Journal of Computing in Higher Education
Spring 1995, Vol. 6(2), 120-137.

Russian HyperTutor: Designing Interactive Multimedia for the Macintosh

George Mitrevski
Auburn University

ABSTRACT

THIS PAPER describes a multimedia project developed at Auburn University for the interactive teaching of Russian grammar. The **Russian HyperTutor** was developed using Apple's HyperCard™ and is designed to accompany the textbook *Russian for Everybody*. There are 35 lesson stacks in **Russian HyperTutor** and each lesson integrates graphics, sound, and animation. In addition to the lesson stacks, the program includes a dictionary and extensive vocabulary exercises. Tutorials provide simple, but concise grammar explanations which can be edited and augmented by an instructor. A hypertext approach was used in writing the tutorials. Student can jump from any point in a tutorial to any other point simply by clicking buttons. *(Keywords: HyperCard™, HyperTalk™, multimedia, Russian, foreign languages)*

INTRODUCTION

USE OF THE COMPUTER as an effective tool for language instruction and acquisition has created much excitement among language professionals during the past several years. An increased interest in developing course materials is due in part to multimedia tools for non-programmers that are becoming more functional and increasingly easy to use. The availability of different technologies have stimulated language educators to rethink their teaching methodologies to accommodate the new possibilities for creating interesting learning environments. One aspect of this rethinking includes redefining the term teaching "so that its definition no longer reflects all that is most authoritarian, imperious, and manipulative in the teacher-student relationship" (Rivers, 1989, p. 1).

Initially foreign language educators relied on textbook publishers to provide prepackaged software for their courses. Unfortunately, publisher's software products have two major drawbacks. They are often too expensive for the budgets of many departments, and more importantly, the underlying methodology on which the software is based is often at odds with the instructor's teaching style. In recent years HyperCard™ and other similar authoring programs have gained both favor and praise from foreign language educators, because of the flexibility and ease with which multimedia can be developed to create effective learning materials.

The key to developing successful multimedia projects for foreign language instruction lies in concentrating on those areas of the learning process where traditional classroom approaches are not proving adequate for the individual instructor. In such instances the unique advantages of the computer for storing and visualizing information and for testing student competency can be brought to bear on the problem. Experience in teaching foreign languages has taught us that learning to use a foreign language effectively is a very complex process involving listening, speaking, reading, and writing skills. Thus, one of the initial tasks in planning a multimedia CAI project for language

instruction should include a study of the strengths and weaknesses of the traditional learning environment, such as the role of the instructor, the student, and the media of instruction. Once the developer is aware of the strengths and limitations, then instructional tasks are relegated to the agent that can carry them most effectively. One should also be aware that no computer system can imitate or replicate the entire learning environment. Rather than redesign the entire system of foreign language instruction, the developer should focus on designing instructional units that are appropriate for specific tasks.

In designing the project described in this paper, we decided to focus specifically on those capabilities of the hardware and software that would enhance student learning and retention of the *grammatical structures* of the Russian language. Instructors know that "language learners need a functional mental model of linguistic structure that works for producing at a basic level speech that communicates meaning" (Rivers, 1989), but finding an effective way of learning and retaining such structures has always been a problem. No matter what teaching method an instructor uses in a classroom, *pattern drills* are essential in practicing grammatical structures. When mastered, they give the student better control of the language and are helpful in creating communicative messages in the target language. However, presenting and drilling grammatical structures of highly inflectional languages like Russian can consume tremendous amount of classroom time. It is one learning activity that instructors often relegate to out-of-class work, where the student is assigned exercises either from a textbook or from materials developed by the instructor. This type of activity is one where the computer can meet a carefully defined instructional need and serve students better. By reducing student-instructor contact time for tasks where the electronic medium can serve the purpose much more effectively, our approach maximizes student-instructor contact for those activities that promote use of the language for communicative purposes.

While developing **Russian HyperTutor**, the major objective was to make the hardware and software a learner centered environment designed specifically for learning Russian grammar and practicing

grammatical drills. When learner control is an integral part of the program, motivation also increases, because students can work with the program at a pace and in a manner that is best suited for their own study habits. For this approach to be successful, however, several requirements must be met, including:

1. The learner should have maximum control of the learning activity.
2. The learner should have access to the hardware and software whenever needed. The "learning lab" and "roving computer" approaches have limitations in that they provide the student with limited access. In our project we opted for a more flexible approach: Sudents are provided with a copy of the CAI tutorials and exercises and can use them on their own computers or in the learning lab. However, there was a disadavantage in catering to different types of equipment and models. Some student's computers simply did not have the memory or a large enough hard drive to allow us to incorporate sophisticated QuickTime video and color graphics.
3. The students should be responsible for managing how and when to use the program, as well as continue to evaluate their own progress. Rivers notes that students "will take this responsibility more seriously if they themselves discover and work at their own weaknesses" (Rivers, 1989).
4. The language software should offer the individual instructor who has no extensive experience with programming flexibility to change, add, or edit any of the tutorials or exercises. Instructors with computing experience should be able to redesign the program to fit their individual instructional needs.

In order to maximize effectiveness and the time students spend working with the program, we incorporate well-established principles of behavioral learning theory, cognitive learning theory, and principles of educational psychology. Once we had a clear understanding of

the learning process, we were able to distinguish much more clearly what types of learning activities were most appropriate for a specific task and for the available instructional technology. The main task in this project focused on presenting Russian grammatical structures. The following principles of learning theory (Hannafin & Peck, 1989) were followed in designing the specifics of our program:

Principle 1: Contiguity: The response should follow the stimulus without delay.
Principle 2: Repetition: Practice strengthens learning and improves retention.
Principle 3: Feedback and reinforcement: Knowledge concerning the correctness of the response contributes to learning.
Principle 4: Orientation and recall: Learning involves the synthesis of prior information that must be recalled to active memory.
Principle 5: Individualization: Learning may be more efficient when the instruction is adapted to the needs and profiles of individual learners.
Principle 6: Academic learning time: Increasing the time a student spends actively engaged in profitable instructional activities will result in more learning.

From these principles Hannafin and Peck derive eleven implications for the design of CAI, which they suggest can be used as guidelines for developing effective instructional software. They include:

1. Develop CAI in accordance with the internal processes of learning,
2. Individualize,
3. Make CAI lessons interactive,
4. Use feedback effectively,
5. Guarantee success,
6. Assure congruence among objectives, instruction, and assessment,

7. Allow an appropriate amount of learner control,
8. Account for, monitor, and evaluate affective considerations,
9. Evaluate based on objectives, attitudes, and adequacy of programming,
10. Design screens carefully, and
11. Use additional media as appropriate.

Because HyperCard™ has great many powerful authoring features for combining text, graphics and sound, we felt that it was possible to create really powerful multimedia lessons and exercises without the need to hire additional staff or buy special equipment. With HyperCard™, we were able to utilize existing teaching materials that we were regularly using in our classes (grammar explanations, exercises, graphic illustrations, audio) by simply converting them into electronic format. Our choice of HyperCard™ give us the option of expanding the program with additional materials at a later time as the need arises.

GENERAL DESCRIPTION OF "RUSSIAN HYPERTUTOR"

IN ITS PRESENT FORMAT **Russian HyperTutor** is designed as a supplement to accompany the textbook *Russian for Everybody*, which is currently used in the first year Russian courses at Auburn University and at a great many other universities around the country. **Russian HyperTutor** is divided into 35 lessons. Each lesson corresponds to the same lesson number in the textbook. To use the program, the student is expected to know how to operate a Macintosh computer, as well as know how to do basic editing. Some familiarity with at least the "Browsing" function in HyperCard™ is also required. At Auburn University students who are not familiar with the Macintosh and with HyperCard™ are advised to work with the "HyperCard™ Tour" stack before they start using **Russian HyperTutor**. Almost all

of the tasks required of the student in a lesson are either self explanatory or are explained in detail.

The structure of the program is fairly straightforward. Each lesson is divided into four sections, and each section further divides into sub-branches that are tied to specific grammar topics. The authoring process began by identifying the basic branching structure and then adding content and creating graphics. The stacks graphically resemble a spiral notebook with buttons, which allows the students to move around in the stack and between stacks. The structure of the program permits students to work linearly, or to quickly jump from any place in the program to any other place, and to retrace the steps back to the original position. The text files, which include the tutorials, exercises, and the dictionary, are editable and, therefore, can be updated by the student or by an instructor. With the basic menu and branching logic completed, authoring became a process of inserting content into the "shell". Each lesson is accompanied by several types of exercises that are more or less repeated in every lesson. A template was designed for each type of exercise, which was later filled in with the appropriate text for each lesson.

Figure 1 shows the basic organization of the program. The card is divided into two sections. The right two thirds of the card is used for textual material, such as tutorials and exercises. The left one third is reserved for graphics, charts, or anything else that needs to "stand out". In designing the general structure of the cards we were striving for consistency and readability. We were guided in our approach by examining and working with a variety of stack designs and by consulting the literature on the subject of human-computer interface (Apple Computer, 1987; Shneiderman, 1987). Since our aim was to maximize the amount of time the student spends with the tutorial, we wanted to make sure that the organization of the screen was not cluttered or confusing and that reading the text was easy on the eyes. In designing the navigation buttons, we opted for using text rather than icons, since text tends to indicate the action of a button more obviously. The buttons on each card are arranged according to their function. The buttons in the top row are used for navigating within

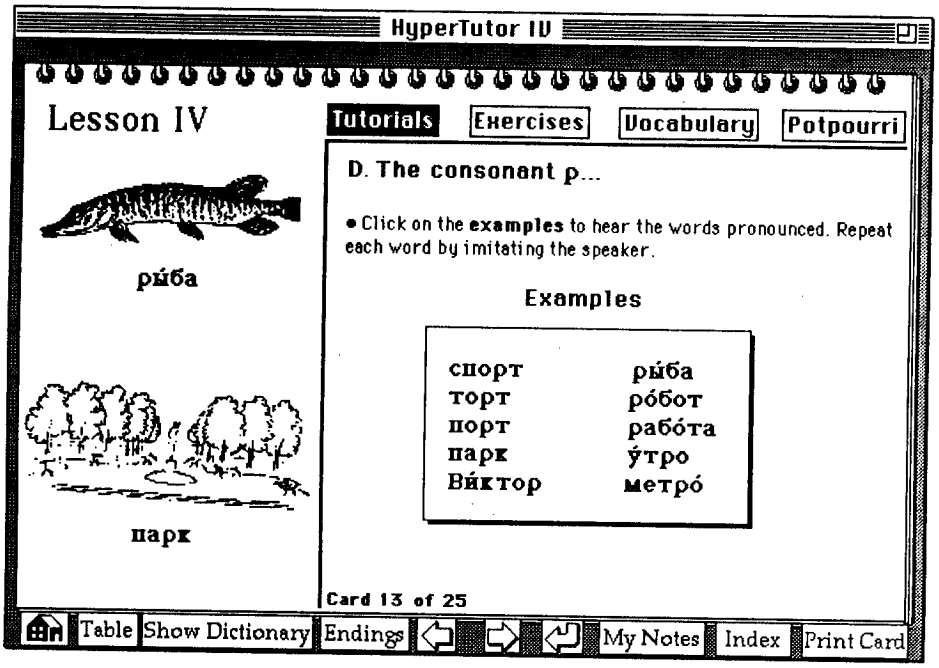

Figure 1. Program's organization.

a lesson, and the ones in the bottom row are used for navigating through the major sections of the program.

At the top left corner of every card is the lesson number. On the same line, to the right, four buttons labeled **Tutorials**, **Exercises**, **Vocabulary,** and **Potpourri** indicate the four sections into which each lesson is divided. Clicking on these buttons will take the student to the appropriate section in the lesson. The first card in each of these sections contains a list of further subdivisions. The student navigates through **Russian HyperTutor** either sequentially, one card after another, or by jumping from one place in the stack to another, or from one stack to another. The right and left arrow buttons located at the bottom of the card are clicked for moving sequentially. The quickest way to get to a particular topic within a section is by clicking its title.

"TUTORIALS"

The student chooses a topic in the **Tutorials** section by clicking on its title. At various points in the **Tutorials,** the student may be referred to a specific exercise in the **Exercises** section that is appropriate for that particular topic. For example, in the middle of a tutorial there may be a prompt for a student to "**Do Exercise A*.**" The quickest way to get to the exercise is by clicking the asterisk. When the student is finished working with an exercise, he can click on the return button, located at the bottom of the card, and is taken back to the last "jump-off" point in the tutorial. Thus, the student never has to worry about remembering how to get back to the point of departure. Buttons that lead to linked information in other lessons are interspersed throughout the **Tutorials** section of every lesson. They are designed to be unobtrusive, they don't obstruct linear reading of the text, and are always available to the student who needs extra information.

The grammar tutorials in **Russian HyperTutor** are short and concise, and are written in a style that complements the linguistic knowledge expected of a college freshman student. They are not intended to replace the exhaustive explanations available in the textbook but rather to aid the student in recalling into short term memory the necessary grammatical structures of the language. Since the main focus of the program is on grammar drills, grammar explanations are provided primarily as references for the student to consult whenever difficulties in completing grammatical drills successfully are encountered. Digitized sound and graphical illustrations are used extensively in the first five lessons to help the student master pronunciation of Russian sounds and as an aid to vocabulary memorization. Since the audio output of the speaker on the Macintosh is rather poor, students are advised to use mini headphones that can be plugged into the audio output located in the back of the computer. The sound quality of the Russian pronunciation in the current version of **Russian HyperTutor** does not match that of a good audio tape recording, therefore, students are advised not to rely solely on **Russian HyperTutor** for

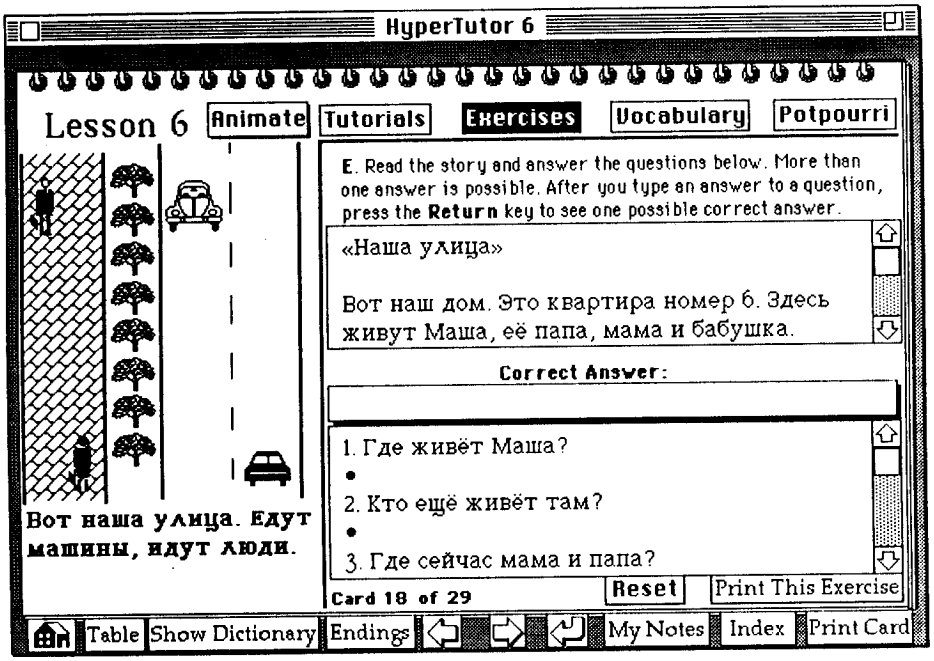

Figure 2. Graphic and animation.

learning proper Russian pronunciation. (Future versions will include recordings of listening exercises on CD.) Graphical illustrations, and some animation (Figure 2), are also used to relieve the monotony of looking at screens full of text, and as an aid to clarify unfamiliar grammar concepts.

While QuickTime video and still images would certainly enhance the learning environment in **Russian HyperTutor**, we believe that the portability of our program would suffer because QuickTime video requires large amount of disk space.

"EXERCISES"

There is a large variety of exercises in **Russian HyperTutor**. Most imitate the structure of exercises in traditional textbooks and laboratory manuals. Exercises are designed as aids in learning rather than for measuring student progress. Each exercise reflects the

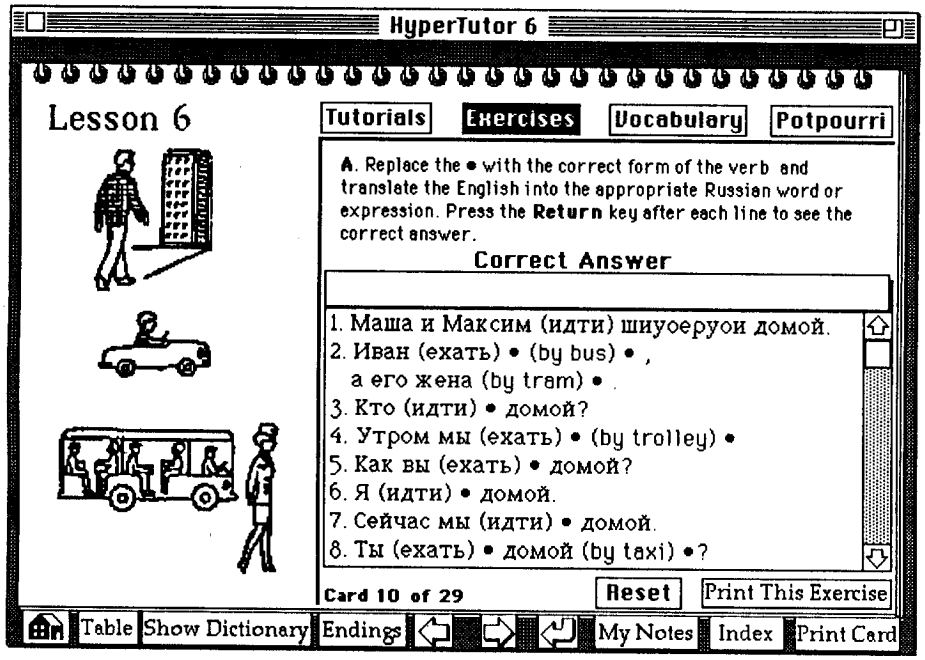

Figure 3. Structure of a typical exercise.

objective of a specific section in a lesson. Specific feedback for wrong answers is not provided. Programming the kind of feedback that would take into account all expected incorrect answers is time consuming, if not impossible, and is not one of the strengths of the HyperTalk programming language. We wanted to keep the design of exercises simple so that they can be modified easily and can be used as "shells" by instructors with little computing experience. The programming code for the majority of exercises rarely exceeds five lines.

Figure 3 shows the structure of a typical exercise in **Russian HyperTutor**. Although there is a great variety of exercises, the structure is basically the same. At the top of the exercise field are instructions on how to work with the exercise. The next field contains the exercise items and a blank field in which the correct response will appear when the student presses on the return key after completing an item in an exercises. The student is asked to compare his answer to the one *possible* correct answer displayed in the **Cor-**

rect Answer field. The student may print the exercise at any time by clicking the **Print This Exercises** button. The **Reset** button, which is located at the bottom of the exercise, erases all answers and resets the exercise. The student resets the exercise so that none of the answers appear when working with the exercise in a subsequent session. In a learning lab environment the exercise is reset with a script each time the card, or stack, is closed.

Some of the types of exercises in **Russian HyperTutor** include: Fill in the blanks, multiple choice, translation, and reading. In the first five lessons of the program we include a multitude of listening comprehension exercise as a way to help the student in learning the sounds of the Russian language. In dictation exercises, the student clicks on the **Play** button to hear a word. By writing the word in the box and pressing on the return key on the keyboard, the correct spelling of the word is displayed. A new word is played randomly each time the **Play** button is clicked. In every exercise, the student may select practice items from a pool of choices. Students can continue to work with exercises until they think they have mastered the grammar objective. This approach places the responsibility for mastering the material on the student. The program provides the student with an appropriate learning environment and with flexibility to make choices based on individual needs. Ross (1984) states that computerized instruction designed to adapt to the needs of the learner has shown to improve educational outcome. Bright (1983) also suggests that involving the learner in the instruction may lead to willingness to spend more time with the program.

The **Vocabulary** section in **Russian HyperTutor** contains the lesson vocabulary presented in a quiz format. As is the case with the exercises, students are given the option to select the vocabulary items and test their knowledge. Some lessons contain a separate card with subject specific vocabulary items. These are helpful when the student needs to augment vocabulary related to a particular topic in a lesson.

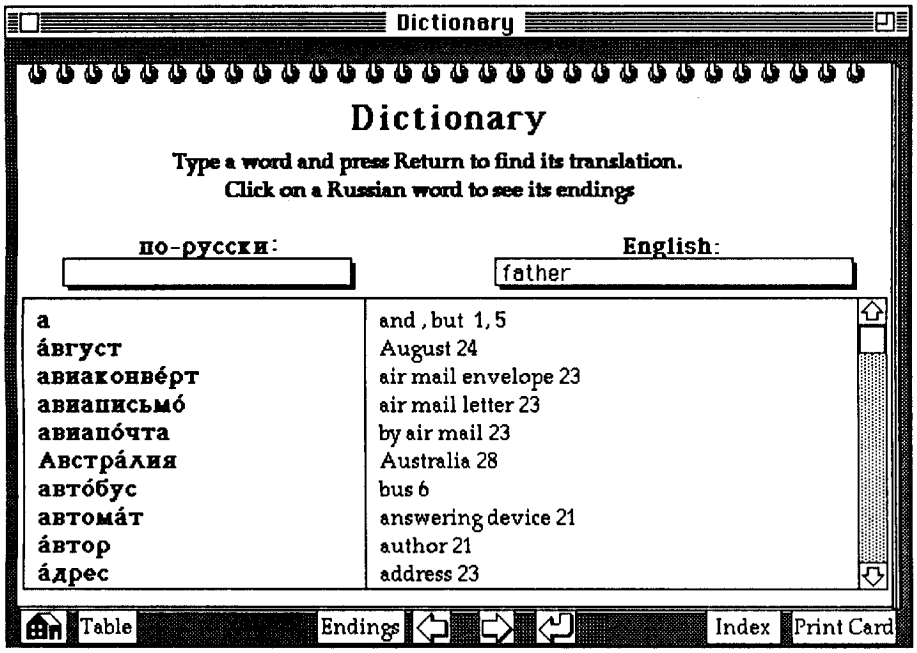

Figure 4. Dictionary.

"RUSSIAN HYPERTUTOR" ACCESSORIES

There are several accessories in **Russian HyperTutor** that students will find very useful as resources and references. These include the **Dictionary**, **Endings**, **Index**, and **My Notes**. The navigation buttons representing each are located along the bottom of the card and are available from anywhere in the program. The first three accessories are separate stacks, while the last one is actually a card with an empty field located at the end of every lesson stack.

Dictionary. The Russian HyperTutor dictionary (Figure 4) contains only words, and some expressions, found in the textbook *Russian for Everybody*. To access the dictionary the student clicks the **Show Dictionary** button. If the computer is running under MultiFinder with a large screen monitor, the dictionary can be left open at all times while working with the program. In the Dictionary stack the student

can search both for Russian and English words. To find the Russian translation of an English word, the student simply types the word in the English box and presses the return key. The Russian equivalent will be found and highlighted in the Russian section of the dictionary. The numeral following the English translation indicates the lesson number in which the word appears for the first time. Typing a Russian word in the Russian box will locate the English equivalent in the English section. This is not an exhaustive dictionary; it should be used only as an aid in working with the exercises. The list of items in the dictionary is expandable allowing the instructor to input additional words.

Endings. The Endings stack (Figure 5) presents the inflected forms of every Russian word in the dictionary. The student can go to this stack from anywhere in a lesson. To find the inflected forms of a word, the student types the word in the box on the top and presses

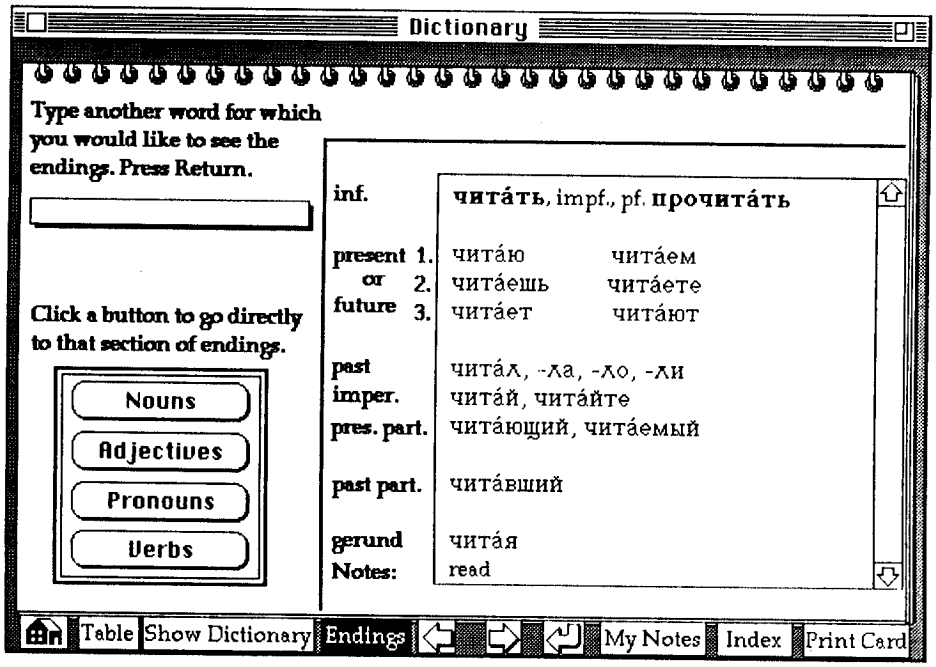

Figure 5. Endings.

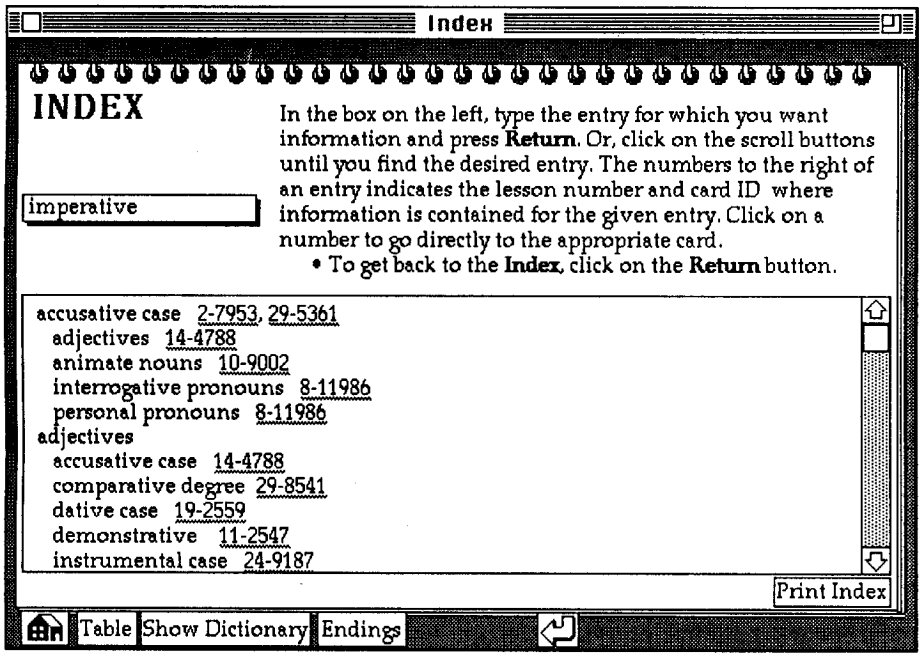

Figure 6. Index.

the return key. The student can also look for a word from the dictionary by first highlighting the word, and then clicking on the Endings button.

My Notes. This section provides a convenient place for the student to write notes, homeworks, essays, etc. The utilities available in **Russian HyperTutor** eliminate the need for the student to have any other materials available while working with a lesson on the computer. These utilities were not designed, however, to replace traditional target language reference materials, such as dictionaries and grammar reference books.

Index. The **Index** (Figure 6) is designed to resemble an index found at the end of a typical textbook. The student can access this accessory by clicking the **Index** button, located at the bottom right corner of a card. The numbers to the right of an entry indicate the lesson

number and the card ID where information is located about that entry. Clicking a number will take the student directly to the appropriate stack and card. To look for a specific topic the student can scroll down the list or search for it by typing the title of the topic in the box. The **Index** utility is used heavily when reviewing grammar points that are presented across several lessons and when Russian students use a textbook other than *Russian for Everybody* where the grammar is presented in a different order.

CONCLUSION

The key to developing effective foreign language CAI lies in concentrating on those areas of foreign language instruction where traditional approaches aren't proving effective or where the unique advantages of multimedia presentations can enhance, or even replace, traditional form of instruction. Multimedia offers unique advantages to foreign language instruction that have no parallel in the classroom approach.

Multimedia involves the integration of technology and instructional content. When initiating a project of this type, the big decisions should involve content and application design, not technologies and systems (Comcowich, 1992). Our project focused on the learner as the center of the learning process. Since language students tend to have different pedagogical requirements, we elected in our design to give learners maximum control of the program with the aim of helping them form stronger mental models of the concepts of Russian grammar.

Finally, teaching methodologies in second language instruction have evolved to reflect current learning theories and new technologies. I am unaware of any methodology, however, that reduces the role of the live human instructor to a bare minimum. Further, since each instructor has certain individual preferences when it comes to using instructional aids and target language resources, there is no commercial program on the market that can satisfy the specific needs

of every instructor or language student. Because of this, even well designed instructional courseware does not always lead to widespread use.

HyperCard™ offers non-programmers the means to organize instructional material effortlessly, in a way that best fits their personal approach to language instruction. The strength in the basic design of the **Russian HyperTutor** lies in the fact that it is adaptable to whatever methodology the instructor subscribes. The flexible and dynamic structure of the program's "shell" permit practically unlimited changes and improvements.

REFERENCES

Apple Computer, Inc. (1989). *HyperCard™ Stack Design Guidelines.* **Addison-Wesley Reading, Massachusetts: Addison-Wesley**

Bright, G. W. (1983). Explaining the efficiency of computer assisted instruction. *AEDS Journal, 16*(3), **144-153.**

Comcowich, William J. (1992). Integrating multimedia into your organization. *Multimedia and Videodisc Monitor, X*(10), **25.**

Hannafin, M., & Peck, K. L. (1988). *The Design, Development, and Evaluation of Instructional Software.* **New York: MacMillan Publishing.**

Kostomarov, V. (1990). *Russian for Everybody.* **Moscow: Russky Yazyk Publishers.**

Rivers, Wilga. (1989). *Ten Principles of Interactive Language Learning and Teaching.* **NFLC Occasional Papers. National Foreign Language Center at Johns Hopkins University, Washington, DC.**

Ross, S. M. (1984). Matching the lesson to the student. Alternative adaptive designs for individualized learning systems. *Journal of Computer Based Instruction, 11,* **42-48**

Shneiderman, Ben. (1987). *Designing the Student Interface: Strategies for Effective Human-Computer Interaction.* **Reading, Massachusetts: Addison-Wesley**

ABOUT THE AUTHOR

George Mitrevski is an assistant professor of Russian and Director of the Language Resource Center at Auburn University. He received his Ph.D. from Ohio State University. His interests include multimedia design, hypertext programming, and foreign language pedagogy. The program Russian HyperTutor received the 1993 Macbeth Award for best foreign language software at the Annual Macbeth Conference on Computing in the Liberal Arts. Author's present address: Department of Foreign Languages and Literatures, 8030 Haley Center, Auburn University, AL 36849-5204. Internet: mitrege@mail.auburn.edu.