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ABSTRACT

The relevance to elementary foreign language instruction of certain findings of child language development (native language) and the psychology of language acquisition is examined. A set of premises is proposed for a new scheme for the teaching of German based on these findings, namely, that comprehension precedes production, that language material is stored in short-term memory as chunks of seven plus two units, that pronunciation is best avoided until syntax and semantics are well learned, that the native language (English) interferes with the learning of the foreign language (German), and that language learning takes place optimally when the student is solving problems rather than memorizing by rote. The report presented here raises questions for continuing research on these theories. The explanatory paper, included with the report, establishes the premises mentioned above and describes their practical application through the use of a teaching machine. (Author/VM)

Final Report

Project No. 1G035
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TRANSFORMATIONAL GRAMMAR AND PSYCHOLINGUISTICS AS APPLIED TO TEACHING COMPREHENSION OF GERMAN

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Author's Abstract

The relevance to elementary foreign language instruction of certain findings of child language development (native language) and the psychology of language acquisition is examined. A set of premises is proposed for a new scheme for the teaching of German, based on those findings, namely: that comprehension precedes production: that language material is stored in short term memory as chunks of 7 ± 2 units: that pronunciation is best avoided until syntax and semantics are well learned: that the native language (English) interferes with the learning of the foreign language (German): and that language learning takes place optimally when the student is solving problems rather than memorizing by rote. The grammar being taught derives form modern transformational theory.

Following the above premises a series of 22 lessons have been developed for presentation by a teaching machine recently perfected. The lessons, covering a portion of the first semester of college German, have been tested in pilot form. The initial encouraging results are reported. The preparation of new lessons continues.

Introduction

Following a set of premises outlined in the attached paper, "Rapid Acquisition of a Foreign Language (German) by the Avoidance of Speaking" (Working Paper Number Two, Kansas City Working Papers in Speech Science and Linguistics), by Harris Winitz and James A. Reeds, September, 1971, a pilot study for the preparation of lesson materials for the teaching of foreign language comprehension was undertaken. Those premises, derived from a study of child language acquisition and a survey of foreign language teaching methods now in use, and enumerated below:

1. Comprehension precedes production.
2. Language units are chunked during acquisition.
3. Pronunciation is best postponed until syntax is mastered.
4. Translation is best avoided altogether until the entire language system is mastered.
5. Language acquisition is most efficient when the student is solving problems.

The materials were produced to be used with a particular teaching device, the TAPAC machine manufactured by Lehigh Valley Electronics, Inc., Fogelsville, Pennsylvania. The TAPAC was rented from the manufacturer under the terms of the grant and has since been returned. The scheme for using the TAPAC in teaching the comprehension of German was as follows: Each frame started with a spoken message in German, at first simple words, later on whole sentences; a set of four pictures were projected onto a screen in front of the student; the message was repeated; the student

selected the one picture that matched the spoken message, showing that he comprehended what was just said; as the projection screen also served as a response panel, touching the correct picture closed an electronic circuit that gave a "correct" feedback (light and tone) and recorded his success; the machine advanced to the next frame; and finally the total number of correct responses was printed out on adding machine tape, together with a record of the length of time required to select the correct picture, item by item.

Using this presentation scheme a total of 22 lessons were prepared, covering grammatical principles of slowly increasing complexity. The lessons were presented to a small group of students, who achieved a level of success well beyond what might have been expected by usual methods.

Methods, Results, and Conclusions are all fully detailed in appropriate sections of the attached paper. It should be mentioned here that that paper has been accepted for publication in the International Review of Applied Linguistics and is to appear soon.

Recommendations

Considering the novelty of the method reported here, and considering the relatively modest pilot-study scope of the research project involved, it must be admitted that more study should be pursued relative to several important points before extensive use of the method could be recommended in the classroom. The specific points are treated as questions to which tentative answers are suggested:

1. What teaching machine or process could take the place of the TAPAC in routine use? A smaller, less cumbersome, simpler, and more reliable device is indicated. There is no reason to doubt that given sufficiently imaginative design, a production model could be bought for under $500 each. A prototype model might cost considerably more. Preliminary inquiries with electronic engineers and manufacturers of psychological and educational equipment have centered around a rugged, portable desktop device integrating sound and slide or filmstrip. The engineering details appear to be the only stumbling block.

Alternatively a relatively simple technique might be employed taking advantage of a process recently perfected by the A.B. Dick organization. In using this process a student is given a response booklet consisting of sets of four pictures per frame printed visibly. The "correct" picture has a mark printed <u>invisibly</u> underneath. The student indicates that he can match the spoken stimulus to the printed response panel by marking a line under the correct picture with a felt tipped developer pen which resembles a yellow felt pen. Instantaneously the developed Latent Image (the process is so-called) then appears as a black line, if he selected the right response. If he marked under one of the three incorrect panels he just gets a faint yellow line. An experiment with this presentation scheme was undertaken using Xeroxed copies of pictures similar to those included in the attached paper. The results with six subjects on one lesson were so

satisfactory as to suggest that the Latent Image process is well suited to our foreign language method. We are pursuing the matter with A.B. Dick.

The Latent Image process has been tried in our laboratory with an introductory course of 25 lessons in phonetics. The results of that experiment have led us (Professors Harris Winitz, Conrad LaRiviere, and James Reeds) to seek a publisher for our phonetics course. The answer to the educational technology question would appear to be that the technology is there, we have tried it, and it works.

2. To what extent is the method generalizable to foreign languages other than German? The answer to this question, to be demonstrated through further experience, is that the choice of foreign language taught is rather less important than the contrastive structures model of foreign language instruction would have one led to believe. Under the contrastive structures model, which has been quite popular, especially in teaching English as a foreign language, the surface structure of the native language and that of the foreign language are contrasted with each other. Where differences appear between the two structures they represent matters to be taught. Where there are no differences there are also no pedagogical problems. This model corresponds to what psychologists call a transfer paradigm. The drawbacks for language learning, as can now be seen from a generative-transformational vantage point, are that it is really the deep structure we should prefer to teach, rather than the surface structure, and moreover the preoccupation with the surface structure of language inhibits our quest for language universals.

Teaching a different foreign language by our method (or indeed by any method) would of course necessitate minor differences in the strategy for the introduction of new grammatical concepts. Of course the actual frames would in many cases be ordered differently and the spoken messages would be different but the overall scheme would not vary markedly. In this we are guided by a quest for language universals which would transcend genetic relationships between languages. The really crucial test of language universal arising out of such a pedagogical context would come when the source language and the target language (in this case English and German respectively) are not related as those two languages are. Such a test is being met in a series of lessons in Hebrew developed in Kansas City under the direction of my colleague, Harris Winitz. Experience derived from teaching Hebrew by this method is highly encouraging in that the students perform better than is the case with other methods. It would be highly desirable to test our hypothesis that the difference between native and foreign language is a relatively minor factor, by means of the following test: if two small groups of students take the existing set of German lessons under identical circumstances to compare both their differences (if any) in overall achievement and their different performance on particular items where the contrastive structures model would lead us to predict a high degree of difficulty. The two groups of students would differ in their native language. One group would be native speakers of a non-Indo-European language, for example

Japanese or Arabic, and the control group would be speakers of English, or a language relatively closely related to the target language, German.

3. To what extent is this method or any method for foreign language teaching generalizable to the acquisition of native language and related skills? More specifically, can experience gained in developing materials for foreign language help us gain insight into the problems of children with delayed language, impaired hearing, or reading disability, children from a bicultural provenience, or other difficulties? The answer would have to be that specific research experience using our method is lacking, but that the educational problems mentioned are so serious that our approach to their solution deserves more attention. Our aim is to apply current linguistic theory and psycholinguistic theory to the solution of one problem (namely foreign language comprehension) and thereby to gain insight leading toward answers to the question of how people learn language. Our hope is that this insight will in turn lead to more enlightened methods for language teaching.

4. To what extent is our method for language learning applicable to other kinds of learning? We have no answers to this question. From time to time, as we believe, it is desirable for scholars to examine educational theory, as in this case a generalized theory of language learning and language acquisition. Some kinds of research are undertaken to vindicate (or attack) a particular theory. Certain

other kinds of research are pursued so as to generate theory. Results of the traditional methods of language instruction, both foreign and native, are so poor as to cry out for the generation of new theory. We should hesitate to recommend further research of this nature unless: (1) we had based our research program on sound theoretical principles, or (2) we had accumulated sufficient favorable data from previous research. In fact we have both theoretical and practical grounds for continuing. The relevant theory, well established in the psychological literature on language and pure linguistics, has not until rather recently been applied in language pedagogy. The contribution we claim here is one of synthesis and application. Our experience in the production of materials and in the preliminary testing of those materials encourages us to try even harder to refine our theory and invite others to try it out.

KANSAS CITY WORKING PAPERS IN SPEECH SCIENCE AND LINGUISTICS

Number Two

Rapid Acquisition of a Foreign Language (German) by the Avoidance of Speaking

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University of Missouri-Kansas City

September, 1971

(Third Printing
November, 1971)

Rapid Acquisition of a Foreign Language (German) by the Avoidance of Speaking

Harris Winitz and James A. Reeds

Many sensible ideas have been expressed about the teaching of foreign languages (Politzer, 1968; Rivers, 1968). Yet a systematic approach, which is pedagogically realistic, has never to our knowledge been attempted. At a time when so much thoroughly sound theory is available to them, it is a pity that so many foreign language teachers still cling to a few discredited notions of language acquisition. Our foreign language teachers, to say nothing at all about their students, deserve better.

We shall present here our approach to the teaching of foreign language, restricting our examples to German, the language now being taught in our research laboratory with the aid of a machine. Admittedly we will be in an even better position to defend our findings when we have accumulated more of them, but we feel our premises are sound enough to bear scrutiny while our results continue to pile up.

Premises

Our approach stems from our appreciation for child language studies (see Brown 1968, McNeill 1970, Menyuk 1963, and Winitz 1969), and the psychology of acquisition

and retention (Adams 1967, Underwood 1966 and Spence 1956). There is something to be said for correlating foreign language instruction and the development of language in the young child, although the parallel is an abstract one, since not all of the details of child language need to be obeyed. We shall give only limited documentation for the following premises, which serve as the basis for our teaching program, since the references we cite contain detailed information in each one of several areas. After we present our premises a detailed description of the programs and the teaching machine will follow.

A. Comprehension Precedes Production.

It is a well documented fact (see Fraser et al, 1966) that comprehension precedes speaking in the young child. Children begin to utter their first word at about 12 months (Darley and Winitz, 1961), but do not utter sentences of three words or more until after their second birthday (McCarthy, 1930). We would guess comprehension antedates sentence generating by about a year. At the beginning of the third year of life children utter fairly complex sentences (Templin, 1957), but appear to understand a great number of transformations (Menyuk, 1963).

We regard this sequence of development - comprehension first, production second - a functional property of the human brain, which should not be violated in language instruction. Therefore, we take the point of view that foreign language instruction should discourage speaking until a high degree of comprehension is achieved, that is

until the student can hear a non-technical conversation and decode it with ease.

Children who come to acquire their native language are not passive instruments. They are active language responders, but their responses are primarily non-verbal. They follow directions well, associate names with objects, and answer questions, all by non-verbal means. Our automated language program provides for non-verbal responses on the part of the subject.

There is another reason which supports the teaching of fluent comprehension before production. Memory theory (see Adams, 1967) has clearly shown that retrieval of items requires more training than recognition of items. The bulk of our language program calls only for recognition. We do not ask our subjects to recall grammatical forms so that they can produce errorless sentences, rather that they can recognize grammatical forms which are associated with non-verbal stimuli.

B. Chunking.

The classic work of Miller (1956) shows the short-term memory of humans to be 7 ± 2 units. Short-term memory is a critical component for decoding language. Without any acquaintanceship with a foreign language our short-term memory would be restricted to about eight phonemes. Acquiring categories allows us to chunk units (phrases and sentences) which would have originally exceeded our short-term memory span. Using sentences which contain more than eight words (after words have been memorized as isolated units) violates the basic finding of Miller. We should not

expect students to chunk more than eight words, on the average, yet sentences of 12 and 15 words can be found in the first few lessons of most foreign language texts. Our automated language program restricts the length of sentences to no more than eight words until all of the base structures (Chomsky, 1965) are understood well.

C. Pronunciation is avoided until syntax and semantics are well learned.

Contrary to the standard practice well accepted by speech pathologists, foreign language instructors insist upon accurate phonetic production before syntax and semantics are internalized correctly by students. Phonetic productions are not perfected by children of English until about eight years of age (Winitz, 1969). Insistance upon phonetic mastery prior to the receptive understanding of the phonological system is contrary to the normal language process. For one thing, receptive phonological understanding systematizes the string of allowable distinctive features. Knowing what is phonologically permissible systematizes the imput to the phonetic system for both paradigmatic and syntagmatic events (Chomsky and Halle, 1968).

D. Interference.

English-speaking students who learn by the translation method are by definition unable to avoid interference from the dominant language system. Pairing English and German nouns, for example, or worse yet English and German functors, makes the probability for interference very great. The translation method assures that English will be the mediator.

There is a way to avoid interference from English. Our subjects always hear the German word, phrase or sentence first. About two seconds later the pictures on the teaching machine, as described below, appear. Often of course, the student will know the word (or one word of a phrase). Yet delaying the presentation of the picture until the German utterance is heard tends to prevent the pictures from being clothed into English words.

Psychologists define other varities of interference. One is called semantic similarity, that is items of a list which are semantically similar generate confusion with each other. We avoid this kind of interference in our very first lesson by carefully selecting nouns that are unrelated. For example Bleistift appears and Papier does not.

E. Problem Solving

The student, like the child, is never given the rules of German. He only problem solves to arrive at the rules. Problem solving has two advantages: (1) it is motivating - far more "fun" than memorizing, and (2) it probably encourages rehearsal (Hall,1971). A child discovers the grammar (of English or German) by testing a series of hypotheses (Chomsky, 1965). Each hypothesis is often incomplete because the child is given only fragmented exposure to the range of possible sentences.

Not uncommon in the speech of youngsters less than five years of age is the use of weak verb inflections for non-weak verbs (e.g. *swinged and *goed) (Slobin, 1971). This typical error is, in part, due to the incorrect solving of the grammar of verbs. In this case it is apparently an overgeneralization from the set of verbs regarded as regular in conjugation. Similarly, students who have taken our program and who solve the grammar we present to them, would, at certain stages in their training, be regarded as having wrong or incomplete strategies. Nevertheless, we feel the price is worth paying.

In particular, the nominative singular cases are presented first (beginning with lesson one) as would be expected. The accusative masculine, however, is not included when the feminine and neuter accusative cases are presented (lesson eight). The subject, of course, assumes that the paradigmatic similarity die-die, das-das extends to der -*der. He no doubt has to revise his grammar when confronted with den (lesson 13). The article den is attended to carefully because it becomes an important marker. The article den is presented with nouns which are unmarked in number. For example, the subject must relate each of the following sentences to a different picture:

Der Mann hat den Wagen.
Der Mann hat die Wagen.

In the above example den and die contrast. The subject will at first assume that den marks singularity and die plurality for some nouns. Note also that the sin-

gular masculine accusative is not introduced with the singular feminine and neuter accusatives, but in conjunction with plurality .

Since in this lesson die singular and das singular contrast with die plural, the student soon realizes that the den-die contrast is not singular/plural, but masculine singular /masculine plural. Also, he realizes that den plays the same role as die and das in the singular. The student is able to recall the article den very easily because it has first been introduced as an important marker rather than as a memorized word belonging to the paradigm of singular definite articles.

Another example of problem solving (lessons 11 and 12) involves the pronouns er, sie and es. The subject is given the same pictures as in lessons one and two, but the audio has been changed. He now hears either er, sie or es and must learn to press thepicture according to gender. These lessons result in the correct learning of der, die and das as well as er, sie and es. Thus, our students do not memorize the correct form of the definite article with each noun but problem-solve pronoun referents and thereby learn the correct form of the definite article.

A final example of problem solving which is planned for a later lesson is the following contrast:

Der Hut der Frau und ...
Der Hut, die Frau und ...

In the sentences instanced above der becomes associated with Frau out of necessity. After the der genitive marker is learned the der dative singular will be

introduced, because the above example allows for the reasonable linking of der and Frau.

F. Base Structures and Transformations.

Our intention is to limit the complexity of sentences to base structures, as defined by Chomsky (1965), for example, until a considerable number of vocabulary items, perhaps about 3,000 content words and all function words, are learned. Our only deviation from base structures will be the following: w-questions, prepositional phrases, conjunctions, pronoun substitutions and adj +N. The little words like damit, auch, hinter etc. will be taught by both syntactic and semantic means. For example, w -transformations will be introduced according to the findings of Brown (1968).

Audio: Der Mann hat den Hut.
*Der Mann hat was.

Picture: Man holding hat.

Audio: Was hat der Mann.
Der Mann hat den Hut.

Picture: Man holding hat.

After the above structures are well learned, tranformations will be taught. One example will be given for the relative clause.

Audio: Der Mann hat den Hut.
Der Man ist alt.

Picture: Old man holding hat.

Audio: Der Mann, der alt ist, hat den Hut.

Picture: Old man holding hat.

Preliminary Testing of the Program.

Two subjects with no prior knowledge of German have been tested. One is a senior university student with an average grade record (subject No. 1), and one a graduate of a masters degree program in psychology (Subject No. 2).

Subject No. 1

This subject completed all of the lessons described in the above section. Thus she had about four hours of practice with the TAPAC machine. She was first tested on the following nouns written in German: Messer, Ei, Tisch, Richter, Tasse, Blatt, Bleistift, Treppe, Kühlschrank, and Fenster. Although she had no experience reading German, she translated these words into English with 100% accuracy.

She was next tested on the following words to assess her ability to translate from German / English and to determine if she could recall the correct gender for the definite article:

Test Items	Student's response
the bridge	die bricket
the shirt	das hint
the egg	das i
the pear	die buer
the teacher	die Lerherren
the boy	der junger
the window	das fenster
the monkey	der affer

Test Items	Student's Response
the wing	*die flugl
the brush	die berstra

She recalled only one gender incorrectly (the wing).

Subject No. 2

This subject completed all of the lessons as did subject No. 1, but was tested for the form of the definite article prior to lessons K and L as well as after lessons K and L.

Test Items	Prior to K and L	After K and L
the lady	die Frau	die Frau
the clock	*dad our	die our
the ear	*der our	das our
the table	*das tish	der tish
the roof	*die *___	das dast
the pencil	*die blistift	der blistrift
the bird	der vogel	der vogel
the brush	die bierna	die biersta
the boy	*die junge	der junge
the fork	*___ gabble	die gobble

Prior to lessons K and L the subject missed seven items, essentially what would be expected by chance. Following lessons K and L she achieved a perfect score. It seems that lessons K and L achieved their purpose. The solving of the gender for "it" provided the functional stimulus to learn the gender of the definite article.

It is simply not enough to tell a subject that sie is substituted for all die + N; he must problem-solve several occurrences of sie in contrast with er and es. Psychologists do not understand exactly why problem solving leads to better learning and retention than mere instruction by a rule which guides a set of instances, but nevertheless problem solving appears to be the most effective approach to rule learning.

Subject number two was also given the following test prior to lessons K and L.

Test Items	Student's Response
das grosse Messer	the big knife
das lange Brett	the long board
die gute Apfelsine	the good orange
der tote Affe	the dead monkey
die breite Tür	the*front door
die glückliche Lehrerin ist jung	the happy teacher is young
der grosse Kühlschrank ist kalt	the big refrigerator is cold
die starke Frau ist jung	the strong lady is young
die junge Königin ist glücklich	the young queen is*intelligent
der junge Kellner ist glücklich	the young waiter is *intelligent

The performance of student number two suggests that the reading of German is an easy matter once comprehension is achieved. Good translation can be developed without specialized training in translating German to English at least in initial stages. As can be noted above the student incorrectly interpreted our pictures for happy and wide. This is a minor problem and will be corrected when contrasts for these adjectives are introduced in subsequent lessons.

The thirteen lesson programs prepared to date cover the following topics in order: the noun alone, noun with definite article in the singular nominative, attributive adjective in noun phrase, predicate adjective with linking verb, conjoined noun phrases with attributed adjectives, pairs of attributive adjectives together with predicate adjectives, intransitive verbs in sentences, transitive verbs, first with singular feminine or neuter objects, then with plural, and finally with masculine singular objects, pronouns substituted for nouns, gender, sentences with prepositional phrases of static location, prepositions and their objects in the dative including the preposition mit in sentences. Although the thirteen lessons include only 150 different nouns, adjectives, verbs, conjunctions, prepositions, and pronouns, the subjects have shown a noteworthy ability to understand old words in new sentences based on old syntactic patterns and even new words in old patterns. This finding encourages us to believe that students can be taught a wide range of syntactic patterns in a few lessons, using relatively few different words, provided the steps to be learned are clearly identified (to the teacher, at least), provided the steps are introduced in a carefully graduated sequence, and provided the new material is repeated often after it is introduced. The technique can perhaps be illustrated best with the following examples taken from the first lesson, three middle lessons, and the last lesson.

In the very beginning of the first lesson the subject is called upon merely to associate one word, Bleistift, with a picture of a pencil, then to indicate his comprehension by touching the picture, projected onto one of four screen panels. The panels also serve as the four response switches of the manipulandum console. The position of the correct response is randomly varied. At first there is only one response possible: the other three panels have no projected picture. As the lesson progresses, old words previously learned are repeated as foils so that a correct choice must be made from two, three and finally four projected pictures. The difficulty of choice is thus progressively increased as the newness of the items diminishes. This pattern is adhered to throughout all the lessons.

Late in Lesson One the definite article is prefixed to the noun, so that a preparation for teaching German gender is made. (The significance of the definite article is not explained at the time. Indeed, nothing about German grammar is explicitly explained in these lessons. See Lesson 11 below for the continuation of German gender.)

Frame A1

Black screen

Audio: "Bleistift"

Shutter opens:

[Insert Figure 1]

Audio: "Bleistift"

Response by student: correct (upper left)

Feedback: correct light and pleasant tone.

Black screen

Next frame

Frame A2

Black screen

Audio: "Bleistift"

Shutter opens:

[Insert Figure 2]

Audio: "Bleistift"

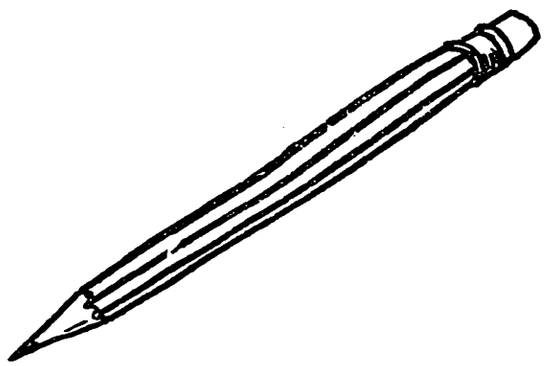
Response by student: correct (upper right)

Feedback: correct light and pleasant tone

Black screen

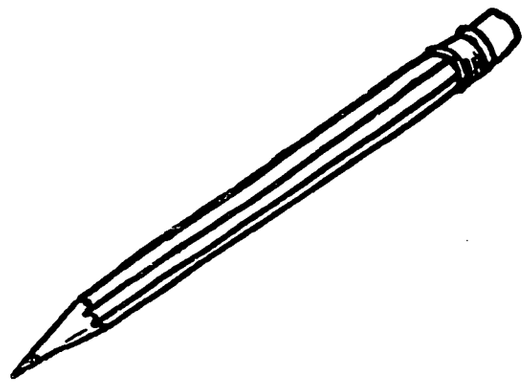
Next frame

Figure 1



Frame A1

Figure 2



Frame A2

The next words, Hemd, Frau, Brücke, Tasse, Ei, (shirt, lady, bridge, cup, egg) are introduced in order, first as the only response possible then gradually with pictures as foils. The tenth and 25th frames are shown below as examples.

Frame A10

Black screen

Audio: "Frau"

Shutter opens

[Insert Figure 3]

Audio: "Frau"

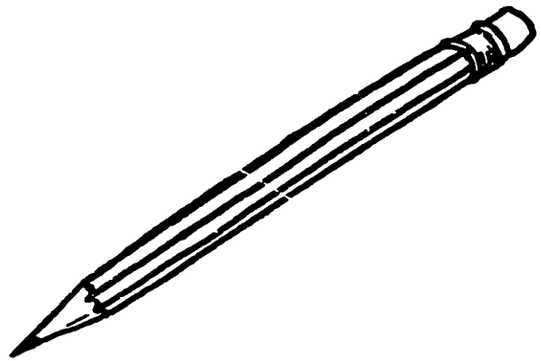
Response by student: correct (upper left)

Feedback: correct light and pleasant tone

Black screen

Next frame

Figure 3



Frame A10

Frame A25 (a review frame)

Black screen

Audio: "Hemd"

Shutter opens

[Insert Figure 4]

Audio: "Hemd"

Response by student: correct (lower right)

Feedback: correct light and pleasant tone

Black screen

Next frame

etc.

The sixth lesson tests the student's ability to differentiate between pairs of adjectives that contrast semantically. One frame will perhaps suffice:

Frame F15

Black screen

Audio: "Das kleine Hemd und die kleine Gabel."

Shutter opens:

[Insert Figure 5]

Audio: "Das kleine Hemd und die kleine Gabel."

Response by student: correct (upper left)

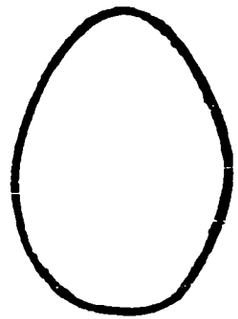
Feedback: correct light and pleasant tone

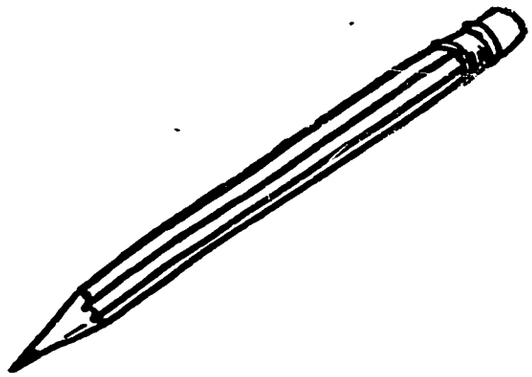
Black screen

Next frame

etc.

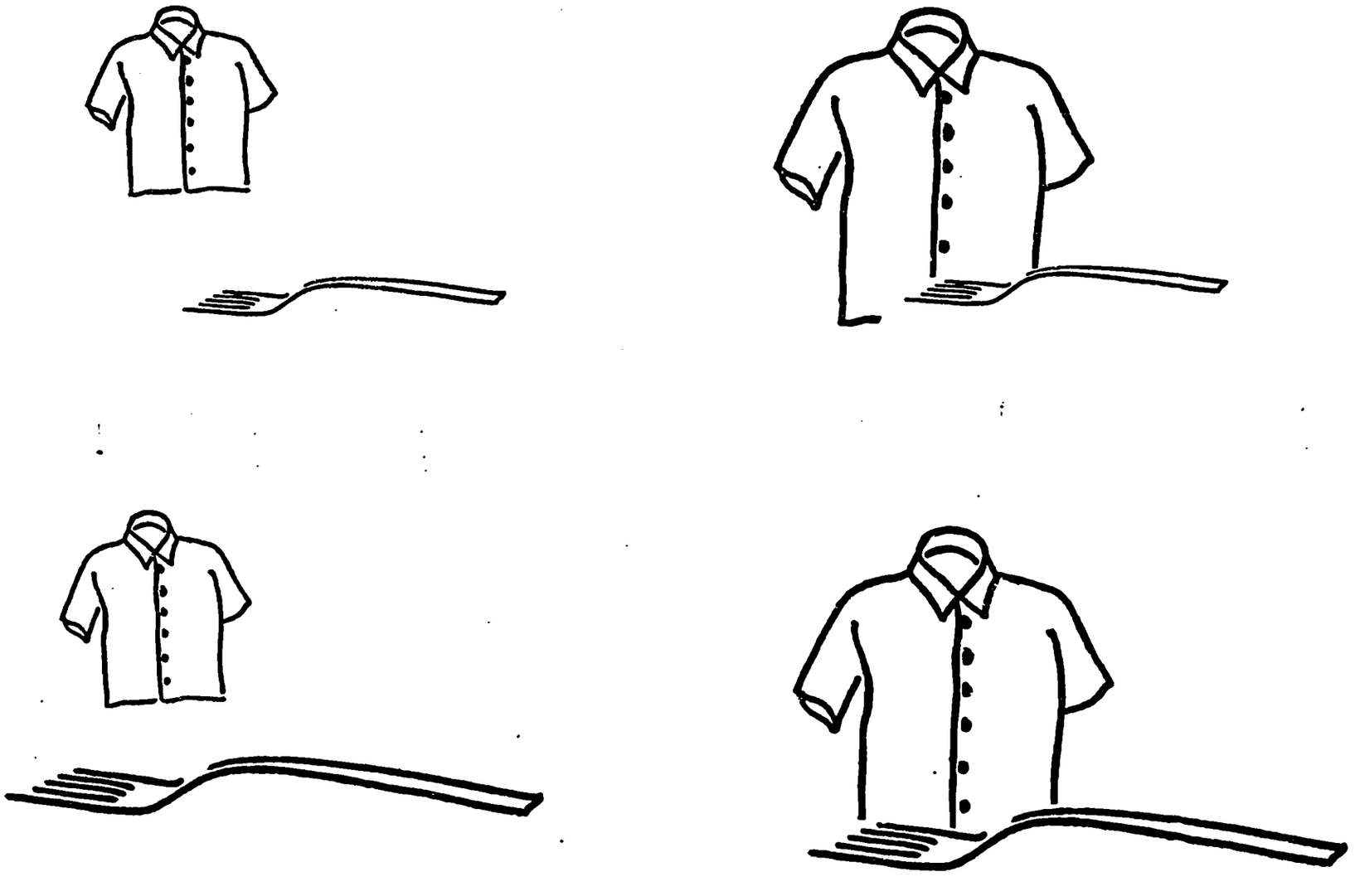
Figure 4





Frame A25

Figure 5



Frame F15

By the time the student reaches the tenth lesson he will have learned a number of words, will be able to segment the audio stimulus into its relevant chunks, will be familiar with some basic syntactic patterns, and will be able to recognize the correct picture from a field of increasingly difficult choices. In the following four examples, which are not in immediately consecutive order, the student is required to reject as incorrect foils pictures that semantically and syntactically intersect more and more with the correct response.

Frame J1

Black screen

Audio: "Der Mann trinkt das Bier."

Shutter opens:

[Insert Figure 6]

Audio: "Der Mann trinkt das Bier."

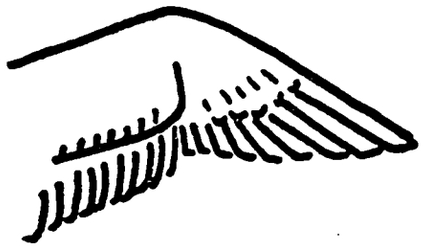
Response by student: correct (upper left)

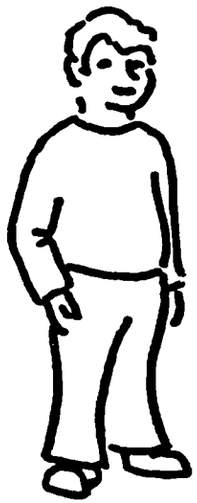
Feedback: correct light and pleasant tone

Black screen

Next frame

Figure 6





Frame J1

Frame J38

Black screen

Audio: "Der Mann trinkt das Bier."

Shutter opens;

[Insert Figure 7]

Audio: "Der Mann trinkt das Bier."

Response by student: correct (lower right)

Feedback: correct light and pleasant tone

Black screen

Next frame

Frame J49

Black screen

Audio: "Der Mann trinkt das Bier."

Shutter opens:

[Insert Figure 8]

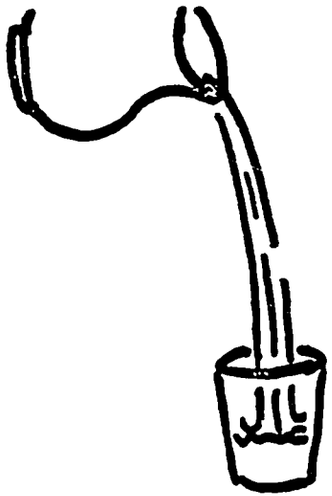
Audio: "Der Mann trinkt das Bier."

Response by student: correct (upper left)

Feedback: correct light and pleasant tone

Next frame

Figure 7



Frame J38

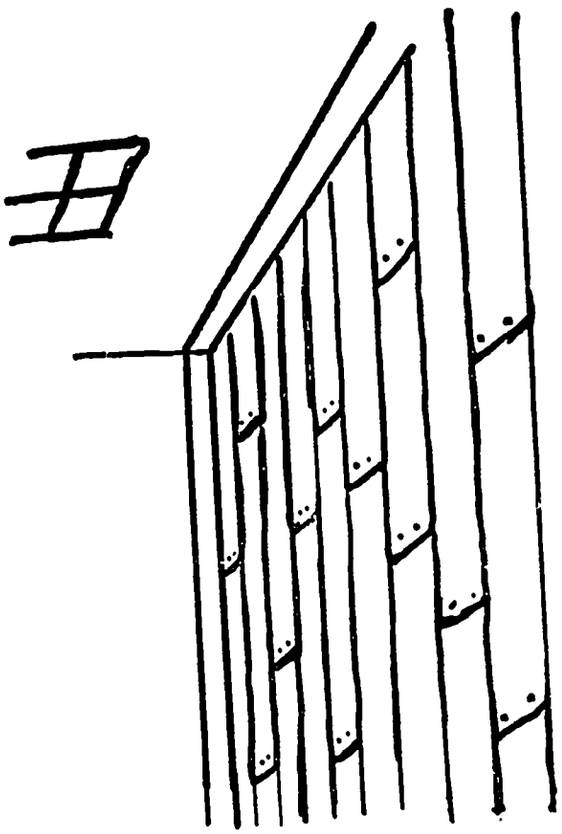
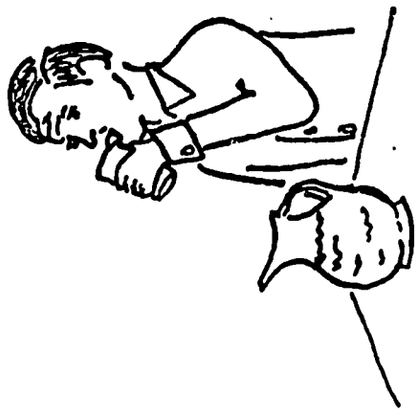


Figure 8



Frame 145

Frame J70

Black screen

Audio: "Der Mann trinkt das Bier."

Shutter opens:

[Insert Figure 9]

Audio: "Der Mann trinkt das Bier."

Response by student: correct (lower left)

Feedback: correct light and pleasant tone

Black screen

Next frame

etc.

Lessons 11 and 12 illustrate the gender recognition referred to above.

Frame K1

Black screen

Audio: "Der Bleistift. Er."

Shutter opens:

[Insert Figure 10]

Audio: "Er."

Response by student: correct (upper left)

Feedback: correct light and pleasant tone

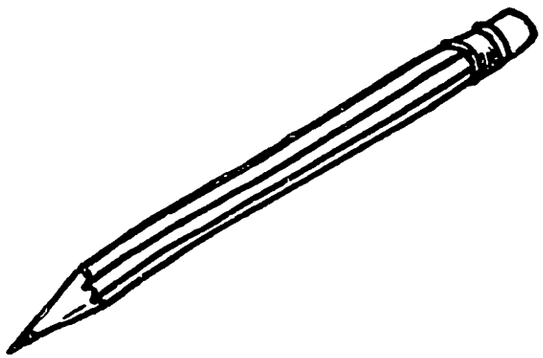
Black screen

Next frame

Figure 9

Frame J70

Figure 10



Frame K1

Frame K23

Black screen

Audio: "Es."

Shutter opens:

[Insert Figure 11]

Audio: "Es."

Response: Correct (upper right)

Feedback: correct light and pleasant tone

Black screen

Next frame

•
•
•

The upper right panel is the only correct response to the neuter pronoun stimulus as two of the others are feminine (die Frau, die Tasse) and one is masculine (der Bleistift).

Frame K44

Black screen

Audio: "Die Uhr. Sie."

Shutter opens:

[Insert Figure 12]

Audio: "Sie."

Response: correct (upper left)

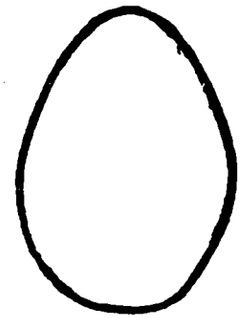
Feedback: correct light and pleasant tone

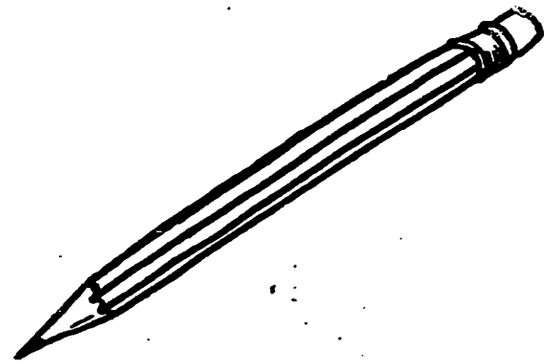
Black screen

Next frame

•
•
•

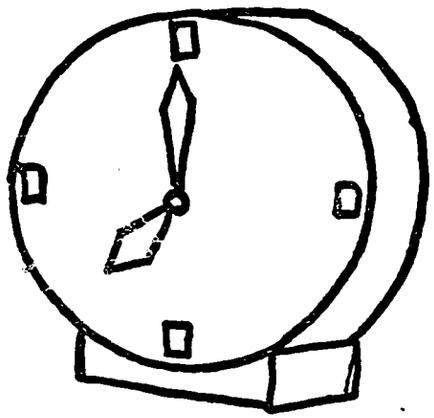
Figure 11

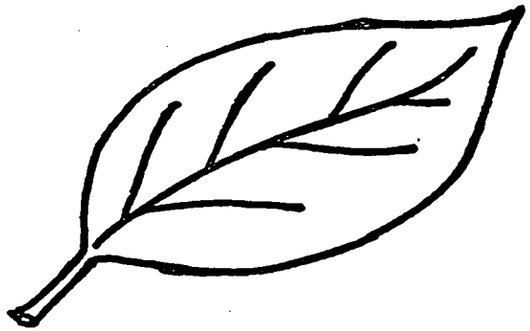


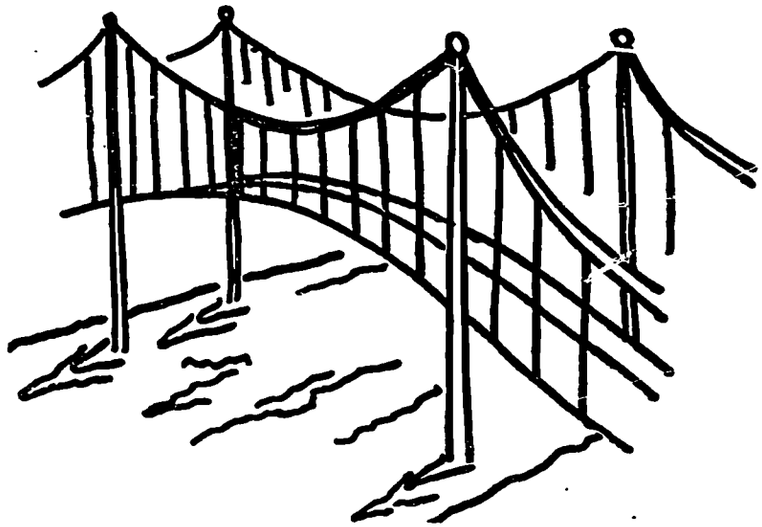


Frame K23

Figure 12







Frame K44

The noun, die Uhr, was spoken by the reader because the correct picture could not have been identified by the feminine pronoun alone. Die Tasse and die Brücke are also feminine. Die Uhr is repeated often enough in the eleventh lesson, both as correct responses and as incorrect foils to enable the student to associate the noun with its appropriate feminine pronoun.

The last lesson produced to date is designed to teach the use of the dative case after certain prepositions and to show the difference between the forms of the definite article in the dative. Two frames of moderate difficulty will perhaps illustrate the level of achievement attained after thirteen lessons:

Frame M298

Black screen

Audio: "Das Fräulein geht über die Brücke."

Shutter opens:

[Insert Figure 13]

Audio: "Das Fräulein geht über die Brücke."

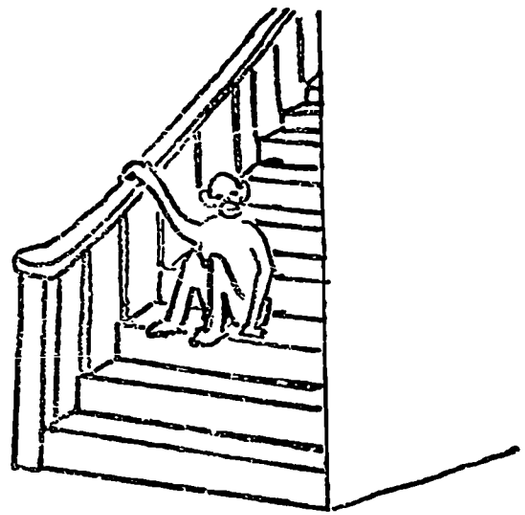
Response by student: correct (lower left)

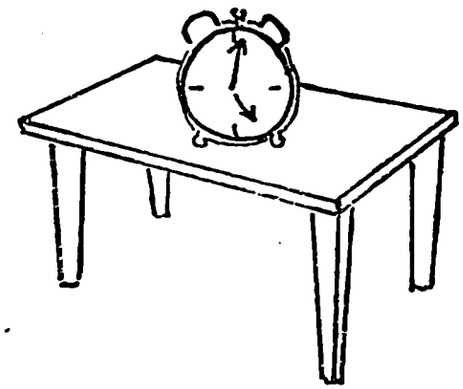
Feedback: correct light and pleasant tone

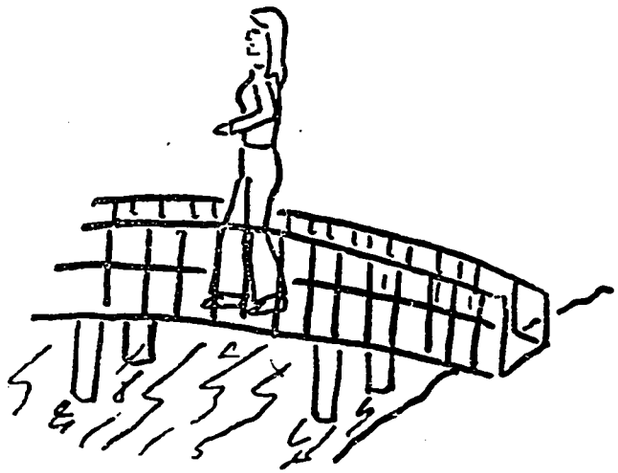
Black screen

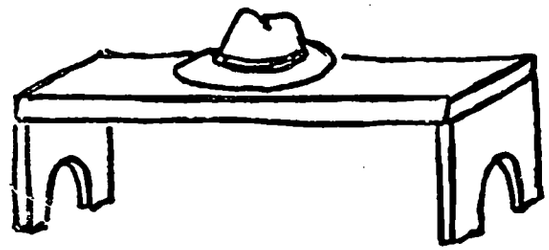
Next frame

Figure 13









Frame M298

Frame M306

Black screen

Audio: "Das Messer ist über dem Brot."

Shutter opens:

[Insert Figure 14]

Audio: "Das Messer ist über dem Brot."

Response by student: correct (lower right)

Feedback: correct light and pleasant tone

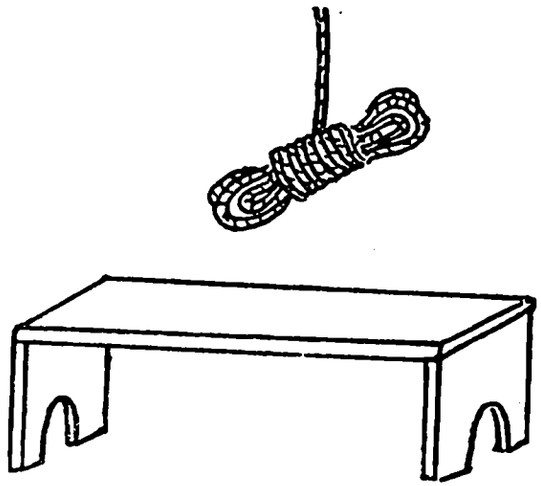
Black screen

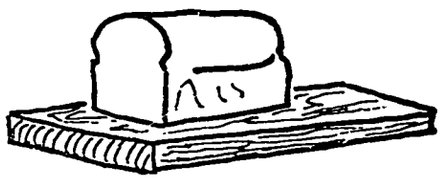
Next frame

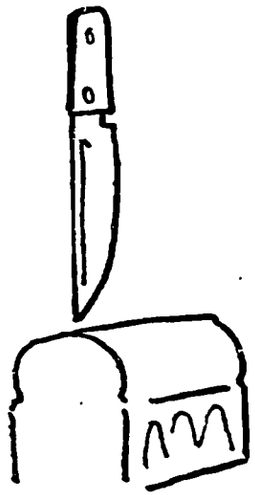
etc.

Of course the lesson material is designed to increase in difficulty so slowly that the students will probably not make many mistakes. The small variation in latency across items or across students is expected to reveal more information about the items and the students than is the percentage correct. The TAPAC gives latency printout, item by item, in centiseconds. In the unlikely event the student makes a mistake, the following events occur: (a) an unpleasant buzzer sounds; (b) a light labeled incorrect is lighted; and (c) the presentation of the next item is delayed for a programmable, pre-set time interval, typically ten seconds.

Figure 14







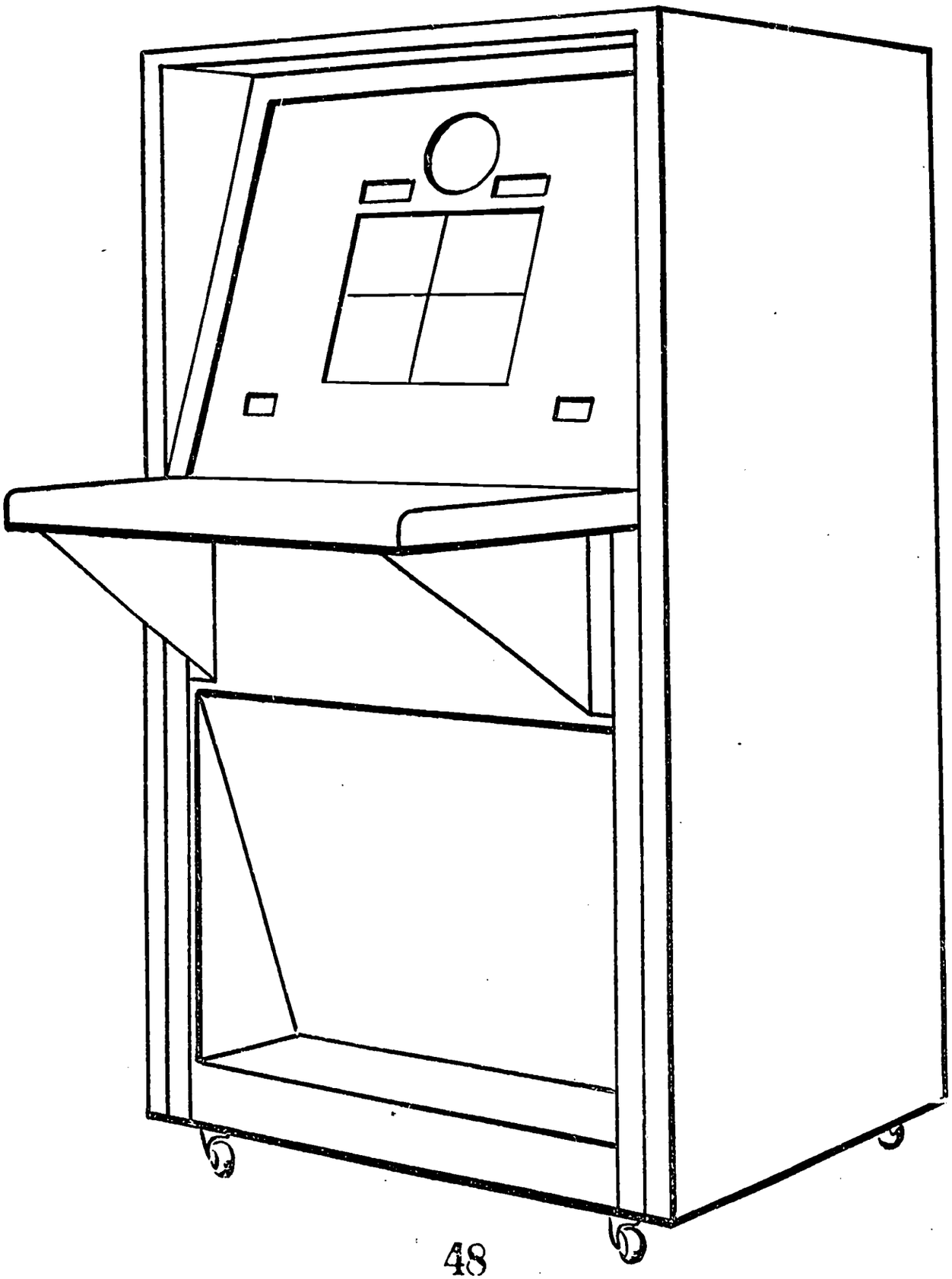
Frame M306

TAPAC-Totally Automated Psychological Assessment Console.

(see Figure 15)

The TAPAC machine/is a totally automated audio-visual console which was developed by its manufacturers (Lehigh Valley Electronics, Fogelsville, Pennsylvania) for a number of psychological tasks. The manufacturer was kind enough to modify the front panel of the machine for our purposes, as described above. With the modification four quandrants of a square, each quandrant approximately 4 5/8" by 3 1/4", serve as screens on which pictures are projected. By depressing the plexi-glass cover of the correct screen, circuits are actuated which advance the aperature card. An aperature card is similar to a standard tabulating card. It contains on one side the microfilm and on the other side key punch columns. A card reader and a tape recorder work (programmed by audio-signals) jointly in the presentation of the material. There is considerable flexibility in the logic circuitry to permit a variety of stimulus-response intervals, time delays, key-enabling and stimulus intervals. Automatic recording of data is provided by a print-out counter which records among other things the card number, the latency interval, and the cumulative correct response total.

Figure 15



TAPAC (Totally Automated Psychological Assessment Console)

SUMMARY

The relevance to elementary foreign language instruction of certain findings of child language development (native language) and the psychology of language acquisition is examined. A set of premises is proposed for a new scheme for the teaching of German, based on those findings, namely: that comprehension precedes production; that language material is stored in short term memory as chunks of 7±2 units; that pronunciation is best avoided until syntax and semantics are well learned; that the native language (English) interferes with the learning of the foreign language (German); and that language learning takes place optimally when the student is solving problems rather than memorizing by rote. The grammar being taught derives form modern transformational theory.

Following the above premises, a series of 13 lessons have been developed for presentation by a teaching machine recently perfected. The lessons, covering a portion of the first semester of college German, have been tested in pilot form. The initial encouraging results are reported. The preparation of new lessons continues.

ACKNOWLEDGEMENT

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