The Matter With Listening Comprehension Isn't the Ear: Hardware & Software

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Listening Comprehension—Hardware and Software

For many years, listening comprehension has been one of the chief concerns of the proponents of media-assisted language instruction. The language laboratory or merely the tape recorder and headset have provided a vehicle for testing listening and have enhanced student learning ability for countless numbers of individuals. However, in the face of a continuing curricular emphasis on speaking and writing—the productive skills, reading and listening—the receptive skills—have been left to develop on their own, seemingly by osmosis. The few professionals who have commented on the teaching of listening have pointed out the need for regeneration of interest in the receptive skills. Prior to his death, Paul Pimsleur and his colleagues summed up the conditions which they felt exist today throughout the profession:

> Listening is the least understood of the four language skills, and consequently the least well taught. Until recently, teachers have assumed that listening comprehension would develop of itself if we taught our students to speak. (Such an attitude was actually espoused by Nelson Brooks in the mid-sixties).[1] Now we are coming to realize that listening is not a mere adjunct to speaking, but an independent skill . . . .[2]

Some of the blame for this problem may be laid on the foreign language teaching profession itself, for assuming that the ability to listen effectively is easier to learn than the ability to speak effectively. Certainly, none of us would argue that speaking is solely dependent upon our ability to vocalize sound. But, how many of us have assumed that the ability to listen and comprehend is solely dependent on our ability to hear sounds? If this be the case, what course of action should we follow?

The time has come to pay more attention to listening as an integral part of the language-learning process. Indeed, attending to advances in educational technology and pedagogical strategies will give us a basis for developing our own techniques to ameliorate the situation referred to by Pimsleur, et. al.[3]

In turning our attention to some of the advances in educational technology, let us first look at some of the factors affecting student performance. Cullen has divided student performance factors in listening comprehension into two broad categories: (1) those factors inherent in the students themselves—their physical and mental attributes, their knowledge of the foreign language and its culture, and their attitudes toward listening; and, (2) the materials and the way in which they are presented.[4] While it's obvious that good teaching will lessen the effects of the factors in the first category, knowledgeable use of available media and educational materials in the second category can further enhance actual acquisition of the listening skill.

Instruction in aural comprehension in the past suffered from a fixed rate of presentation set by either the speaker, the recorders of listening comprehension tests, or by misinformed methodologist and teachers. Making a change in this situation used to be beyond the control of the listeners or their instructors. This is no longer the case. Rate-altered instruction and testing, a relatively new technology, ,has the ability to change the rate of presentation with little effect upon the intelligibility of the recorded message. Neither the "Chipmunk'" nor the "Lurch" effect is present when the recording is speeded up or slowed down. That is to say, voice pitch does not change when the time allocated for recorded voice playback is changed electronically. We call this phenomenon time-compression or time-expansion of speech. The machines which do this are called speech compressor-expanders.

Any of the several speech compressor-expanders now on the market may be used to adjust the rate of presentation of new sound to language learners. Many times listening comprehension materials are well beyond the comprehension of our students for an interesting reason. Often, it is not the grammar, the vocabulary, nor the ideas which impede understanding. Students may handle these elements with relative ease and yet be unable to understand what they hear. What causes the comprehension difficulty is the velocity of the speech stream itself. When foreign words arrive at the listener's ear, they soon pile up. The listener's short-term memory overloads, and the student simply "tunes out."[5]

Fortunately, we are now able to control the velocity factor in order to assist the student to listen more effecively.

Historically, rate alternation began in the early fifties when Fairbanks, Everitt and Jaeger made public an ingeneous application of Garvey's (1953) earlier efforts at physically cutting pieces out of recorded speech to make compressed speech. The Fairbanks, Everitt and Jaeger scheme utilized electronic means to discard certain speech segments.[6] Today various inventors and manufacturers are producing tiny integrated circuits which restore the sound of a voice to normal pitch and tone even though tape velocity is altered. There are two basic schemes of electronic time compression-expansion of speech, both use sampling techniques. The

first technique makes use of a pair of shift registers. These electronic components consist of two analog digital devices which work on a sampling principle. For compression, input signals are scanned and 512 samples are retained, and the remaining portions are discarded. For expansion, instead of discarding sounds, the circuitry duplicates the first 512 bits of sound and adds them to the speech signal already recorded. Thus the speech is electronically squeezed together or stretched out.[7]

The second scheme using a sampling technique employs a Random Access Memory (RAM). This is a system which feeds raw signal data into an electronic memory unit. The memory is sampled periodically and signal data are output at a constant rate without regard to any increase or decrease in tape velocity. Unlike the shift register scheme, the interval of data bits kept for output is not constant in compression, but the interval of those being discarded is. In expansion, the RAM scheme repeats speech segments of fixed durations (about 20 milliseconds) and outputs them at a constant rate.[8]

Time-altered speech has been used in several different areas of education. Medical students use compressed lecture tapes to cut study time. Research has been reported indicating that faster listening requires greated concentration and therefore results in better retention of material. Lass and Foulke have used slowed speech as an aid in the development of listening skills in student clinicians.[9] Also blind students have benefited from listening to compressed tapes of recorded textbooks or other educational materials designed for sighted individuals.

In medicine and foreign language learning, researchers have found that using expanded speech is the mode that makes a difference. Albert and Bear have shown that patients suffering from aphasia comprehend better at slowed presentation rates.[10] In another recent study Flasherty found that high school French students performed significantly better on a French Aural Comprehension Test when the test materials were expanded to 135% of normal rate of 175 WPM.[11] Phillips describes a project underway at Miami University (Ohio) where expansion and then compression are applied to first-year Spanish reading. The procedure is to record a first year reader then expand it. Then re-record it six times increasing the rate for each successive occurrence by applying speech compression. The students prepare each lesson at home (probably using conscious translation) so that they have the meaning of the reading selection before confronting the aural version on tape. As they listen to the tape, they are taken in succession from an expanded rate of 120 WPM to the final compressed rate of 240 WPM. The objective of the application of rate alteration is to force the student to associate sound, meaning, and the printed word more rapidly and thus avoid the cumbersome but very common practice of conscious translation.[12] It is assumed

that application of such a technique will result in an increase in fluency, student comprehension, and retention.

Electronics and media form an important part of an integrated aural comprehension course. However, they neither constitute a panacea nor are they the main thrust of a good listening program. A successful aural comprehension course must satisfy three conditions: (1) exercises and materials must convey meaning from the beginning of instruction, even at lower levels; (2) the curriculum design should provide reinforcement to students which will verify comprehension immediately following each response; and (3) students should be challenged—not bored—by a curriculum design which stimuates problem-solving and educated guessing to arrive at meaning.[13]

Educators at Michigan State have developed a program for listening comprehension which appears to meet the three criteria just mentioned. It consists of a programmed auditory workbook which employs latent-image feedback technology to provide confirmation of comprehension.[14]

One successful technique used in the workbook is Nord's Sens-it-Cell. It consists of recorded stimuli and programmed worksheets. The procedure involves learning stimulus discriminations through hypothesis testing of contrasts and similarities of linguistic cues, and providing immediate feedback of results. The students heard a word. Synchronized with that hearing they see a pictorial representation.[15] The alternate choices are designed to focus attention, extend memory, and force a mental choice.

Nord's answer format provides between two and seven possibilities for a response. The initial binary trials provide students with a 50 per cent probability of correct guessing. Their choice is immediately confirmed or denied by the latent image impregnated in the answer sheet. The student is led through a series of trials to associate the proper line drawing with the proper group of verbal symbols. After making a pure guess on the first row, the student has a tendency to mark the same column if the audio sentence sounds similar. If the stimulus sounds diffffferent, he tends to mark the alternate column. In either case his selection is positively or negatively reinforced by immediate feedback technology. Nord feels that the procedure is similar to the scientific method where one: (a) makes a hypothesis; (b) makes an experiment to confirm or deny that hypothesis; and, (c) accepts or rejects the hypothesis on the basis of the experimental data.[16]

The Sens-it-Cell format is based on Miller's concept of the magic number 7-2. The student listens to a series of audio stimuli and tries to determine which box on the worksheet to mark; [17] he tries to match what he hears with the visual cue corresponding to each box. The dual choice for the first three audio trials expands to three for the fourth sentence, then to four and so on to seven. This scheme seems to follow

the human tendency to cluster incoming information into units of seven or less.[18]

Line drawings for use as visual cues may be collected from picture dictionaries. A series of pictures from the same basic class should be photocopied, cut out and pasted on to the work-sheet. For example, objects which are all modes of transportation should be collected and clustered on one audio worksheet. Other work sheets could be based on: foods, with the worksheet containing drawing of meat, fruits, vegetables, etc.; animals; furniture; and clothing.

Review sheets must also be introduced. These may be constructed with multiple symbols to be filled in by the student. For example, the first time through a specific tape program, the student would mark only boxes under each visual cue on each audio worksheet. The second time through, the students would hear a different series of audio cues, see the same visual referents, but this time mark circles, etc. When a choice is made the latent image technology provides immediate confirmation of their comprehension.[19]

Listening fluency is the next sub-goal for the second language learner. The same review format may be used with the addition of rate alternation technology to the audio cues. Research by Foulke and Sticht[20] and by Friedman and Johnson indicates that the speed factor is of utmost importance in developing fluency.[21] The stimulus sentences are first expanded to 135% of normal speed by using a speech compressor-expander. Then they are progressively compressed to take the listener up to and beyond normal native velocity (175 words per minute) to one and one-half times original speed. This procedure adds the final dimension to the progressive challenges which can be built into each audio worksheet.

Research has long indicated that providing visual cues in second language teaching is one of the preferred tools for conveying meaning, aiding retention and reducing cognitive noise.[22] Indeed, the field dependency of some individuals makes it necessary to provide them with visual referents in addition to auditory cues before they can successfully comprehend a spoken message in the second language.[23]

The main thrust in the paper thus far has been theoretical. However, listener problems can only be solved by putting theory into practice. Therefore, we now move from a discussion of what might be done or what others have done to some suggestions for using games as partial solutions.

One gaming technique which attends to listener needs is "SCUCHO," an adaptation of Picture Bingo. (In French it is entitled "J'Ecoute.") Games like 'SCUCHO are not new. Some forms of Picture Bingo have undoubtedly been used in a number of second-language classrooms: Yet, with the recent increased interest in listening comprehension, using it may provide a new approach to problem solution.

For American students who already know Number Bingo, the explanation of 'SCUCHO is simple. The teacher first photocopies line drawings from a picture dictionary. These are then cut up and pasted together in a Bingo format. This base is used to make a Thermofax ditto master onto which latent image chemical is fixed. The resulting dittoed sheet is then ready for student use. Rather than covering up a picture with special covering markers once it has been indicated, the students merely mark with special felt-tip pens the drawing which they think corresponds to what they heard. When they have a straight line of latent images vertically, horizontally or diagonally across the entire page then they yell out "lescucho!," and receive a prize. Aural cues may be given vocally by the teacher in front of the class, or by a student designated as the "locutor."

Variety in 'SCUCHO games can be developed by varying the pictorial sheets. One class of pictures which is particularly flexible is that of communication/transportation. International signs which might be seen in and around an airport form the basis for review lessons at several different levels of difficulty. At the elementary level, students listen to single vocabulary words. At the intermediate level they are exposed to words in a sentence context. For more advanced work, students will hear a cue sentence which describes an item picture.[24]

Other variations may be made by rearranging the pictures into columns of adjectives, nouns, verbs, adjectives and nouns. While still another version should be constructed where speed of auditory presentations is varied along with number of repetitions. For example, in early vocabulary games, the spoken words are expanded ten per cent and repeated twice. In later trials, the words are heard at normal speech rate and repeated twice. In order to provide a challenging experience, the cues may be compressed to 10⅓ faster than normal rate and repeated only once.

Extra competition may be added by varying the formal order for a particular series of audio cues. Different sets can be made up and distributed to a class according to size. For example, if there are only ten people, the teacher could distribute five sets of game sheets. If there are 18, six sets could be distributed so that at least three people should be simultaneous winners, if of course they are all of equal listening ability. Once the students figure out the situation, the interest level usually rises, but more importantly, the teacher has a check to insure that class members are all hearing and comprehending on a relatively equal basis. It provides important feedback on both the instructional system and individual students.[25]

'SCUCHO games have proved very popular with English-speaking students of Spanish at the college level. Their purpose is three-fold: overlearning, decreasing reaction time, and generally smoothing out the fluency of listening. It is flexible enough to be used at a basic level,

particularly for vocabulary building. However, it is designed especially for remedial training and review, and would probably work best in an individualized program at a more advanced level. It has yet to be submitted to extensive usage in a controlled experimental situation in which the exact amount of benefit has been measured empirically. However, student response has been favorable toward it.

Listening comprehension exercises based on the Sens-it-Cell or 'SCUCHO format worksheets appear to be useful at many diqerent levels of language proficiency. They are limited more by the teacher's imagination than by any inherent quality of a particular format.

It is hoped that we, as teachers, can use these materials to expose students to increase practice which will set in motion the process which leads to development of full linguistic competence, apprehending sound meaning, overlearning responses, and making a timely, meaningful response. As Simon Belasco candidly observed, "the key to achieving proficiency in speaking is achieving proficiency in listening comprehension."[26]

Notes

[1]The parentheses are my own.

[2]Paul Pimsleur, Charles Hancock, and Patricia Furey, "Speech Rate and Listening Comprehension, in **Viewpoints on English as a Second Language,** ed. Marina Burt, Heidi Dulay, and Mary Finocchiaro (New York: Regents Publishing Company, Inc, 1977), 27-34.

[3]Ibid., p. 27.

[4]Vicky Cullen, "Factors Affecting Student Performance in Listening Comprehension and Their Development in the Classroom," **BABEL, 11** (October, 1975), 29-35.

[5]Pimsleur, et. al., p. 28.

[6]Grant Fairbanks, W. L. Everitt, and R. P. Jaeger, "Method for Time or Frequency Compression-Expansion of Speech," **Institute of Radio Engineers Transactions on Audio,** AU-2 (January, 1954), 7-12.

[7]Francis F. Fee, "Time Compression and Expansion of Speech by the Sampling Method," **Journal of the Audio Engineering Society,** 20 (November, 1972), 738-42.

[8]Ibid., p. 741.

[9]Norman J. Lass and Emerson Foulke, "The Use of Time-expanded Speech as an Aid in the Diagnosis of Articulation Disorders," **Journal of Communication Disorders,** 9 (1976), 111-19.

[10]M. L. Albert and D. Bear, "Time to Understand: A Case Study of Word Deafness With Reference to the Role of Time in Auditory Comprehension," **Brain,** 97 (1974), 373-84.

"Sister Etienne Flaherty, "The Effect of Time-Expansion on Listening Comprehension of High School Students in Second-Year French Classes," Diss., The Ohio State University, 1975. "The majority of listening materials available to the classroom teacher come recorded at native speed, which is about 175 words per minute (WMP)."

[12]Robert Phillips, "Can Compression Ease Transition from Translation to Reading?" **CRCR Newsletter,** 12 (March/April, 1978), p. 2.

[13]Frank Ingram, James Nord, and Donald Cragt, "A Program for Comprehension," **Slavic and East European Journal,** 19 (1975), 1-10.

[14]Ibid., p. 5.

[15]James R. Nord, "The Sens-it-Cell," **System,** 3 (January, 1975), 16-23.

[16]Ibid., p. 18.

[17]George A. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information," **Psychological Review,** 63 (1956), 81-97.

[18]Nord, p. 19.

[19]Latent image materials are available from A. B. Dick Company, Chicago, Illinois. Feedback is provided by impregnating answer sheets with invisible chemical ink by using a ditto machine (A. B. Dick Latent Image Transfer Sheets, 97-1001). The pre-printed images are made visible by applying another chemical (A. B. Dick Latent Image Developer, 97-3011) contained in a felt tim marker. Confirmation can take any form desired: a large dot; the actual word in question, etc. Sample cue sentences in Spanish might be as follows:

	Sentence A.	**Sentence B.**
#1	Me llamo Eduardo	Me llamo es Eduardo
#2	Me gusta el helado	Yo gusto el helado
#3	Me llamo es Eduardo	Me llamo Eduardo
#4	A mi, Me gusta el helado	Yo gusta el helado
#5	Yo llevo mi libro a clase	Yo lleve mi libro a clase
#13	Yo lleve mi libro a la clase	Yo lleve mi libro a la clase
#14	Yo llevo mi libro a la clase	El llevo mi libro a la clase
#15	Me llamo Eduardo	Me llamo Eduardo
#16	Yo gusto ella	Le gusto a ella
#17	Ellas me gustan a mi	Ellas gustan me

[20]Emerson Foulke and Thomas G. Sticht, "Review of Research on the Intelligibility and Comprehension of Accelerated Speech," **Psychological Bulletin, 72** (1969), 50-62.

[21]Herbert L. Friedman and Raymond L. Johnson, "Time-compressed Speech as an Educational Medium: Studies of Stimulus Characteristics and individual Differences," Research Report, DHEW-USOE, (September, 1969) (E.D.R.S.: ED 035 315)

[22]Frank Smith, **Comprehension and Learning, A Conceptual Framework for Teachers,** (Toronto: Holt, Rinehart and Winston, 1975).

[23]M. D. Steer, "Speech Intelligibility in Naval Aviation," **Journal of Speech Disorders,** 10 (1945), 215-19.

[24]A hierarchy of difficulty for audio scripts might be as follows:

(a) vocabulary words,
   1. telefono
   2. ascensor
   3. taxi
   4. vapor
   5. regalos

(b) words in sentences,
   1. Alli esta **el metro.**
   2. El avion aterrizo a su hora.
   3. Tienen el oleoducto gracias a **los helicopteros.**
   4. **El vapor** entro en las esclusas de Miraflores.
   5. **(Es gratis!)**

(c) sentences about the item,
   1. Entraron donde no debieron entrar.
   2. Registraron todo el equipaje alli con mucho cuidado.
   3. No durmieron por que bebian demasiado de esta bebida.
   4. De vez en cuando este no despega bien y hay accidentes terribles.
   5. Suena como avion, pero lo que uno necesita cuando esta perdido.

[25]Ingram, et. al., p. 8.

[26]Simon Belasco, "The Plateau; or the Case for Comprehension. the 'Concept Approach,'" **Modern Language Journal,** 51 (1967), 85-87.