a grammar-translation method have
tested various assumptions implicit in the audio-lingual
habit method.\textsuperscript{25} This investigation has been more thorough
and controlled than most classroom experimentation.


\textsuperscript{22} R. Brown and J. Berko, "Word Association and the
Acquisition of Grammar", \textit{Child Development}, XXXI (March
1960), 1-14.

\textsuperscript{23} R. Brown and C. Fraser, "The Acquisition of Syntax",
in C. N. Cofer and B. S. Musgrave, eds., \textit{Verbal Behavior and

\textsuperscript{24} A. Saporta, \textit{Evaluation of Three Grammatical Models
in the Teaching of Foreign Languages} (Washington, D. C.: Government

\textsuperscript{25} Scherer and Wertheimer, \textit{A Psycholinguistic}
While structural and descriptive linguists and Skinnerian psychologists have conceived of language as sets of habits, experts in psycholinguistics have further divided language behavior into specific habits and general rules. They characterize language as rule-governed behavior and the mastery of a language implies the internalization of grammatical rules. In his paper, "Psycholinguistic Perspective on Language Learning", Anisfeld has turned to the transformational grammarians for an explanation of how these rules are acquired:

The answer that emerges from the writings of Chomsky (e.g., 1962) and others is that the child is functioning as an implicit inductive scientist. The child collects data from his environment in the form of linguistic utterances he hears, classifies them into various grammatical categories, and constructs rules to account for the regularities he discovers. He then uses these rules in producing new utterances. The system the child develops is not static but subject to revision as new linguistic data become available in the course of development. Apparently, human beings are endowed with a program for analyzing linguistic input to discover a system of underlying regularities. The amazing thing about language acquisition is that out of a collection of random, unorganized, and often ungrammatical linguistic utterances the child manages to form a well-structured system of rules. Because such a phenomenal system is mastered in a relatively short

Experiment in Foreign-Language Teaching.
time, it is suspected (e.g., Lenneberg, 1964) that the language analyzer is largely innate and that it makes a substantial contribution to the shape of the product of its analysis, i.e., to grammar. In other words, the acquisition of language depends not only on exposure to environmental stimulation but also on specific innate propensities of the organism. 

It has often been described in the language of children that grammatical errors are made by the use of an analogical pattern which happens to lead to an incorrect form. French children sometimes analogize *vous faisez for vous faites *pris instead of *pris, *les chevaux instead of les chevaux, *vous disez for vous dites, or *nous buivons for nous buvons.

Berko has studied the language of American preschool children and found that they can extend morphological rules to nonsense material with a high degree of accuracy. He describes some of the areas he wished to investigate:

To test for knowledge of morphological rules, we use nonsense materials. We know that if the subject can supply the correct plural ending, for instance, to a noun we have made up, he has internalized a working system of the plural allomorphs in English, and is able to generalize to new cases and select the right form. If a child knows that the plural of witch is witches, he may simply have memorized the plural form. If, however, he tells us that the plural of *gutch is *gutches

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*Nonce or grammatically unacceptable form.
we have evidence that he actually knows, albeit unconsciously, one of those rules which the descriptive linguist, too, would set forth in his grammar. And if children do have knowledge of morphological rules, how does this knowledge evolve? Is there a progression from simple, regular rules to the more irregular and qualified rules that are adequate fully to describe English?

In very general terms, we undertake to discover the psychological status of a certain kind of linguistic description. It is evident that the acquisition of language is more than the storing up of rehearsed utterances, since we are all able to say what we have not practiced and what we have never before heard. In bringing descriptive linguistics to the study of language acquisition, we hope to gain knowledge of the systems and patterns used by the speaker.28

The children were presented with a number of nonsense words and were asked to supply English plurals, verb tenses, possessives, and derivations and compounds of those words. Berko concluded that children do, in fact, possess morphological rules which can be extended to enable them to deal with new or nonsense words. This experiment emphasizes the importance of analogy rather than mimicry and memorization in language learning.

Use of Linguistic Techniques

In recent years language teachers have frequently turned to linguistic science to gain greater insight into

the systematic structure of language. Programmers also use linguistic techniques as an aid in constructing programmes and determining learning steps. These techniques are evident in almost all programmes, and while they are useful, programmers are unanimous that the final criteria for determining learning steps should be student response. After describing some linguistic techniques applied to programming, Valdman comments:

One should, however, caution against too literal an application of linguistic theory in the determination of optimum learning steps and in the ordering of steps into pedagogically efficient sequences. Ultimately, learning steps are determined on the basis of student response, and one should not expect necessarily a close correlation between the results of linguistic and behavioral analysis.29

Belasco describes four systematic techniques evolving from linguistic science which can be adapted to the language teaching situation.30 He stresses the fact that a teacher should be more concerned with the results or findings of these analysis than with the methods represented by each of these procedures. The four techniques are formal contrast, structural marking, transformation grammar, and tagmemics.

In a formal contrast of two languages, a linguistic analyst will describe the structures of the languages and compare them. By contrasting the significant units, phonemes,

morphemes, tagmemes and graphemes, etc., of the first language with those of the second, he will isolate precisely the points at which the two languages differ. Language teachers and programmers often use a contrastive analysis of the native and target language (the foreign language to be learned) in order to identify areas which might cause interference in learning. This analysis will often influence the amount of time spent on various linguistic items and these contrasts can also be brought to the attention of the student in order to make him consciously aware of problem areas.

In certain areas, such as phonology, the contrasts are presented directly to the student in the form of discrimination training. The student might be given information about the formation of a French sound and this sound would be contrasted with the English equivalent. The student also learns those phonological distinctions important to the foreign language which might be absent from his native language. However, whether the contrasts

are presented directly to the student, as in discrimination training, or whether they are used by the programmer in the construction of the programme and the determination of the amount of time spent in various areas, most programmes utilize some form of contrastive data.

In Marty's programme, "Active French: Foundation Course", the student is made aware of the areas of interference and the amount of practice time spent on various structural and morphological elements is determined according to the degree of interference. In his analysis of the structural interference which exists between French and English, he has found that this interference is most severe in the structures which are normally reserved for literary expression, and rather small in the structures which might be selected for a basic course, he comments:

In fact, this amount of structural interference is small enough to have the students assume that the structural order will be the same (Je resterai ici jusqu'à midi si vous voulez/ I will stay here until noon if you want) unless they are told to the contrary (I want you to stay here/ Je veux que vous restiez ici).32

31 Marty, Active French: Foundation Course, Book One and Two.

32 Marty, Linguistics Applied to the Beginning French Course, p. vi.
Though most student difficulties in an elementary course occur in French morphology, it is wondered whether this is a valid assumption for the student to make in regard to French structure. Even in a basic French course one of the more difficult areas for a student is the positioning in French of indirect and direct object pronouns. Numerous pattern drills have been created in this area, yet even advanced students experience difficulty in handling these structures, especially when they occur simultaneously in a sentence. The student of a beginning course would also experience structural interference in the placement of adverbs and adjectives. This is especially true of adjectives, where the position of French adjectives often differs from that of English, and where positioning can also determine lexical meaning.

Georges Gougenheim has noted two types of adjectives, those with a fixed position, either always before, or always after a noun, and those adjectives with a mobile position which can come either before or after the noun with a corresponding change of meaning. He comments on the adjectives with a mobile position:

Pour certains adjectifs, en particulier dans des locutions, il y a une différence de sens très nette entre les deux constructions; l'adjectif postposé a sa valeur propre, l'adjectif antéposé une valeur uniquement appréciative: un enfant pauvre est un enfant dépourvu de biens, un pauvre enfant, un enfant digne de pitié;
un personnage triste est un personnage chagrin ou affligé, un triste personnage, un personnage sans moralité; un repas maigre est un repas qui ne comporte pas de viande, un maigre repas, un repas peu abondant. Un homme jeune et un jeune homme ne sont pas du même âge. . .33

A word such a grand in French has a very high frequency and would probably be included in a beginning course, yet the structural difficulties related to this word would present a large area of interference for the student. Gougenheim has described some of the difficulties and comments that the usual place for grand is before the noun: une grande maison. However, this will vary according to the noun and the intended meaning:

Mais cette place habituelle lui vaut d'avoir souvent une valeur appréciative qui varie avec le substantif: un grand homme est un homme illustre, une grande dame, une dame de haute naissance ou de belle tenue; avec des substantifs qui désignent des personnes exerçant une profession artistique, littéraire ou scientifique, il a le sens d'"illustre": un grand peintre, un grand poète, un grand chimiste; avec des substantifs désignant des malfaiteurs il a le même sens avec une valeur non plus laudative, mais péjorative: un grand criminel. Avec d'autres mots encore il peut avoir un sens analogue: un grand soldat; Victor Hugo dit les grands paysans en parlant des Vendéens (Contemplations, V, III). Enfin avec les substantifs impliquant l'exercice d'une qualité, il marque l'intensité

de cette qualité: un grand mangeur, un grand bavard. Quand, qualifiant des personnes, grand a-t-il donc son sens propre, physique? Il l'a avec femme (une grande femme n'est pas une grande dame), il l'a eu avec homme: dans les Fausses Confidences de Marivaux, Mathon cherchant à savoir à qui est adressé un paquet, suggère au garçon: Un grand homme qui s'appelle Monsieur Dorante (II, 7); mais ce sens n'existe plus que si homme est suivi d'un autre adjetif descriptif (un grand homme brun). Pour exprimer qu'un homme, un peintre, un poète est grand (physiquement), on dit quelquefois un homme grand, en postposant l'adjectif. Cf.: On sait que Mme Mary Marquet, qui est peut-être une grande comédienne, est à coup sûr une comédienne grande (Marianne, 6 mars 1935); mais c'est une construction que le sujet parlant lui-même sent exceptionnelle et anormale. En somme on est réduit à employer d'autres mots (par exemple un homme de haute taille) ou à dire un homme grand et maigre, grand et fort, etc. ... La valeur spéciale de l'antéposition des adjectifs épithètes a donc amené une gêne pour la langue dans l'emploi de grand.34

While Marty has said in his book Linguistics Applied to the Beginning French Course that the structural interference between English and French is small enough to have the student assume that the structural order will be the same unless they are told to the contrary, he devotes more time in his own programme, on these interrelated problems of structure and meaning than most other programmes, which will often tend to avoid the semantic problem. He first presents most adjectives which usually come after the noun

and then describes those that precede the noun. He then presents those adjectives which are placed either before or after the noun depending on their meaning:

L'école est une ancienne église. The school is a former church.
Voici une église ancienne. Here is an old/ancient church.

Jean est un brave homme. John is a fine man (friendly, helpful).
Jean est un homme brave. John is a brave man.

Parlez de la dernière semaine des vacances. Speak about the final week of vacation.
Parlez de la semaine dernière. Speak about the last week.

Paul est un pauvre homme. Paul is a poor man (to be pitied).
Paul est un homme pauvre. Paul is a poor man (no money).

Vous êtes un sale homme. You are a nasty/wicked man.
Vous êtes un homme sale. You are a dirty/(not clean) man.

Nous habitions dans la même ville. We live in the same town.
Nous habitions dans la ville même. We live in the town itself.35

Marty describes the adjective grand as normally place before the noun, with its meaning (tall, great, big, spacious) dependent on the noun and the context:

Marie est un grande femme.
Pierre est un grand homme brun.
J'ai un grand ami à Paris.
Nous avons une grande maison.

Mary is a tall woman.
Peter is a tall man with dark hair.
I have a great friend in Paris.
We have a big house.

However, with the noun *homme*, *grand* makes this distinction if no other adjectives are used:

De Gaulle est un grand homme.

De Gaulle is a tall man.

While it is probably true that students will encounter most difficulties with adjectives in the area of morphology (the concept of gender and agreement of adjectives with nouns is difficult for most English-speaking students), nevertheless, structural problems of interference are apparent even at the elementary level.

In a monograph on the programming of a foreign language course, Marty stresses the idea that practice of various linguistic elements must be dosed according to areas of interference:

The comparative linguists have mapped out the areas of interference between English and the second language. We know what the areas are where interference from English is greatest and where it is very small.

When there is no interference from

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English, the foreign structure can be learned rapidly: when there is interference, intensive practice is needed in order to eradicate the native habits.

Examples:

<table>
<thead>
<tr>
<th>No interference</th>
<th>I let my children do their work.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Je laisse mes enfants faire leur travail.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strong interference</th>
<th>I want my children to do (infinitive) their work.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Je veux que mes enfants fassent (subjunctive) leur travail.</td>
</tr>
</tbody>
</table>

Interference is also found by Marty in pronunciation and spelling. He has found that partial audio and visual cognates (French words which are pronounced or spelled nearly like their English equivalents) are harder to acquire than words which are entirely different. A word such as ressembler is misspelled more often than doigt. R. J. Sweet also finds similar areas of interference, "The Toronto experiment showed that pupils mispronounced those words which were nearly approximated in English; e.g. "papier" and paper; "brosse" and brush; "serviette" and serviette; "personne" and person.

Evidently, to avoid confusion, the verbal stimulus in the

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early stages should not include these near-approximations".  

Valdman has pointed out that the process of shaping behavior, a principle which is implicit in all programming, actually emphasizes a difference between a contrastive and behavioral analysis:

One of the most important techniques of programmed instruction is shaping new responses from responses the student already emits. In conventional pronunciation drills the student is expected to acquire new sounds by simple mimicry or, in more refined methodologies, by contrast drills, either target language oppositions (French, russe/rousse; Spanish sera/seda; German, kennen/konnen) or target-native language pairs (French, tout/English too). But veteran teachers know that most students can be guided to the acquisition of sounds not present in the inventory of their native language. Most teachers scorn tricks that lead to intermediate sounds which are neither native language sounds nor accurate renditions of the target language sound; these are precisely the trick the programmer seeks.

In devising shaping sequences the programmer must examine the passive as well as the active inventory of the learner. For example, in the teaching of English /θ/ to French speakers it is customary to instruct a student to place his tongue between the upper and lower front teeth to produce a friction noise. This procedure requires him to produce a new voiceless fricative distinct from the French fricative /f/ and /s/ as well

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as the dental stop /t/ in a single step. Many French children and some adults lispe (French zézayer), as such tongue twisters as combien sont ces six saucissons-ci, Monsieur Sans-souci? attest. French lisped /s/ is acoustically similar to English /θ/ and is within the passive and - for purposes of mock imitation - within the active inventory of all French speakers. This suggests a pedagogical sequence that starts with the shaping of English /θ/ from a lisped French /s/ and ends with contrasting the newly acquired sound class to English /f/, /s/, and /t/ in minimal pairs like thin/fin, thin/sin, thin/tin. Shaping underscores an important difference between behavioral and contrastive analysis. In classical contrastive analysis the analyst focuses on the points of difference between two languages or, in other words, on probable negative transfer from the native to the target language. The programmer, on the contrary, seizes upon positive transfer. In programmed as in conventional instruction thorough and expert linguistic analysis must precede the preparation of materials.

A. S. Hayes and others have also used this technique of shaping a new phonemic response by utilizing the students first-language repertoire. They have conditioned a German sound by pointing to a nearly equivalent English sound. Harlan Lane, however, cautions that this process of shaping

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pronunciation by using the students' first language repertoire may impede rather than facilitate eventual mastery of accurate phonology:

Several writers, among them Sweet and Hayes and others, have suggested that the shaping of new response topographies may be accelerated by employing those in the first-language repertoire. For example, the student may be led to a correct pronunciation of the German ich via the following steps: (a) "fish", (b) "fish" said through spread lips, (c) "fish" said through spread lips while opening the teeth slowly. The danger of such techniques is, of course, that they evoke the very responses in the first language which are sources of interference and must be weakened. Here the language programmer faces a choice, unguided as yet by research findings, which recurs in programming other repertoires as well (...). By calling into play first-language discriminations and patterns of responding an approximation to the desired terminal behavior is more quickly attained but it may then be more difficult to move precisely onto target.41

While there is still no specific research in this area, both F. Marty and R. J. Sweet have noted that French cognates (French words which are nearly approximated in English) present areas of strong interference for the student. R. J. Sweet describes the control of pronunciation as involving "the sequencing of phonemic elements and their combinations so as to minimize the possibility of confusing

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41 Lane, Teaching Machines and Programed Learning, Volume II: Data and Directions, p. 608.
phonemes and their combinations in the new language with others already acquired in the native tongue". Since students seem to have such difficulties with near equivalent sounds of cognates, it is possible that the advantage of calling into play first-language discriminations is out-weighed by the subsequent detrimental effects.

**Structural Markers**

An important aspect of language which has been studied extensively in linguistic science is the **structural meaning** of a sentence. Whereas the number of lexical items that can fit in a basic frame of a sentence are almost limitless, there is a definite limit to the structural devices used in a sentence. Simon Belasco describes the linguistic technique of structural markers:

Structural marking involves words or parts of words functioning as signs which indicated the grammatical relationship of words having lexical meaning. Let us examine the following sentence: **The nomely zuggs unzacked the koaler steffnessly.** We can read the sentence with just the right stress and intonation so that it sounds like a statement in the English language. Except for the word "the", which occurs twice, none of the words appear to have any meaning. At most, the sentence sounds like double-talk or jabberwocky. However, repeating the sentence several times will reveal a good deal about the structural

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meaning of the "words", if not their lexical meaning. The word order as well as the "sound" of the word endings appear to identify several parts of speech: two nouns, one verb, one adjective, and endings appear to identify several parts of speech: two nouns, one verb, one adjective, and one adverb. The words zuggs and koaler are nouns because they are both "marked" by the definite article. Even though the word homely immediately follows the article, its ending -ly /liy/ and position in the sentence -- unlike the ending -s /z/ of zuggs and its position -- indicates that the former is most likely an adjective and the latter a noun. The ending -ed /t/ and position of unzacked, among other markers, reveals it to be a verb. Although selfishly like homely ends in -ly /liy/, its position "after" koaler, rather than before it, reveals it to be an adverb.

Other features are signaled by the endings. The -s /z/ of zuggs reveals that it is plural; the -ed /t/ of unzacked that it is past tense. The -er /ir/ of koaler helps to identify it as a noun (cf. boarder, manger, etc.), and absence of -s /z/ makes it singular. On a different level, moreover, the position of zuggs and koaler with respect to unzacked shows the one to be "subject" and the other "object". We can compare this sentence word for word with an actual sentence in English having the same structural features "The homely zuggs unzacked the koaler selfishly" versus the homely thugs ransacked the larder selfishly. The position of the words and their markers are identical. Only the lexical meaning of the stems differ. In fact the stems in our sentence have no meaning since they represent "nonce forms"; that is, they occur only in this one instance. Such a comparison can easily be extended to other languages. The same nonce words can be "translated" from one language into another. The structural features for the respective languages must be "real", however: English, The narpish galats morted the fleens stationiously; French, Les galats narpeux mourtaient statieusement les flenes; Spanish, Los galastos narposos mortaben estasiosamente las flanas; Italian, I galasti narposi mortabano stasiosamente.
le flane; German, Die narpischen Galasten morteten die Flane stattlichweise; Russian, н'арале галастен мортали фланы сталогоя. Except that the stems represent nonce forms, each sentence is a basic frame in the languages mentioned of the type: Nouns Subject--Verb--Noun Complement (NVN).

It is important to note that in an analysis of this type, the important features are structural markers and ordering — meaning has been kept to a minimum. Among psychologists, however, there appears to be two schools of thought on the nature of language. The behaviorists, represented by Skinner, are interested in observable behavior, i.e. the physical manifestations of language, while a newer school, represented by C. Osgood and O. Hobart Mowrer, feel that meaning and emotion play key roles in characterizing the nature of language.

In most current studies in linguistics, the abstract approach is taken in language analysis, and meaning is considered minimal. Chomsky comments:

> Meaning is a notoriously difficult notion to pin down. If it can be shown that meaning and related notions do play a central role in linguistic analysis, then its results and conclusions become subject to all of the doubts and obscurities that

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plague the study of meaning, and a serious blow is struck at the foundations of linguistic theory. 44

T. Mueller and F. Rand Morton have made extensive use of the concept of structural markers in their language programmes. However, since their programs are audio-lingual, they use the term "acoustic signifier". An acoustic signifier is a sound or group of sounds which carry grammatical meaning and are capable of differentiating utterances from each other. An example could be the sounds in French, /mɔ̃/ (mon) and /me/ (mes) which differentiate plural from singular nouns and also indicate possession. In Spanish the phoneme /o/ indicates the first person singular (that is, it is the acoustic signifier for the first person singular – hablo versus habla) and /n/ is the acoustic signifier for the third person plural (hablan versus habla).

The syntax frames of Mueller’s French programme are not intended to teach systematically the structure of the language. Mueller comments:

They are intended to make the student aware that the grammatical structure of the language consists in sound shifts, that sounds are used as syntactical signifiers or acoustic morphemes and have meaning in specified environment.

During the entire Part I lexical meaning is withheld from the student. The

44 Noam Chomsky, Report on the Sixth Annual Round Table Meeting on Linguistics and Language Teaching (Georgetown University, 1955).
student learns to discriminate and to mimic without knowing the meaning of what he is saying. In the syntax frames only is he taught the meaning of the grammatical structures but not the lexical meaning.45

The student is taught to manipulate the acoustic signifier, an abstract phonic signal carrying grammatical meaning, in an utterance, but the semantic meaning of the utterance is withheld from him. The student is first taught to discriminate and vocalize a particular sound, and he is then introduced to the various acoustic signifiers that use that sound. The first two tasks of Mueller's programme are the discrimination and vocalization of a French phoneme (in this case, closed /e/). The student is then taught particular acoustic signifiers which use this phoneme:

Task 3: Acoustic Signifiers. Acoustic signifiers using the closed /e/-sound are:
the determiners les, des, mes, tes, ses, ces, and these verb forms: passez, passer, passé, passerai, passerez. In order to acquire the grammatical habits of the language, the student manipulates utterances containing the closed /e/-sound used in these ways.

Not all the signifiers using the closed /e/-sound can be introduced at this point... since the sounds needed have not all been taught. Such is the case for the future and the determiners ses, tes, des, and les.

The determiner mes: The student adds

45 Mueller, Trial Use of the ALLP French Program at the University of Akron, 1963-64, p. 4.
mes to a noun stimulus given orally. He changes the stimulus ma noun or à ma noun to mes noun or à mes noun, in two-word utterances at first, in short sentences later.

Second person plural: The student changes the verb, presented in the present stem form, into the required form, and later adds vous as the prefix with which this particular form is to be associated. There is a progression from a single word to a short sentence.

Passé composé: The student transforms the verb stem into the first person singular of the perfect tense. The utterance length increases to a short sentence.46

The above example is taken from an early stage in the development of Mueller's French programme. However, it resembles the final programmes that he has just published in 1967. In teaching the /o/ sound Mueller begins with a sound identification phase (discrimination) in which the student learns to distinguish the French phoneme from English near-equivalents, and from other French phonemes. The programme then has a vocalization phase where the student learns to pronounce the sounds he has heard in the previous section. The section which follows, syntax, requires the student to listen to a syntactical pattern and repeat it. Confirmation of the student response follows. For example, the student may read and hear a noun marker, an appropriate noun, and then be required to respond by repeating both, incorporating liaisons when appropriate. Mueller gives the following example from his programme, Basic French:

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Syntax

5-70 Plural noun markers: *nos*, *vos*, *tes*. *Nos bébés* pronounced /no bebe/, means our oogles. *Nos*, pronounced /no/, is a noun marker meaning our. It is a plural noun marker indicating that the noun following it is plural and is spelled with an *s* which is not pronounced.

*Vos bébés*, pronounced /vo bebe/ means your oogles, that is, oogles belonging to several people, not an individual *you*. *Vos*, pronounced /vo/ is a noun marker meaning your. It is a plural noun marker indicating that the noun following it is plural and is spelled with an *s* which is not pronounced.

*Tes bébés*, pronounced /te bebe/, means your oogles also, but oogles that belong to an individual person, not several people. *Tes*, pronounced /te/ is a noun marker meaning your. It is a plural noun marker indicating that the noun following it is plural and is spelled with an *s* which is not pronounced.

Remember the liaison factor which also applies in the above examples when the noun following the noun marker begins with a vowel sound. *Nos amis* is pronounced /no zami/, *vos amis* is pronounced /vo zami/ and *tes amis* is pronounced /te zami/. Remember, it is not the noun marker but the noun which gives evidence of this liaison factor in speech. The noun begins with a /z/ sound. The noun marker remains unchanged.47

The only semantic information that the student is given is that *nos* means our and *vos* and *tes* mean your. The student is not given the semantic meaning of the nouns until many lessons later, when he has internalized the grammatical meaning of the acoustic signifiers. In this section, then,  

47 Mueller and Niedzielski, _Basic French: A Programmed Course_, Introduction.
lexical meaning is kept to an absolute minimum. The technique of the acoustic signifier is used by Mueller for teaching basic syntax such as singular and plural noun markers (articles and most possessives), the present tense of one- and two-stem verbs and the subject pronouns. However, as the French structures become more complex, Mueller uses standard pattern exercises and conversation drills to condition structural responses.

Transformation Grammar

The generative transformational theorists are interested in the formal syntactic properties of sentences, intuitive judgements of speakers concerning utterances in their language, and explanations or interpretations of ambiguous sentences. The most important work in this field has been done by Noam Chomsky. He has criticized the traditional view of a sentence consisting of lexical items placed in a grammatical frame (structural marking and ordering). As an example he gives the utterances (1) furiously sleep ideas green colorless, and (2) friendly young dogs seem harmless. The sequences have the same frames (-ly, -s, -less) but only utterance two is a grammatically acceptable English sentence. Similarly in the following utterances, (3) colorless green ideas sleep furiously, and (4) harmless seem dogs young friendly the order of the structural markers is the same, (-less, -s, -ly) but only utterance three could
be accepted in English and utterance four would not be considered grammatically well formed. Chomsky feels that the comprehension of language, therefore, relies on a deeper level of analysis than structural marking, and he attempts to make this explicit in his studies.

Transformational grammarians view any sentence as being ultimately derived from certain basic or "kernel" sentences (unless the sentence is already in its "kernel" form). Belasco has applied the transformational theory to three French sentences:

Differences among sentence types are represented by the relation between source kernel sentences and their transforms. For example, in French the three sentences, 1. Le garçon embrasse la femme, 2. Le garçon obéit à la femme, and 3. Le garçon parle à la femme, are all sentences of the type NVN in the active voice. It will be observed that the noun complement in sentence 1 is a direct object, whereas the noun complements in sentences 2 and 3 are indirect objects. However, only sentences 1 and 2 but not 3 can occur as transform in the passive voice; that is, one can say 1. La femme est embrassé par le garçon and 2. La femme est obéit par le garçon but not 3. *La femme est parlée par le garçon (nonce form). By certain restrictive and obligatory rules, transformation grammar can convert kernel sentences into types of constructions which show one or more of the relationships traditionally termed active-passive, assertion-question, main clause -- dependent clause, etc. Moreover, certain peculiarities of structure between the source and target languages can be isolated and proper drills devised to prevent impossible

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sentence types from creeping into language texts, e.g., *Que Jean voit-il? *Le garçon fut donné l'argent, etc.49

It is difficult to see how transformation grammar will affect programming. Current French programmes show little or no influence from these theories. However, a Latin programme by Waldo B. Sweet has been developed according to kernel sentences and their transformations.50 Sweet has utilized all four techniques of linguistic science, formal contrast, structural marking, tagmemics, and transformational grammar, very effectively. By consciously pointing out to the student the various methods he is using, Sweet has succeeded in maintaining a vitality and stimulation which is singularly lacking in most Latin textbooks.

Valdman has experimented with transformation grammar for determining learning steps in a programme:

Should one prefer to follow the currently fashionable generative model, one might be tempted to define a step increment as equivalent to the application of an individual rewrite or transformational rule. For example, with regard to the derivation of the appropriate form of French adjectives such as petite/petit that exhibit contrasting feminine and masculine forms, one would start from the feminine singular form and account for all others by rewrite rules as follows:

1. /pEtit/ --- masculine, prevowel \(\rightarrow\) /pEtit/ (no change)

2. /pEtit/ --- masculine, general (loss of final consonant) \(\rightarrow\) /pEti/

50 Waldo E. Sweet, "The Choice of Syntactical and
Mastering adjectives like grande/grand or fraîche/frais, whose masculine prevowel forms differ from the feminine base form (e.g., /gräd/ versus /grä/ and /frèʃ/ versus /frèz/) or those with nonpredictable generalized masculine forms (belle/bel/ beau/bèl/ versus /bô/) would require additional learning steps.51

While transformational grammar may provide the teacher with new insight into structural analysis, it does not appear to be the most efficient or economical method of presenting structures to the student. While some programmers are experimenting with transformation techniques, no French programs which are commercially available have incorporated them for presentation to the student.

Tagmemic Analysis

The fourth technique used by linguists, tagmemic analysis, is quite important because it is related to the concept of substitution drills in pattern practice. Belasco describes this technique as follows:


51 Valdman, Trends in Language Teaching, p. 141.
the relationship between a 'slot' in a grammatical structure and units of speech which 'fill' the slot. The technique is referred to as slot-class correlation. By a slot in grammar is meant a position in the structure at which substitution of one element for another may take place, and a point at which new words may be introduced to the system.52

Thus in the sentence Jean va partir demain there is a slot where Jean may be replaced by Marie, Paul etc. Since the use of pattern drills is so prevalent, and since much of programmed material is based on these drills, it is necessary to take a closer look at their relation to programming techniques.

Most programmes appear to use adaptations of "New Key" pattern drill material for conditioning syntactic responses. Programmers have attempted to fit "pattern practice drills" within the framework of programmed instruction. Various types of pattern drills - substitution, transformation, mutation, fixed increment, analogy, etc. have been adequately described by Stack,53 Valdman,54 Pimsleur,55 Delattre56 and others. Since these drills have

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56 P. Delattre, "Un Cours d'exercices structuraux et
been treated extensively elsewhere, this discussion will be limited to describing their adaptation for programming purposes.

Though Marty describes the techniques he used for programming as "constructed response, memory responses, and multiple choice response", they are basically "New Key" pattern drills and testing devices. The "constructed responses" correspond to transformation or substitution drills. For example in No. 3 - Je me pèse. → Nous nous pesons. or No. 4 - Il veut du pain. → Il ne veut pas de pain., No. 6 - Je crois Marie → Je la crois.

Marty also uses chain substitution - No. 9 Jean va parler (travailler), Jean va travailler (venir), Jean va venir, etc. In his description, then, of techniques used for programming a French course, Marty has described most pattern drills developed for New Key materials. 57

Mueller also uses pattern drills in his programmes, though he tends to use mainly question and answer drills rather than the variety of drills used by Marty. An example is taken from Part Two, lesson 3, which deals with feminine-masculine forms of the adjective. 58

57 Marty, Programming a Basic Foreign Language Course: Prospects for Self-Instruction, p. 42.

58 Mueller and Niedzielski, Basic French: A Programmed Course.
grammatical explanations and sample frames and continues with question and answer drills:

<table>
<thead>
<tr>
<th>question</th>
<th>answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame 26 - La robe est grise. Et le manteau?</td>
<td>Il est gris.</td>
</tr>
<tr>
<td>- La blouse est blanche. Et le chapeau?</td>
<td>Il est blanc.</td>
</tr>
<tr>
<td>- La viande est fraîche. Et le pain?</td>
<td>Il est frais.</td>
</tr>
</tbody>
</table>

In lesson 34 of Part Two, the lesson is concerned with word order of two object pronouns. Explanations and patterns are shown to the student followed by drill material:

<table>
<thead>
<tr>
<th>listen</th>
<th>reply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame 359 Est-ce qu'elle donne le livre à Jean?</td>
<td>Oui, elle le lui donne.</td>
</tr>
<tr>
<td>Est-ce que vous donnez la robe à Marie?</td>
<td>Oui, Je la lui donne.</td>
</tr>
<tr>
<td>Est-ce que vous apportez le livre à Jean?</td>
<td>Oui, Je le lui apporte.</td>
</tr>
</tbody>
</table>

Valdman has also described his attempts at presenting a programmed French course at Indiana University. Since no programmed materials for spoken French were available when the course was first instituted, it was necessary for him to devise his own. These materials essentially followed the New Key closely, with a variety of pattern drills and an emphasis on mimicry and memorization. However, Valdman felt that the pedagogical efficiency of these materials left much to be desired, and they were revised for the second run of the course:
The revised version departed from the New Key by a more thorough linguistic and pedagogical analysis of the structural elements presented: a distinction was made consistently between discrimination/comprehension and differentiation/production phases; the material was carefully graded and presented in minimal steps at all levels - phonology, spelling, grammar; structure was presented in terms of grammatical categories and generative processes rather than in terms of paradigms; for instance, the presentation of phonology was spread over thirty units, instead of eight, simultaneously with the introduction of vocabulary and grammar.

Drill material was also made more natural and progressive: correlation and transformation drills were replaced by response drills which allowed the student to assimilate grammatical features by responding to a series of related questions posed by the voice on the tape and usually referring back to situations and using vocabulary presented in dialogues recently learned.

[Valdman then compares the earlier drills with the revised materials. For the sake of brevity only the revised material will be presented here:]

Step one
Answer the questions in the past tense.
Model: Est-ce qu'il est parti ce matin?
Student: Oui, il est parti ce matin.
Conf.: Oui, il est parti ce matin.

Step two
Answer the questions in the past tense.
Model: Il est allé au cinéma. Et vous, est-ce que vous êtes allé au cinéma?
Student: Oui, moi aussi, je suis allé au cinéma.
Conf.: Oui, moi aussi, je suis allé au cinéma.

Step four
Answer in the negative.
Model: Est-ce qu'ils sont arrivés?
Student: Non, ils ne sont pas arrivés.
Conf.: Non, ils ne sont pas arrivés.
Step five

Answer the questions.

Model:  A quelle heure est-ce que vous êtes allés au bureau?
Student: Nous sommes allés au bureau à deux heures.
Conf.: Nous sommes allés au bureau à deux heures.

Step seven

Model:  Ma soeur arrive ce soir. Et ta soeur?
Student: Ma soeur est arrivée ce matin.
Conf.:  Ma soeur est arrivée ce matin.

Step ten

Responde to the command.

Model:  Dites que vous êtes descendu au laboratoire.
Student: Je suis descendu au laboratoire.
Conf.:  Je suis descendu au laboratoire.59

The materials that Valdman used for the third trial programme comprised a set of programmed units consisting of material presented in frames as well as drill sets. The programme was linear and only those features presented in the frames were formally programmed in chained sequences using standard prompting and vanishing techniques.

Conclusion

As can be seen by these examples of audio-lingual programmes, most foreign language programmes have incorporated some form of New Key pattern drills into the format of the programme. While such devices as pattern drills and testing

procedures may be effective teaching techniques, there is little experimental research in this area. Since much of the value of programming lies in its empirical approach, it would be expected that a foreign language programmer would rigorously test all materials and techniques that are to be included in a programme. However, most programmers appear to be as negligent in this respect as their New Key predecessors. There has recently been criticism of pattern exercises, and the question has arisen as to whether the mastery of pattern drills actually results in any significant language behavior. While this is a complex issue, involving questions about the acquisition of first language behaviors, transfer conditions, and theories of syntax, there is very little experimental research data. Most programmes have accepted and adapted pattern drills without questioning their validity as a teaching tool (Valdman appears to be the only one to raise doubts as to the effectiveness of New Key drill materials). This uncritical acceptance of current techniques is inconsistent with an empirical approach. The most difficult area of foreign language teaching is the conditioning of syntactic responses and if programmed instruction is to make any significant contribution to language training, programmers must begin investigations in this area.

One important difference between New Key and programmed materials is that most programmes have
monostructural approach. This is contrasted with the polystructural approach implicit in the memorization of New Key dialogues. In a majority of programmes, structures are presented one at a time and each structure must be fully mastered before the next is introduced. There is also an emphasis on presenting productive structures which encourage a student to analogize correctly. Programmers have often criticized the memorization of dialogues because the student is often led to make faulty analogies and does not gain experience in solving linguistic problems automatically.

In an attempt to make drills more meaningful and less boring, most New Key materials relate the pattern drills to actual situations that the student might encounter in the country where the language is spoken. The structural patterns, therefore, are determined through the medium of the dialogue. However, as programmers point out, there is reason to believe that the dialogue is not necessarily the best medium in which to develop real linguistic competence, i.e., the ability to generate novel utterances determined by the conditions of the situation. Much of conversation, idioms and clichés, occurs within a formal repertoire. For a certain stimulus there is a certain set response or responses which are relatively unchanging - How are you? Fine thanks, and you? etc. These clichés and idioms of the
language allow the student to acquire a certain superficial knowledge of the language, (which is undoubtedly useful when travelling), however, they cannot be equated with a real ability to express a novel idea or to adequately handle a new situation.

In departing from New Key dialogues and encouraging the solving of linguistic problems automatically, programmers appear to be going in the right direction. By emphasizing productive language patterns rather than clichés or idioms, the student may develop the ability to analogize in the foreign language. It is hoped that future foreign language programmers will make more careful investigations as to the value of pattern drills.
CONCLUSION

Within the last decade there has been an increasing emphasis on psychological aspects of foreign language training. Programmed instruction materials represent an attempt to apply the results of laboratory research to the practical problems of a classroom situation. In one respect, programming has marked a new era in language teaching. For the first time teaching materials are being produced according to their tested effectiveness. Perhaps the most stimulating material that has been recently written on foreign language training is the reports of those psychologists, linguists and foreign language teachers involved in programming. A vital part of the construction of a programme is continuous testing while still under development, and field trials in actual classroom situations. By this process of testing and revision, a programmer is able to determine which presentation is, in fact, most efficient and effective. Those programmers who have remained flexible and open-minded, rather than rigidly adhering to preconceived theories and methods of language instruction have produced research materials which will be of value to all foreign language teachers in the future. However, not all programmes have been rigorously developed or evaluated and it is the responsibility of the prospective purchaser to
obtain research reports from the editor or author of a programme from the Centre for Applied Linguistics in Washington.¹

The construction of a foreign language programme is a complex process and a programmer will necessarily be concerned with questions in programming, linguistics, psycholinguistics, psychology, and language teaching. This study has been primarily concerned with the application of programming principles to a French course, and has concentrated on problems in this area. However, in order to fully understand the implications of programming a French language course, it has been necessary to review the historical development of programmed instruction and to summarize the current trends in language teaching and linguistic studies of French.

There has been much controversy as to whether the theoretical basis of programmed instruction is adequate for the complex process of language learning. Research in language acquisition is at such an elementary stage than an examination of programming efforts must take into consideration the objections of psychologists and linguists such as Noam Chomsky and others. While it is necessary for those involved in language training to be aware of theoretical considerations, the ultimate criterion must be the demonstrated effectiveness of programmes as a teaching

¹Center for Applied Linguistics, 1717 Massachusetts Avenue, N.W., Washington, D.C., 20036.
A programme proposes to do a stated amount of teaching and the final judgement must be based on whether, in fact, it does so. The ultimate test is empirical.

A programmer of a foreign language will also attempt to organize the linguistic material in such a way that the student acquires the desired language skills (the terminal behaviors of the course) with maximum efficiency. The programme proposes to teach more material in less time. While the goal of most programmes is effective and efficient teaching, it is extremely difficult to perform experiments comparing programmed learning with conventional learning. The problems arise in trying to control the variables which would otherwise influence the results. Important variables which would have to be controlled are the quality of the programme, the quality of the teacher in the conventional instruction, time available, the novelty (Hawthorne) effect, and the relevance of the criterion tests.

Another important aspect of programming is that it has resulted in a more rigorous analysis of a foreign language. With its emphasis on the specification of terminal behaviors, programming has necessitated not only a detailed examination of linguistic elements, but also a description of the behaviors expected of a student in relation to those linguistic elements. A thorough programme will state in quantifiable and observable terms what behaviors will be
expected of a student who has completed the programme.

As John B. Carroll has noted in specifying the terminal objectives of a programme:

One would list the phonological, grammatical, and lexical items which the student is expected to master. But there is more to the task than this. It is also necessary to specify the language behaviors desired in the student, that is, to state what mastery means in terms of behavior. 'Mastery' of a phonological item might mean anything from 'a technical knowledge of the phonetic classification of a phoneme' to 'habitual and consistent use of the phoneme, with pronunciation like that of a native speaker, in free conversation as well as in formal speech', one must decide what kind of mastery one seeks. Some items might be listed only for recognition rather than active use (e.g., the forms of the past definite in French).

A traditional textbook would merely list those linguistic items to be included in the book, but programming calls for a detailed specification of skills, behaviors and knowledge desired of a student who has completed the programme. Different behaviors may also be conditioned in relation to different language elements. For example, while a student might be expected to recognize and understand a variety of styles of speech, he might be trained to produce the speech of a cultivated Parisian.

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In comparing French programmes, a difficulty arises because of the great variation in programme organization and course objectives. Some programmes will be organized according to chapters or lesson units while others will be continuous, with no indicated stopping point. This means that a chapter by chapter comparison is impossible. It is also difficult to isolate and compare specific linguistic elements. In a programme, the language is atomatized into its smallest element and each new frame builds on the preceding one. Thus there is a constant interplay on new and old material; elements previously learned in the programme are continuously reviewed and interwoven into newer material. Sounds and structures learned in earlier sections continue to be used in more complicated utterances.

The comparison of programmes is also complicated by the variety of course objectives which programmes exhibit. While some courses have an audio-lingual orientation and have large sections devoted to teaching pronunciation, other programmes only teach reading and writing skills and give no instructions on pronunciation. Among the audio-lingual courses some resemble New Key materials and present dialogues to be memorized while others are more comprehensive and attempt to develop linguistic competence through a variety of techniques. Because of the difficulties of directly comparing various programmes, it was found that the most productive method of examination was to discuss the
problems and techniques of programming a French course in the areas of phonology, syntax, and morphology.

One particular problem that a French programmer encounters is the difficulty of applying rigid scientific principles to the complex, open system of the French language. French is a living, changing system and the variations of the language do not always lend themselves to scientific regimentation. For example, in the area of phonology, French speakers vary in the number of phonemic distinctions they maintain. Depending on region and style, the French language may exhibit from seven to sixteen vowel phonemes. Most programmers base their choice of phonemic contrasts on the speech of the cultivated Parisian. However, even among Parisians, there may be variations in the number of phonemic contrasts maintained. Thus the nasal vowel /œ̃/ is not always distinguished from the nasal vowel /œ̃/, or the contrasts imperfect/past definite, e.g. *je parlais* versus *je parlai* or the contrasts between the conditional/future, e.g. *j'irais* versus *j'irai* are not always realized because /œ̃/ is not always distinguished from /e/. While there is a great deal of regularity in the language, it is still not always possible to predict what distinctions a speaker will make.

In examining phonological, morphological and syntactical aspects of French programmes, two important problems become apparent. These involve the method of
selecting linguistic elements to be included in a programme and the presentation of these elements in an effective and efficient manner. Most programmers are aided in both these areas by techniques and studies of linguistic science. Frequency and linguistic studies are used to determine which elements are essential to a mastery of the language, and the programmer uses linguistic techniques such as structural markers (or "acoustic signifiers") formal contrast and tagmemics for presenting aspects of the language. In the presentation of structures to be learned, most programmers follow a monostructural approach. Structures are presented one at a time and each structure must be thoroughly mastered before the next one is presented. This could be contrasted with the New Key method where many different structures are presented simultaneously.

Since programming prescribes no view of the course content, the objectives of a programme may be the development of audio-lingual skills or only reading and writing skills. If the course is to emphasize the spoken language, it is important that a programmer base his selection and presentation of language elements on linguistic and frequency studies of the spoken language. An analysis of the spoken language will differ significantly from that of the literary language. Certain techniques, such as Mueller's "acoustic signifiers" will have special relevance
if an audio-lingual mastery of the language is desired.

Central to the principle of programming is the concept that for learning to take place, responses must be immediately reinforced. The reinforcement of responses is not particularly difficult in the area of syntax and morphology where most programmers have adopted the use of pattern and structure drills. Most pattern drills used in the language laboratory will follow the sequence - model, pause for student repetition, and repetition of the model. The sequence for structure drills is - cue, pause for student answer, model of the correct answer. In structure drills the student response would require a change in word order or a change in form and a student could compare his response with that of the model. If the student’s response is incorrect, the difference between his wrong answer and the correct repetition is fairly obvious, and it can be assumed that on this level the student response is being adequately reinforced.

However, in the area of pronunciation, programmers have found that it is not valid to assume that a student can automatically compare and evaluate his own response. The student must be specifically taught the skill of evaluating his pronunciation. Most audio-lingual programmes develop this skill by a process of discrimination training - the student is taught to discriminate between French and non-
French sounds so that he will eventually be able to evaluate his own imitation of the recorded model. If the discrimination training has been adequate, the recorded repetition of the model will act as reinforcement to the student's response.

At this point it is necessary to point out some of the difficulties encountered in doing research in programmed instruction. Since programming is a relatively new field, considerable effort must be expended in gathering and assimilating research materials. Bibliographies listing programmed materials are scarce (two or three at most) often inaccurate and out-of-date (an examination of two of these bibliographies has revealed that many institutions and programmes listed no longer exist). Research materials and reports (both published and unpublished) must be gathered from journals, institutions and individuals involved in programming French language courses, and much private correspondence is involved because many programmes are still in the developmental stage.

An empirical approach to the construction of language materials has been basic to the programming technique. While there is great variation in the quality of French language programmes, there are several which have been rigorously developed and tested over a period of years and these programmes promise to provide stimulating information about student reaction to various aspects of language training.
This study of the application of programming principles to French language courses has been exploratory in nature. It does not pretend to give definitive answers because the field of programming is still in an elementary stage. However, the problems which arise in programming French materials will be of interest to those attempting to improve the effectiveness of foreign language teaching.
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French Programmes

*Burroughs, Elaine. Modern French (French A & B). Behavioral Research Laboratories, Box 577, Palo Alto, California, 1966. 1  
Cost:  
French A  
Text (2 Volumes): $9.74  
Tapes (set of 8): $84.00  
Teacher's Manual: $1.00  
Test Booklet: $1.48

*Commercially available. Some programmes are out of print and have not been republished.

1The cost listed here is subject to change.
Cost: Text: $7.70  Tapes: (set of 3) $42.30.

Cost: Text (3 books): $4.95 each  Teacher's Manuals (3): $1.50 each.


Cost: Programmed text and TEMAC Binder: $4.00.

Cost: Text (5 Volumes available): $2.95 each.

Cost: Text: $4.90 (paper bound); $5.50 (hard cover)  Tapes: (nine 7" reels) $45.00.

Cost: Book I: $4.90  Tapes: $50.00  Book II: $4.90  Tapes: $40.00


*Pimsleur, Paul. *Speak and Read Essential French.* Tapeway, Box 3014 University Station, Columbus, Ohio, 1964.
Cost: Tapes (set of 30) and Reading Booklet: $270.00.

**Testing materials:**
Tapes (Form A or B for Listening Comprehension): $12.50 per form  Tapes (Form E or F for Speaking): $12.50 per form
Answer Booklet (Form A or B for Listening Comprehension): $10.00 per set of 5  Answer Booklet (Form C or D for Reading Comprehension): $15.00 per set of 5


Stack, Edward M. *French (Elementary).* CLT French Series I (No. 16-12-03), Electronic Teaching Laboratories, 5034 Wisconsin Avenue, N. W., Washington, D. C. [1964].
Cost: Programmed Text and Tapes: $79.95

Cost: For use in LEARNATRON MK II: $415.00
A/Z MARK I AND II: $89-$189.00
THE MINIK: $4.95-$14.75
Program reusable, 106 frames: $2.00-$20.00.

*Universal Electronics Laboratories Corp.* French 4009, Grade Level 7 thru 9. French 4010, Grade Level 10 thru 12.
Cost: Programmed Text: $1.50 each.