Cognitive Development and Language LS 750
Fall 1994
Instructor: Dr. Paula Menyuk

First Paper on Relation Between Cognition and Language
An Information-Processing Approach to Interlanguage Phonology
Jilani Warsi
11/3/94

"Language completely interpenetrates direct experience. For most persons every experience, real or potential, is saturated with verbalism. This perhaps explains why so many nature lovers do not feel that they are truly in touch with nature until they have mastered the names of a great many flowers and trees, as though the primary world of reality were a verbal one, and as though one couldn't get close to nature unless one first mastered the terminology that somehow magically expresses it. It is this constant interplay between language and experience which removes language from the cold status of such purely and simply symbolic systems as mathematical symbolism or flag signaling."

Edward Sapir

Introduction

The phenomena of language has intrigued a great number of scholars. The abstract relation between cognition and language has further caused controversy and confusion. Opinion is sharply divided between those who believe that certain degree of cognition always exists before human beings are exposed to language, and those who believe that language influences and determines the development of cognition. Linguists, developmental psychologists, psycholinguists, and educators have all attempted to decipher the mysterious connection between cognition and language.

While all of them have essentially concerned themselves with first language acquisition, this study is concerned with second language acquisition. Klein (1991) believes that language acquisition is a difficult and cumbersome process, and that the learner takes many years to achieve full mastery of his or her language. In opposition to Klein, Hyames (1991) argues that despite this difficult and cumbersome process, children acquire language with relative speed and ease. The logical problem is then how they

acquire knowledge of language. Developmental psychologists have answered that children go through stages of development, in which their cognitive ability expands. According to them, language is only a byproduct of their cognitive growth.

The renowned French psychologist, Piaget, believes that both cognitive and language development take place because of genetic epistemology; he suggests that there is something in the nature of infants that leads to the development of cognition and language. Development is distinct levels of intelligence, and it occurs through the operation of assimilation, accommodation and equilibration.

On the other hand, the proponents of the information processing theory postulate that there is a constant interaction between the inside and the outside that plays an important role in both cognitive and linguistic development. The theory is primarily concerned with what develops and how development occurs. The information-processing approach to development is based on many fundamental assumptions. The main assumption is "that thinking is information processing" (Siegler, 1991). The information-processing theory focuses on children's representation of information, the processes they use to transform the information, and the memory constraints on the processing and representation. In contrast to Piaget's theory, information-processing postulates that children's thinking changes continuously as a result of ongoing cognitive activity. This phenomenon is known as "self modification."

Information-processing emphasizes processing limitations, strategies to overcome those limitations, and knowledge about specific contents. In other words, the whole approach to cognitive and linguistic development is that of problem solving. The information-processing scientists call it "task analyses." The representation and

processing of information is contingent upon the nature of the task. It is, therefore, advisable that we understand the task environment in order to understand people's actions.

It should be noted that at a certain age children's thinking is limited, and they can only perform certain tasks depending on their thinking capacity. This raises some interesting questions: if thinking is limited, how can it be flexible to meet new task demands? Does this limitation change over a period of time, depending on constantly changing circumstances, goals, tasks, etc.? The convincing answer to these rather perplexing questions is that though thinking is limited in both amount and speed, it can be flexible to adapt to constantly changing goals. According to this hypothesis, children use two processes to manipulate information: automatization and encoding.

The automatization process is important to understand because it provides basis for understanding the world. The processing of information appears to be automatic, perhaps from birth; however, some processes may change from controlled to automatic, such as learning to drive a car. This shift is initiated by repetitive experience. The second important process is the process of encoding important features of the environment, which is limited. Children, sometimes, fail to learn from important experience because they do not know how to encode it.

It is important to discuss three very important structural characteristics of information-processing: sensory memory, short-term memory, and long-term memory. Sensory memory is the capacity for retaining large amounts of information. On the other hand, short-term memory is like a computer's central processing unit. People are aware of the contents of short-term memory. However, it is limited in the sense that it only

includes a limited number of information. The longer the piece of information is kept active in the short-term memory, the longer it will be transferred to long-term memory. The information stored in short-term memory can be retrieved rapidly. Children's ability to retrieve short-term memory helps them see related and varied events. Unlike sensory and short-term memory, there is no limit on the storage and retention of long-term memory. People store information in separable units and retrieve it as and when they need it. However, retrieval may be problematic despite the unlimited capacity of long-term memory (Owens, 1992). He notes that the amount of information stored is so large that it would be difficult to find individual bits.

The supposition that children's thinking is limited, and that they can only process a certain amount of information based on their cognitive ability raises another intriguing question: would acquisition be possible if the new acquisition demands more memory capacity than the child possesses? The answer would be a resounding no; however, research has proved that teaching new conceptual structures helps children think about concepts in more advanced ways (Siegler, 1991). Children's improved ability to surmount short-term memory limits underlie their cognitive development. For this reason, researchers suggest that knowledge of adult thinking can enhance knowledge of children thinking.

We will take this hypothetical notion as a point of departure and discuss the complicated process of second language acquisition, especially adult learners of a second language. The purpose of this study is to focus-with an information-processing approach-on the acquisition of second language phonology by adult language learners . The subjects for this study will be Hindi speakers of English, but before we discuss the

methodology, it stands to reason that we discuss what is interlanguage phonology, and what are the potential areas of difficulty for Hindi speakers of English.

While acquiring a second language phonology, the learners internalize a system of phonological rules, which may be distinct from the target language and the native language. This structured system which learners construct at any given stage in their development is termed interlanguage (Selinker, 1972). Heretofore, little has been done in the field of interlanguage phonology. The reason for the dearth of studies in interlanguage phonology is the common belief that the learner's phonological system does not provide useful insights into the nature of the second language acquisition process. To a large extent, this notion was based on the wrong assumption that all phonological errors were the result of direct transfer of the native language phonology to the interlanguage system in some uninteresting ways (Tarone, 1978). That is to say, pronunciation of a second language was not significant for the field of second language research. This conviction is still prevalent among second language acquisition researchers, second language teachers, and students. However, it would be misleading to presume that language learners only need to acquire the grammar system and vocabulary of a second language. It is equally essential that they acquire the rules of the second language phonology in order to be intelligible to native speakers of that language. Furthermore, it is reasonable to assume that "research in this area will shed much light on our understanding of the process of speech perception in general." (Tarone, 1978). With the development of modern linguistic science, interlanguage phonology has become an important area of investigation leading to resurgence of interest in the phonological

aspects of second language acquisition research, taking into consideration both teaching and learning perspectives.

Researchers argue that a common tendency among second language learners is to resolve the difficulty in pronunciation through interference of a phonological approximation from the native language. However, transfer is not a simplistic process as once believed. It is rather one of several processes influencing the shape of the second language phonological system. These processes are interrelated and seem to interact in an interesting way.

Broselow (1983) strongly believes that transfer plays a crucial role in the acquisition of a second language phonology and that language learners tend to alter the target language syllable structures in order to confirm to native language restrictions. Regarding the subjects of this study, for example, Hindi speakers in speaking English exhibit a particular pronunciation pattern which is influenced by the pronunciation patterns of their native language (Sethi, 1980). Hindi speakers modify English syllable structures which are not permitted in their native language. This can be regarded as an attempt to bring English syllable structures into conformity with Hindi syllables structure constraints (Bansal, 1978).

The focus of this study is the distribution of consonant sequences in English spoken by native Hindi speakers. Emphasis will be on the pronunciation of English words beginning with consonant clusters by Hindi speakers. Two general categories of consonant sequence distribution will be considered: allowable and non-allowable.

For the purpose of this study, the term allowable sequence is used to describe consonant sequences that occur in both languages regardless of distribution restriction.

The clusters that are defined as allowable are /sp-, sk-, & st/ because they appear both in English and Hindi. However, in Hindi, they do not occur in the word initial position. Thus, these elements are shared but they differ systematically in reference to syllable boundaries in the two languages (Kachru, 1983). On the other hand, non-allowable sequences are those consonant sequences that appear in English but do not occur in Hindi in any position. The sequences /sl-, fl-, bl-, fr-, tr-, & Or/ are considered to be non-allowable because they do not occur in Hindi at all.

The motivation for selecting English consonant sequences comes from what Broselow (1988) calls the "syllable structure transfer hypothesis" which states that "when the target language permits syllable structures which are not permitted in the native language, learners will make errors which involve altering these structures to those which would be permitted in the native language" (Broselow 1988: 272).

It is the object of this study to investigate specifically the ways in which Hindi speakers' productions of the allowable clusters differ from their productions of the non-allowable clusters, and from the productions of native English speakers. Based on the findings of Eckman (1977:66), Tarone (1978: 240), and Broselow (1988: 272), it can be assumed that Hindi Speakers will have some difficulty in pronouncing the allowable sequences (sp, sk & st) in English. While this type of argumentation is highly plausible, it is not an empirical argument.

It must be mentioned here that the research will be conducted in information-processing perspective. Another area of empirical interest is how second language learners reach the interlanguage phonological stage. It would be interesting to know why they could not produce the target language sound combinations despite getting a massive

amount of input. This is especially the case where learners are exposed to an English speaking environment.

The following questions are worth mentioning: why couldn't they retrieve the phonological data from their long-term memory? Do they lack the motivation and desire to become successful language learners? Have their brains lost the plasticity and reorganizational capacities necessary for acquiring language (Lenneberg, 1967). Menyuk (1972) argues that children are born with the capacity to hear and discriminate between speech sounds. What happens to this natural ability in adult learners of a second language? After adults acquire two languages, how do the speech understanding and speech production processes function? Is second language knowledge and processes entirely independent of the first (Steinberg, 1982)? Why is it that second language learners sometimes produce a particular speech sounds accurately and at other times substitute or omit? Explaining first language acquisition, Menyuk (1971) argues that variation in speech sound production can be attributed to the specific context in which they are produced. Finally, this study has the following pedagogical concern: can native-like phonology be achieved by average learners?

Method

As mentioned previously, Hindi speakers of English will be the subjects for this study. It is deemed necessary to control certain social and linguistic variables to minimize variability in performance.

Subjects

For the purposes of this study, it is essential that Hindi be the subjects' native language. This requirement is extremely important because it would be difficult to

determine any possible influences of the native languages on the spoken English of multilingual subjects. It is important to consider that Hindi and English were not learned simultaneously by native Hindi speakers. This criterion is establish for a somewhat different reason. According to Krashen (1973), the first four years of a child's life are crucially important in determining his or her language behavior as it is considered a 'critical period' before lateralization takes place.

The third criterion requires the subjects to have learned Hindi before having been introduced to English. This is to ensure that if transfer exerted some influence on the L2, it must be originating from a solitary source, i.e., Hindi. Also, it is considered important to ensure that Hindi speakers learned English in India. This criterion has some pedagogical implications. Hindi speakers, speaking English, exhibit a particular pronunciation pattern, which is influenced by the pronunciation patterns of their native language. They also may have non-native English speech models which might impede acquiring native-like pronunciation in their second language, i.e. English.

A total of twenty Hindi speaker will participate in the data-collection process. As mentioned earlier, they must be older than four years when they started learning English in India. All of them must be in the age group of twenty-to twenty-five years. They must not have spent a considerable period of time in the United States, because it would allow them to use English for communicative and academic purposes, and would result in production differences.

Procedure

Once the subjects are located, the next step will be to select an appropriate procedure for collection of the speech data. Most studies reported in the literature have

used artificial laboratory settings for data collection. This type of artificial setting affects learners' pronunciation of a second language (Nemser 1971). Keeping this in view, it is considered important to decide exactly what type of methodology should be used for studying interlanguage systems. Selinker (1972) argues that the data for interlanguage should be based on sources other than those used in conventional error analysis. However, Corder (1974) argues that the judgment of the learner will give valuable information about his interlanguage system. It is crucially important to understand that the method used to collect data exerts significant influence on the nature of the data collected.

The data will be collected in a reasonably natural speech situation. The subjects will be initially contacted by telephone, and the requirements of the study will be explained to them. If the subjects agreed to participate in the study, the investigator would visit them at home for the data collection. The home setting is selected to avoid the unnaturalness of a laboratory setting and the possible effects on the data set. The purpose of the study will not be explained to the subjects to minimize any and all conscious efforts to enhance their pronunciation of the sound targeted in the study.

At the time of the date collection, subjects will answer a specially prepared questionnaire to provide information about their social and linguistic background. This is done to gather demographic data which would later be examined to account for possible trends in the data.

Elicited Speech

A list of fifty words will be prepared, twenty-five words containing the allowable sequences (sp, sk & st), and twenty five words containing the non-allowable sequences

(bl, fl, fr, sl, tr, & Or). However, the words will not be presented in the same order as shown here. They will be given in a random order to minimize a response bias pattern.

The subjects will be asked to respond to pictured items which will elicit pronunciation of /sp, sk, st/ and /bl, fl, sl, fr, tr, & Or/ consonant clusters in word initial position. They will be instructed to name the pictures using the fixed frame sentence structures, e.g., "I can say school, I can say flower." Each subject will be shown the picture in the same order. Their responses will be audiotaped.

First language acquisition research suggests that sentence repetition tasks result in better performance than spontaneous (Dickerson, 1974). The effect of sentence versus spontaneous discourse on the phonology of second language users is unknown. However, in order to obtain a sufficient data sample, a sample that was consistent across subjects, sentence production is selected for this study. Johansson's (1973) use of target language sounds at the sentence level is a significant improvement over previous experimental studies, for example.

Connected Speech

In addition, a sample of spontaneous connected discourse will be elicited from each subject for purposes of comparison and documentation of any differences in his or her production of the allowable and non-allowable consonant sequences.

The natural speech of each speaker, speaking English, will be audiotaped as they speak a monologue. In order to elicit natural utterances, the subjects will be asked to speak for five minutes on selected topics such as their educational background, work, personal interest, and academic goals, etc. Prompting will be kept at a minimum. The subjects will be asked to speak on these topics with the expectation that they would

produce words with the consonant sequences targeted in the study, e.g. school, study, three years, etc. This technique is expected to be very effective in eliciting production of both the allowable and non-allowable consonant sequences under investigation.

Once all data are collected, the subjects will be asked if they perceived any difficulty in articulating the targeted consonant sequences. Later a portion of the audio recording will be selected for transcription and analysis. The subjects' productions of the target clusters will be compared qualitatively for differences in the elicited and natural speech samples. The English as spoken by native English speakers will also be compared to the data in order to see whether these subjects pronounced both allowable and non-allowable consonant sequences correctly.

Conclusion

It is believed that universal grammar(UG) is available to first language learners only. Second language learners, on the other hand, do not have access to UG and use information-processing strategies or problem-solving procedures, which make adult language learning very different from child language acquisition. Although the input-processing strategies may not work sometimes, "the insight that acquisition involves input-processing strategies of some kind is important and should be pursued" (White, 1991).

If the learners pronounced both allowable and non-allowable sequences correctly, it would invalidate the notion of transfer determining the shape and form of interlanguage phonology. If they had difficulty with either allowable or non-allowable sequences, it

would strengthen the concept of positive or negative transfer. Based on the dichotomy of the expected results, it is reasonable to assume that the study will provide the following evidence:

1. Transfer does play a role in the acquisition of second language phonology, but there are other processes and constraints that interact with it in determining the form of the interlanguage systems.

2. Syllable structures which are allowed in both the target language and native language are particularly susceptible to transfer.

3. Language learners show a preference for marked (more sonorant or natural) syllable structures.

4. It is difficult for adult language learners to achieve native-like phonology in his or her second language.

It is important to mention that many questions still need to be answered more fully in order to understand the complicated interlanguage systems. They are as follows:

1. Why are syllabification rules so susceptible to transfer?

2. What sorts of phenomena tend to participate in transfer?

3. What is the relative influence of processes such as transfer, overgeneralization, avoidance, and first language acquisition on the shape of interlanguage phonology?

4. What are the causes of the fossilization of interlanguage phonology?

Further research should be conducted to get a better understanding of the interrelationships of language, mind, body and society in the process of second language acquisition. In our attempts to answer these polemic questions, we will learn much about linguistic universals. At this point, it is reasonable to assume that certain universal

constraints interact with the first language and that interlanguage forms result from this multiple causation.

References

Bansal, R. K. 1978. English and Hindi: A Contrastive Phonological Study. *CIEFL Bulletin.* Hyderabad: Central Institute of English and Foreign Languages, 17-54.

Broselow, E. 1983. Non-obvious Transfer: On Predicting Epenthesis Errors. In S. Gass and L. Selinker (eds.), *Language Transfer in Language Learning.* Rowley, MA: Newbury House.

_____ 1988. An Investigation of Transfer in Second Language Phonology. In Nehls (ed.), *Interlanguage Studies.*

Corder, Stephen P. 1974. *Introducing applied linguistics.* Harmondsworth: Penguin.

Dickerson, L. 1974. *Internal and external patterning of phonological variability in the speech of Japanese learners of English.* Ph. D. dissertation, University of Illinois.

Eckman, Fred R. 1977. Markedness and the contrastive analysis hypothesis. *Language Learning,* 27, 315-330.

Hyams, H. 1991. Seven Not-So-Trivial Trivia of Language Acquisition: Comments on Wolfgang Klein. In Eubank, L. (ed.). *Point Counterpoint: Universal Grammar in the Second Language.* Philadelphia: John Benjamins Publishing Company.

Johansson, F. A. 1973. Immigrant Swedish phonology: A Study in Multiple Contact Analysis. *Lund,* Sweden: CWK Gleerup.

Kachru, Braj B. 1983. *The Indianization of English: The English Language in India.* Delhi: Oxford University Press.

Klein, W. 1991. Seven Trivia of Language Acquisition. In Eubank, L. (ed.). *Point Counterpoint: Universal Grammar in the Second Language.* Philadelphia: John Benjamins Publishing Company.

Krashen, S. 1973. Lateralization, language learning and the critical period: Some new evidence. *Language Learning,*20, 237-248.

Lenneberg, E. 1967. *Biological Foundations of Language.* New York: J. Wiley & Sons, Inc.

Menyuk, P. 1971. *The Acquisition and Development of Language.* New Jersey: Prentice Hall.

_____1972. *The Development of Speech.* New York: Bobbs-Merrill Company.

Nemser , W. 1971. Approximately systems of foreign language learners. *IRAL,* 9, 115-124.

Owens, Robert E. 1992. *Language Development An Introduction.* New York: Macmillan Publishing Company.

Selinker, L. 1972. Interlanguage. *International Review of Applied Linguistics,* X: 209-30.

Sethi, J. 1981. Sentence Stress in Educated Punjabi-Speakers' English. *CIEFL Bulletin,* Vol. XVII, No. 2, Hyderabad: Central Institute of English and Foreign Languages.

Siegler, Robert S. *Children's Thinking.* New Jersey: Prentice Hall.

Steinberg, Danny D. 1982. *Psycholinguistics: Language, Mind, and World.* New York: Longman.

Tarone, E. 1978. Some influences on interlanguage phonology. *International Review of Applied Linguistics and working papers in bilingualism,* 8, Feb. 87-111.

White, L. 1991. Second Language Competence versus Second Language Performance. In Eubank, L. (ed.). *Point Counterpoint: Universal Grammar in the Second Language.*