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# **LEARNING LANGUAGES WITH A “SLIM” AUTOMATIC TUTOR**

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## **ABSTRACT**

SLIM is a prototype interactive multimedia self-learning linguistic software for foreign language students at beginner - false beginner level. It allows students to work both in an autonomous self-directed mode or in a way of programmed learning in which the process of self-instruction is preprogrammed and monitored. In this latter mode it incorporates assessment and evaluation tools in order to behave as an automatic tutor. It is organized into three basic components: audiovisual materials; a linguistic database recording all language material in text format; the supervisor. Audiovisual materials are partially taken from commercially available courses; the linguistic database is a highly sophisticated classification of all words and utterances of the course, both in written and spoken form, from all possible linguistic aspects. The supervisor is both an attractive, enjoyable and strongly pedagogically based software that allows the user to work on language materials. The most outstanding feature of SLIM is the use of speech analysis and recognition which is a fundamental aspect of all second language learning programmes. We also assume that a learning model can be represented by a finite state automaton made up by a fixed number of possible states - corresponding to the macro and microlevels at which the student's competence may be modelled - each one being internally constituted by the actual linguistic objects of knowledge of the language that make it up.

## **1. INTRODUCTION**

SLIM - Interactive Multimedia self-learning Linguistic Software, is a multimedia course for self-instruction characterized by a software which allows students to work both in an autonomous and independent self-directed mode or in a way of programmed learning in which the whole process of self-instruction is preprogrammed and monitored. At present, the prototype we are working at is directed to real beginners of both western languages like Italian, English and French, and eastern languages like Chinese and Japanese.

Self-instructional materials should have all the features good language teaching material have - interest, variety, clarity and so on. However the following points seem paramount:

- a clear statement of objectives;
- meaningful language input;
- a sufficient number of exercise materials and of activities - their feasibility for self-instructional use;
- individualisation and flexibility of materials;
- learning instructions in mother tongue for the levels considered herewith information in each unit giving advice on the order in which various activities should be done, how they are to be done; how much time they should take, whether they should be done over a short time interval or paced over a number of days;
- language learning advice - is essential for the learner to be told about how to tackle the job of language learning. Helping facilities should explain how to do exercises and activities; how to learn vocabulary; whether or not to set out to learn lists of irregular verbs and explicit grammatical rules; how and when to use reference materials such as dictionaries and grammar hypertext; how to plan the work and how to pace it; how intensively

to study and how to motivate it; how to assess his/her attainment and how to keep records of progress and so on;

- feedback and tests - the provision of feedback to the learners in the form of answers and explanations to exercises provides a major opportunity for learning in self-instructional materials. It is important to remind that learners need to know why they are wrong and where they are wrong.

## **2. COURSEWARE ARCHITECTURE**

SLIM courses may be accessed in two modalities, according to students' attitudes:

1. Exploratory or Free Modality, self-access for self-directed students with no supervision by the Human or the Automatic Tutor(hence HT or AT);

2. Directed or Guided Modality, self-access for beginners who use self-contained materials which are internally programmed and supervised by the HT or AT.

In the first modality, the courseware is available with free access over each component, so that one can simply decide to organize an individualized path through them by the appropriate facility..

In either case, there is continuous support to the learners when they decide to engage themselves in one or the other modality, in order to advise them as to the setting up of goals which are adequate to their previous knowledge, expectations, and needs.

The course is introduced by a general presentation where all different modules and activities are illustrated and exemplified. In addition, each module has been supplied with a Help facility, a sort of Coach, which illustrates pedagogical issues relevant to the current exercise.

In the Directed Mode, the software is organized into Activities and Modules. Responsibility for the learning processes and corresponding tasks as well as for the decision-making processes for learning is expressly built into the materials. In order to do this the course is programmed in such a way as to allow for graduality in the presentation of materials and to include effective tools for self-assessment. For sure, learners that assess themselves should be aware of how well they achieve learning tasks, and have a reasonable idea of their level of proficiency.

In the Exploratory Mode, activity units are freely accessible from a database structure in which students may access them starting from goals. Students/tutors can design their own courses, the ways that the achievement of their selected goals may be assessed as well as when to take their tests. In other words, students may select preferred learning modes and strategies. It is clear that in this second mode, materials are proposed without any internal structure and students should be aware of their needs.

### **2.1 SLIM FUNCTIONAL COMPONENTS**

The following are SLIM functional components:

- a. The Supervisor
- b. Media
- c. Linguistic Database
- d. Hypertexts
- e. Help
- f. Testing
- g. Translations
- h. Dictionary

We shall describe The Supervisor component for last. Media refer to all media used by the Supervisor: they include the following:

- Animation: Video English + Project Video 1 = 73 video-clips
- Controlled Utterances: 2,700 utterances, including: Grapevine and Two Days in Summer
- Spoken Dictionary: 2,000 words

The second component, the Linguistic Database is currently being organized under FoxPro™, and includes the following items and descriptions:

- 1,800 word types;
- 11,000 word tokens;
- 2,700 utterances;
- 122 communicative functions;
- 27 syntactic/semantic classes;
- 500 grammatical classes;
- Phonetic transcription
- Soundex coding for each word

The third component, Hypertexts includes the following items:

- Grammar
- Phonetics
- Culture & Civilization

The fourth component Help, has both animated and textual helping instructions for each activity.

Fifth component is just the translation attached to each word and utterance of the course; and finally the sixth component is a monolingual dictionary required for Advanced Activities.

Now, coming back to the first component, The Supervisor, this is divided up into the following Modules and Activities:

- 6 teaching modules
  - 4-5 activities per module
1. ORAL MODULE  
audiovisual teaching units; (watching and listening)
  2. WRITTEN MODULE  
writing skills; (graphematics, phonotactics)
  3. GRAMMAR MODULE  
remedial linguistic activities; (grammar-syntax-semantics)  
self-assessment and testing.
  4. PHONETIC MODULE  
audio-speaking practice; (phonetics)
  5. PROSODIC MODULE  
audio-speaking practice; (prosodics)
  6. ADVANCED MODULE  
advanced exercises; (understanding and role-taking)

All these components are made available as a self-access system based on a fully computerized laboratory fully equipped for multimedia modality in audio-active-comparative booths. Each student executes his activities by means of an headset for his speaking-listening tasks.

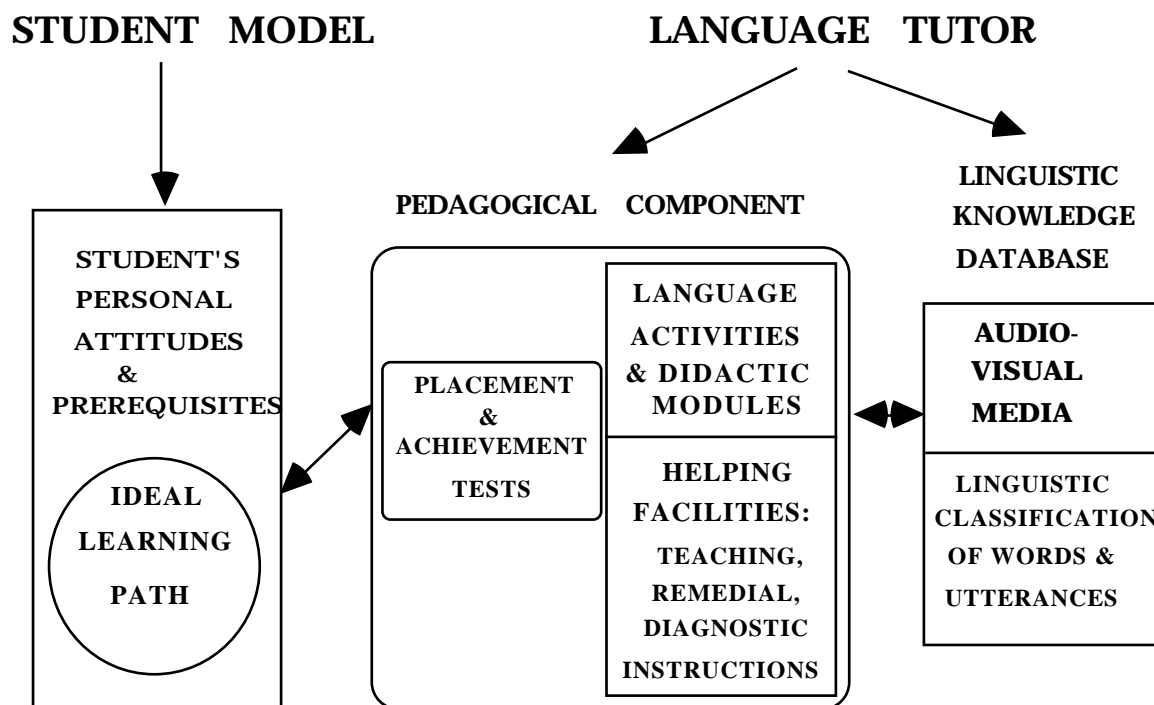
Before thinking about automatic or semi automatic advisor/tutor, performance data on which to base automatic decisions should come from on line assessment and evaluation tools: these tools should be completely and consistently related to the teaching/learning materials studied. They should also have other important features such as: concern oral skills and not only written ones, and be fully reliable.

SLIM allows for a direct mapping between learning/teaching materials and assessment. Most activities are built by the system automatically tapping linguistic knowledge encoded in the database by means of procedures that look for certain linguistic items, in a given order, according to certain teaching criteria which have been implemented directly in each procedure.

### **3. AUTOMATIC TUTOR**

In what follows, automatic tutoring will be described in terms of interaction between Student Model and Language Tutor which in turn is made up of a Pedagogical Component and a Linguistic Knowledge Database.

Tab.1 SLIM Automatic Tutor Architecture



### 3.2 The Student Profile and Student-Tutor Interaction

The following is a list of Student's Problems when learning a second language:

1. LANGUAGE DISTANCE
2. INTERLANGUAGE CONTINUUM
3. STUDY STYLE
4. LEARNING APPROACH
5. TIME AVAILABLE TO EXECUTE THE TASK
6. STUDENT'S BACKGROUND
7. CONFIDENCE IN MASTERING LEARNING SITUATIONS

We addressed each such Problems by the following questions organized in a questionnaire:

1. What languages can you speak apart from "Source Language"?
2. How many years have you been studying "Target Language"?
3. Which way should the contents of the course be presented:
  - a. Bottom-up
  - b. Top-Down
  - c. Analytic
  - d. Synthetic
  - e. Serialist
  - f. Holistic
4. Which way do you prefer to study:
  - a. Directive
  - b. Exploratory
5. How much time can you spare to reach your learning objectives?
6. Was your secondary school an educational or a vocational one?
7. Have you already been working on a computer interactively?

Possible outcomes of the questionnaire are three:

- A. CALL THE HUMAN TUTOR  
(Fully directed)
- B. CALL THE AUTOMATIC TUTOR  
(Automatic Tutor)
- C. CHOOSE THE BEST LEARNING PATH  
(Half-directed)

where the Human Tutor is only the Virtual Tutor, and could be reachable on a local or geographic network connection, and the Best Learning Path could either be chosen by the student or by the Human Tutor if locally

available and is only the physically present tutor. Clearly, a call to the Automatic Tutor only realizes a virtual call and in this case the first requirement would be to go through a placement test.

What kind of knowledge should the Automatic Tutor possess after Student Profile and Placement Test have been completed? We assume that the following is in order:

1. CONCEPTUAL KNOWLEDGE
  - coinciding with grammar of L2
2. PROCEDURAL KNOWLEDGE
  - how conceptual knowledge is put to use
3. OPERATIONAL KNOWLEDGE
  - how conceptual and procedural knowledge are used to react in the appropriate way to real communicative situations

### **3.2 The Student Model**

The Student Model encompasses both a statement of Learning Goals and an Assessment of Student's Skills. Goals are ranked according to intrinsic grammatical difficulty levels, which in our system are graded up to Six Levels. Student's Skills may also be graded from None up to Six Grade where each Skill may be assessed separately and receive a different type of evaluation. According to student's performance in Placement or Entry Tests, and to his statement of Learning Goals his Model will be constructed from the Tutor and an Ideal Curriculum or Learning Path shown to the student. The Ideal Learning Path includes all activities organized as a sequence of Tasks and a number of Milestones depending on Learning Goals. In turn, Learning Goals may be stated into two different modes: Mode 1 allows the student to access and highlight a number of different Communicative Functions, which in turn will automatically address Grammatical, Lexical, Semantic and Pragmatic Goals as exemplified by Audiovideo Learning Units. Mode 2 allows the student to choose among one of Six Grades where each one again addresses a number of Communicative Functions regarded as the most adequate for a certain level of knowledge of the language(see below).

### **3.3 The Language Tutor**

As discussed above, the Language Tutor is The Supervisor and has access to all components. It also has two special components: the Pedagogical Component and the Linguistic Knowledge Database(hence LKD). Before discussing in some detail the contents of these components, we shall outline the interactive part of the system. After the student has taken some test for entry level evaluation or for assessment purposes, the Tutor creates a Student Model which is made up of personal information from the student and a Learning Path. Every subsequent action on the Model is intended as some form of Update of the Learning Path. Any Update action is motivated by the Pedagogical Component and by the intervention of some form of Warning or Advice from the Helping Component.

By accessing the LKD the Tutor creates the Ideal Learning Path which will be subsequently Updated whenever the student enters the system and engages in some exercise. Assessment is done locally by each individual Didactic Module making up some specific Linguistic Activity. Besides, the Pedagogical Component has the further task of evaluating student's performance with reference to his Learning Path, in order to execute some adjustment. Adjustment may be of two kinds: Task Deletion and Task Addition. Every time some adjustment takes place, the Tutor may have to issue some Message to praise or to advise the student.

The LKD is then activated by the Tutor every time the student completes exercises in one of the Modules of Linguistic Activities contained in the Learning Path. The student's performance is assessed in real time according to type and modality of execution of the exercise. The student may decide to repeat the same exercise as many times as he likes, and iterative assessment will take place. As soon as the student leaves the Module, the Tutor is called and a list of results are passed for global evaluation. Helping Facilities are embodied from two hypertexts: a Grammar, and a Phonetics Course, all helping messages are built around them. By matching the linguistic contents of the exercise with the LKD and by computing repetitions and performance overall time, a total proficiency mark will be issued.

The Tutor reasons according to Macrolevels, as explained here below and Updates the Learning Path if needed. In turn Macrolevels refer to single specific items contained in the LKD by connecting to Microlevels and to Phonetics while at the same time having capabilities related to overall Learning Goals.

## **4. STUDENT'S SKILLS AND INVENTORY OF LINGUISTIC ITEMS:**

Knowing a foreign language is a process that involves all communicative skills of the student. In particular it addresses:

- a. passive abilities like understanding spoken and written linguistic messages;
- b. active abilities like writing and speaking in the target language.

In other words, these abilities may be further decomposed into their basic constituent:

- acquisition of a base lexicon made up of a certain number of words;
- acquisition of the basic grammar rules and grammatical words;
- acquisition of the basic syntax and semantics;
- acquisition of the phonetics, phonology and prosody.

In addition, all these learning items must be transposed into a basic communicative environment in which the language must be adequately coupled to cultural issues and knowledge of the world related to the target language.

Supposing now to make a list of linguistic items, be they lexical items, grammatical items, grammar rules, syntactic and semantic structural rules, phonetic and phonological rules as well as morphophonological and prosodic rules of the language. These items have been organized into six levels of difficulty, determined both by objective and by contrastive criteria. The task of the automaton would be that of supervising the transition from one level onto the other, once the entry level of the student has been ascertained by objective placement tests. The automaton will use achievement and proficiency tests during the course in order to establish the increase in proficiency achieved by keeping a record of all the previous lessons and tests carried out by the student.

We might refer ourselves to the ESU Framework which introduces a Yardstick for different types of linguistic performance scales according to language use and skill. In this case, our course will address the first four levels in a ladder made up of 9 levels. We assume that this last level is adequately addressed by an advanced course, whereas an intermediate course of English will suitably address levels going from 4 to 6.

#### **4.1 Topics, Communicative Functions and Semantic Notions**

The student will enter the course from main topics which in turn may be decomposed into communicative functions and semantic notions. Functions may belong more naturally to one or the other topic, thus cutting vertically the list of contents of a course; on the contrary semantic or conceptual notions cut horizontally each topic. The same applies to grammar rules which could be assigned difficulty scores according to an evaluation metric which is commonplace amongst language teachers, thus dividing up the grammar rule universe into levels; at the same time, these rules might be scattered at random amongst topics and be independent of the topic the student is currently learning.

A simple and cursory listing of typical survival or general syllabus of a course for foreign language learners includes all or part of the following themes or topics:

1. Personal Identification;
2. Finding a house, flat, room;
3. Trade, job, profession, occupation;
4. Hobbies, entertainment, free time;
5. Travel, traffic, taxis, automobiles;
6. Interpersonal relations and social conversation with friends, family, colleagues differing in degrees of authority ;
7. Health and welfare --relating to public structures like hospitals, physicians and chemist's shops;
8. Education in schools and universities;
9. Shopping and supermarkets;
10. At the restaurant, foods and drinks;
11. Public transport, postal service;
12. Visiting tourist places in Italian cities;
13. Discussing about the weather.

Suppose now we start up by regarding some communicative function as being intrinsically more pragmatically relevant, we shall end up with a rank list as follows:

1. Describing actions: habitual, future, current, past;
2. Information: ask for, indicate something/someone, denoting existence/non existence;
3. Socializing: introduce oneself; on the phone;
4. Expressing Agreement and Disagreement;
5. Concession;
6. Rational enquiry and exposition;
7. Personal emotions: Positive, Negative
8. Emotional relations: Greetings, Sympathy, Gratitude, Flattery, Hostility, Satisfaction;
9. Categories of Modal Meaning, Scales of certainty: i. Impersonalized: Affirmation, Certainty, Probability, Possibility, Negative Certainty; ii. Personalized: Conviction, Conjecture, Doubt, Disbelief; iii. Scale of commitment; iv. Intentionality; v. Obligation;
10. Mental Attitudes: Evaluation; Verdiction; Committal; Release; Approval; Disapproval; Persuasion; Inducement; Compulsion; Prediction; Tolerance.

All these communicative functions may be given a compact organization within the six following more general functions or macrofunctions:

1. ASK; GIVE, OFFER, CONSENT;
2. DESCRIBE; INFORM;
3. SOCIALIZE.
4. ASSERT, SAY, REPLY;
5. EXPRESS EMOTIONS, MODALITIES;
6. MENTAL ATTITUDES;

Each such macrofunction may contain further specifications in the sense indicated above. In the communicative based approach to language learning, what comes first - as Level 1 - should be related to communicative activities that usually come first in real life situations. For instance, before starting a conversation people exchange greetings, and so on. However, we may assume that the rank list above should be regarded as a functionally relevant subdivision of tasks, which however could be interleaved with situations at all levels. The ranking thus can be used as a simple subdivision into difficulty rating, from the less to the more difficult to learn.

## 4.2 Language Skills and Macrolevels

### • **MACROLEVEL I**

It should be regarded the basic level of knowledge of L2 at which learners shall be able to intervene productively in the simplest communicative situations. They shall be able to use the morphosyntactic structure specified below, and shall understand texts both oral and written, with the lexicon included in the Base Vocabulary.

#### **i. Listening**

Recognize the phonemes of L2, make syllabic segmentation of phonic chains, recognize main intonative-syntactic profiles. Understand simple oral messages related to simple communicative functions, recognize predictable questions and follow simple instructions.

#### **ii. Reading**

Recognize graphic and orthographic structure of word forms; recognize individual words, street names, public signs, shop names; read and digest information at simple sentence level - one sentence at a time. Read word by word from beginning, cannot predict or vary pace. Read at sentence level, and digest each sentence before going to the next. Can work with familiar forms, notices, work sheets.

#### **iii. Metalinguistic competence**

Recognize and name elementary structural elements of L2, make analysis, synthesis and transformation of linguistic structure at morphological, phonological, lexical, and syntactic level.

#### **iv. Writing**

Complete forms which require one word or simple 'stock phrase' answer. Write name and address and a few personal details, some numbers. Fill in forms, work sheets, about own work. Complete appropriate forms using one verb sentences. Produce the odd question when most of the information is supplied by the situation. Produce a very few memorised questions about time, person, and place. Produce simple yes/ no or 'WH' question forms. Describe job in short phrases, give straightforward directions, instructions in memos or standard format.

#### **v. Speaking**

Know a number of words and phrases. Exchange the odd word or phrase but has no meaning exchange outside the situation. Limited by poor production. Give personal information, express personal likes, dislikes, preferences, opinions; describe job and give instructions.

### • **MACROLEVEL II**

Learners acquire greater self-assurance and self-consciousness of previously learned materials, as well as increase their ability to intervene actively in much larger communicative situations both in the oral and written skills. Increase proficiency in the socio-cultural aspects of L2.

#### **i. Listening**

They can understand reports on simple events and actions in the past; expressing doubts, or hesitations.

#### **ii. Reading**

See simple relationships showing cause, effect and simple conditions. Cope with short memos or letters but not with anything longer; recognize relevance at paragraph level and vary pace accordingly; extract factual but not logical or implied information, understand each point of argument but often fail to see connections.

#### **iii. Metalinguistic competence**

Recognize and name structures included in the list above, recognize different genres of texts, and make complex operation of analysis, synthesis and transformation of linguistic structures.

#### **iv. Writing**

Produce individual stock question, one at a time; make standard enquiries of a routine, impersonal nature; describe functions of posts, processes, procedures in simple language; write routine standard letters in answer to simple queries. Write stock letters or memos of apology, assurance, promise; make arrangements for meeting, check or cancel appointments.

#### **v. Speaking**

State position in very broad terms; function in shops, hotels, travelling, and exchange personal details; discuss aspects of work and immediate working environment; make appointments, arrangements, check, cancel, alter; present oneself, make introductions, invitations, or make acceptances or refusals over meals.

## 5. SPOKEN LANGUAGE MODULES

We shall only concentrate on oral activities and amongst these on those requiring feed-back from the computer. In this way we shall not present audio-active comparison, dictation and other exercises which require self-monitoring and self-assessment.

Phonetic exercises focus onto phonemes that cause users the most difficulty. Phonemes have been divided up between consonants and vowels, and graded for difficulty. We have created an hypertext which accesses each

phoneme and gives help to the student in difficulty. Each phoneme is accompanied by a video clip with the front vision of a native speaker's mouth while pronouncing it.

Once the system has identified the users' phonetic problems, they will be able to select from their own list of items to practice. These can be induced by typing in the mispronounced word and the Supervisor will choose the appropriate phonetic area to work on.


**Aree Selezionate**

Centro-Anteriore Aperta  
 Centrale  
 Centro-Posteriore Aperta

Seleziona l'area del quadrilatero vocale che ti interessa e fai click. Se conosci la parola del corso che ti da problemi e non sai quale sia il fonema vocale dove cade l'accento principale puoi scriverla nel campo "Parola" e fare click sul bottone "Indica fonema chiave".

**Parola**

*Indica fonema chiave*



*schema del corso*

i			u
	I		U
		ə	
	e		3
(ei)		Λ	
æ		(ai) (au)	ɑ

### 5.1 Exercises on Contrastive Phonemes

These exercises are aimed at developing users' confidence in different types of phonemes existing in the various languages through a contrastive analysis of Italian and the foreign language which they are learning. Exercises are based on a dictionary mapping that considers the difficulty level of the phonemes of the foreign language in relation to Italian phonemes.

Phonemes are therefore divided into classes of different difficulty levels. These exercises treat the various phonemes in sequence of increasing difficulty; thus, they will start with phonemes that present less problems for the Italian speaker, and will end with the most difficult ones.



The exercises that have been proposed are of three kinds:

- the first one focuses on the perception and correct identification of a given phoneme from a set of four phones chosen at random by the computer from amongst a cluster of phonemes belonging to an easily confusable set, and according to a given scale of difficulty;
- the second one requires the student to identify the tonic phoneme of the word that is proposed again from a set of four;
- the third one relates to the difficulty involved in uttering the phonemes of a whole single word - i.e., the difficulty resulting from the sum of all the difficult aspects of each phoneme that are composed within the proposed word.

In every exercise the system proposes words randomly, selecting them according to their levels of difficulty. Users can decide for themselves to move on to the subsequent level of difficulty.

Moreover, in each exercise it is possible to record one's own voice and compare it with the master's (Repetition Exercise) and also to activate the Speech Recognition mechanism that allows users to evaluate the correctness of the pronunciation.

## **5.2 Minimal Pairs**

The display that presents the minimal pair exercises is designed so that the two columns of words with contrastive phonemes appear in opposite lists.

Users will first listen to the left-hand column, displaying words with the same phoneme. They will be free to record their voice while repeating the single phonetic units and then compare it with the master's. Later users will listen to the right-hand column that displays words containing the contrastive phoneme. If they wish, users can also record their voice while reading the second column and compare it with the master's.

Finally, users will listen to the minimal pairs --i.e., the pairs of words that differ only for the two contrastive phonemes. Users then can record their utterances, by reading and comparing each pair with the master's.

## **5.3 Minimal Pairs Recognition**

In another phonetics exercise, the system recognizes the minimal pairs users are pronouncing. The system offers a minimal pair which they have to produce orally. Subsequently, the system transcribes the users' performance and checks its correctness.

## **5.4 Grapheme-to-Phoneme Exercise**

In this exercise the system displays a set of words that are similar in terms of grapheme. Users choose a word corresponding to the one that the system is orally proposing.

This exercise is made possible through the Soundex application program that calculates the graphemic similarity of words and randomly proposes those words which graphically resemble the closest words users are listening to.

## **5.5 Phoneme-to-Grapheme Exercise**

This exercise presents similar features to the previous exercise. In this case, the system displays a series of words that have been chosen for their phonetic, and not graphemic similarity. Users choose the word corresponding to the one the system is orally offering.

The system selects the proposed words considering the phonetic characteristics of each word. This is possible due to the word classification present in the database, which has been created on the basis of the phonetic transcription of each word.

## **5.6 Exercise on Word-Stress**

This exercise as the one on intonation presented here below is based on a program "Prosodics" created at the Laboratory of Computational Linguistics of the University of Venice with the contribution of research fellows from the University of Iasi in Romania.

The Prosodic Module allows the student to listen to each word making up the exercise both as it is spoken by the Master and in a segmented version: phonetic segmentation is automatically performed on the original digital speechwave by the system in order to allow the student to listen to each phone as it has been really spoken in the actual word context. The same word can be listened to in a syllabic segmented mode: in this second mode, the system performs the same segmentation at phone level. Subsequently, phones are joined together according to rules of syllabic phonology. Again, the student is presented the same word syllable by syllable, where each segment is constituted by the actual syllables being spoken by the Master in the original speechwave.

**Master**


Frase	applicabile
Accento principale	ax • p l ih • k ax b l


**Allineamento**


ax	p l ih	k ax	b l
ax	p l ih	k ax ↓	b l

Maschio      **Studente**       Femmina

Accento principale	⚠	ax p l ih • k ax • b l
Ritmo	⚠	Parla piu veloce.

  
schema del corso

  
 Registra

  
 Ascolta

The aim of this exercise is to make speakers of L1 feel more confident with the peculiar characteristics of word-stress in the target language. In particular, the exercise draws users' attention towards the position of word-stress and the longer the word, the more difficult it is to guess the right position of stress.

Thus, the system proposes words (not shorter than three syllables) and users pronounce them, using stress in the right position. The system evaluates the correctness of users' oral performance by comparing the student's with the master's performance. This comparative activity not only helps evaluate users' performance but also provides them with information regarding the type of mistake they make and how to correct it. Users, therefore, are permitted to try once again in order produce an utterance much closer to the master's performance, so improving their pronunciation.

### 5.7 Exercise on Intonation

Among the advanced activities this exercise plays an important role in improving the prosodic aspects of oral production .

In particular, it deals with intonation and is thought to help learners to pay attention to the various intonation characteristics used in sentences with different communicative functions. Users are asked to produce the proposed sentences with an intonation as close as possible to the master's. The system then compares users' performance with the master's. This comparison can take place due to the close relation between the communicative function of the sentences and their intonation.

In this phase, the system works on single parts of the sentence by associating them to segments which are significative from the intonation point of view. This comparison enables them to identify those parts that have been performed incorrectly. Then the system highlights those parts with an incorrect intonation contour, giving some suggestions on how to improve the performance and eventually invites users to try again, focusing exclusively onto the part to be corrected. Thus, the system supplies users with a good feedback and they can autonomously and effectively improve their oral performance, within the self-learning environment.

The screenshot shows a software interface for language learning. At the top, the 'Master' section displays the phrase 'Can you manage?' and its principal accent 'can you•ma•nage'. Below this is a 'Profilo intonativo' (intonation profile) graph showing a blue line for the question and a red line for the answer. The 'Studente' (Student) section shows the principal accent 'can you•ma•nage' and a warning icon with the instruction 'Parla piu veloce.' (Speak faster). At the bottom, there are icons for 'Registra' (Record) and 'Ascolta' (Listen), along with a navigation arrow and a mouse cursor.

## 5.8 Choose an Answer

This is one of the most interesting activities because it joins together speech recognition, the ability of choice at a textual level and oral production, in a pleasant and stimulating way.

Users listen to a question that the system selects among those available in the database. Users listen to the question twice and then select from three answers that appear on the screen, drawn from the database. Users have to select the most appropriate answer for the kind of question they have just heard, within the time given, and, once they make their choice, they produce it orally. The system activates the speech recognition mechanism that can give different responses.

If users' utterance is not clear and correct, the speech recognition module informs users and invites them to try again.

If users' performance is qualitatively good but the answer is incorrect, users are asked to listen to the question again and choose the right answer.

Eventually, if users select the correct choice and produce it correctly, the system will respond to the good performance and users will be able to move to the other questions. The aim of this activity is to direct the user towards a more realistic usage of language.

## 5.9 Role-plays

This activity has the objective of testing the student's proficiency in the communicative functions of L2. The system has access to all dialogues and to each utterance thereof via the communicative function it expresses. Students will have to listen to the complete clip paying great attention to the particular role that each will have to act out. Each videoclip has been carefully manipulated and visual markers have been added in order to warn the student that they should pay attention to the following turn in the dialogue.

On a later occasion, each will listen to the clip without the utterances which they themselves will have to make. They will have to be ready to interact with the text by correctly pronouncing the missing expressions. To make the activity more authentic, learners will only be given enough time to utter the correct expressions as in a normal dialogue.

We have devised three different modes of execution of this important exercise:

1. Slow Interaction: in this mode it is possible to stop the videoclip in the portion of dialogue to be spoken by the student; different interruption times are allowed. Feedback is always provided: as the available time is about to elapse, the student will listen to the actual utterance to be spoken by the current speaker in the videoclip;
2. Cute Interaction: no feedback is provided in this second mode and the videoclip can only be slowed down.
3. Real Interaction: no feedback, no slowing down or interruption available. Speech recognition takes care of the student's performance.

Speech recognition allows the computer to give immediate feedback to the student. However, the student will be given feedback only at the end of the videoclip. Students may use the same expressions of the original or different ones, as long as they express the same linguistic content or communicative function.

In addition, users will also be able to activate the automatic prosodic supervisor and through this it will be possible to evaluate the correct rhythm and correct intonation pattern, as well as the position of sentence accent.

## **5.10 Dictation and other oral exercises**

Among the remaining exercises we briefly comment on dictation, which is used both in standard and partial modes, reordering of utterances based on a listening task:

The first activity involves first listening to a particular caption which later appears on the screen with certain words missing. The system randomly chooses which phonetical items should be removed. Such an activity proves to be very stimulating since users can make use of it later in new situations. Users complete the text and only then listen to the spoken caption a second time. The system checks the users' work and shows up the errors. Learners can either attempt any corrections by listening to the spoken caption for up to a further two times, or can call up the correct version immediately.

Users listen to and write out the complete text. A help is included: certain dots will appear showing users the number of letters of the individual lexical items, as well as the length of the individual words. Learners write the text, while the system will check and mark the individual errors. They can either call up the correct version, or make a further two attempts to correct the mistakes.

Similar to partial dictation, users can repeat the listening to the spoken text many times after the dictation, but they will have a maximum of two chances once the system has checked the finished work. The reason for this approach is to encourage users to correct mistakes which may either result from typing errors or slight oversights.

The second activity consists of reordering one long utterance or a minimum of three utterances.

After listening to the correct caption, users read the disordered written texts, and they reorder them by inserting each individual section into its correct slot.

Users may either listen to the correct spoken caption, or repeat the listening and re-ordering of the written text as many times as they feel necessary. When they are satisfied with their attempt, the system will instantly show learners any errors. Thus, at all times users are able either to check for possible errors by repeating the activity, or even to compare their efforts with the correct version.

Finally, in the Advanced Activity Module, dictation is performed on narrative texts by means of speech synthesis available from PlainTalk™. We organized short narrative texts with punctuation marks spelled out in orthographic form, and with the insertion of pauses in the appropriate position in the text. The speech synthesizer will read chunks at first in a single sequence without stopping: then, it will reread each chunk twice waiting for the student to type in the corresponding text. Whenever the student ends typing, he may check whether he wrote the right portion of text and the system will correct him.

The big advantage of using speech synthesis is represented by the fact that PlainTalk allows the modification of speech rate and of voice type: in case a slower rate is chosen, the synthesizer will end up by pronouncing each word separately, as in connected speech. Also, the student may listen to the same text in different voices, both female and male thus providing with an interesting comparison tool.

## **6. ASSESSMENT, EVALUATION AND TESTING**

Generally speaking, assessment in self-instructional courses is problematic but very important. Self-assessment can be used for appropriate testing purposes - to provide feedback information, diagnostic testing, and placement testing. Within learner-centred self-instruction, or self-directed learning, self-assessment is a necessary part. Decisions about whether to go on to the next item, exercise or unit, decisions concerned with the allocation of time to various skills, decisions concerned with the need of remedial work, are all based on feedback from informal and formal assessment. This concept then is central both to the learners' personality and to the kind of courseware we are building. We consider it important as an educational goal in its own right, and training learners in this is beneficial to learning.

In fact, language learners regularly engage in self-assessment as part of their learning. They make exercises and check, by whatever means available, whether their responses are correct or not. They check the computer's comprehension of their spoken language, and adjust it when necessary. To check oral production, the computer is equipped with the appropriate speech recognition system which is part of the PlainTalk™© system by Apple,

but it may be constituted by any other speech recognition device available on Windows-based platforms, like IBM's or Dragon's systems.

Self-monitoring is also part of the course to mimic audio-active comparison while listening and watching to video clips, learners are required to check their performance against the model. To improve the ability to self-monitoring, all oral exercises have some form of visual feedback.

In a language like English, the ability to perform a complete phoneme-to-grapheme translation in L2 is severely undermined by its phonotactics which is full of exception and requires a lot of exercise to couple understanding and orthographic abilities. Clearly, a much harder task is encountered by students of oriental languages like Chinese and Japanese, where a completely new sign system has to be learned from scratch. As for written language skills the number of assessment tools is fairly extended and are based essentially on the knowledge the computer has of every single linguistic item considered in a given task. For instance, in case the AT is assessing the learners' achievements in grammatical knowledge, it accesses the LKD where each item may correspond either to a word-form, or a syntactic phrase for syntactic tests; or still to an utterance for context-based pragmatic and communicative function tests.

The LKD is the foundation for all drills construction, and thus it constitutes the basis of all self-assessment activities as well as the AT's ones. In particular, the AT may create an infinite number of drills automatically since it has been given an internal pedagogical and linguistic set of criteria on the basis of which it may choose at random from the LKD the items relevant and adequate for any given linguistic task.

The AT has also been equipped with a number of tools that enable it to check and spot mistakes and errors whenever they are made by the learner, and keep record of them. Errors may be noted in both oral and written activities, and will be simply notified to the student in Free Modality or communicated by the AT when working in Guided Modality.

In all cases, learners will be informed about the error, the kind of error they produced, the possible reason why they made that kind of error: as a side-effect, they will be directed to carry out some linguistic activity appropriate to help remedy that problem or else the grammar section on that item will be shown. The same will happen with phonetic problems: in case the performance scores too low, the phonetics hypertext will be called and presented to the student at the appropriate item.

After being administered a placement test the student is assigned to a Macrolevel. Suppose our student is placed in Macrolevel 1, the AT will try to individuate the Microlevel from the six available according to constraints imposed on each such level. Objectivizing such constraints in the linguistic materials presented to the student while working with SLIM requires a further important step: assigning scores.

Scores are assigned for each main activity at every level of linguistic description: from phoneme to utterance level. In particular phonemes are graded according to contrastivity criteria as well as to perceptual discriminative ones. Words receive a cumulative score according to their inherent phonetic grade of difficulty. Words are also addressed at grammatical level in order to be assigned scores: functional words receive a higher score than content words, and amongst these irregular ones have a still higher score. Structural scoring is computed at utterance level and takes into account intrinsic syntactic complexity in terms of number of constituents, number of embeddings, whether its constituents are argument or adjunct. All the low level scoring adds up to the functional scoring already assigned at utterance level ending up with a final computation which is evaluated and weighted by the AT.

We are also working at a Parser which has a high linguistic coverage of both Italian and English in order to recover error information and thus interact with students' performance in free writing activities.

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