SECOND LANGUAGE DEVELOPMENT: A SEARCH FOR REGULARITY

Ph.D. PSYCHOLOGY

DYNAMICS OF SECOND LANGUAGE DEVELOPMENT: A SEARCH FOR LINGUISTIC REGULARITY

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Abstract

This investigation was designed to study the dynamics of second language acquisition in groups of adult learners of English at two different levels of proficiency. Six experimental studies were conducted to examine a broad range of language processing abilities.

Four of the six studies focused on the learner's ability to comprehend sentences involving grammatical complexity and semantic or syntactic deviance. In addition the "cloze" test was used to probe the learner's skill at integrating syntactic and semantic information in a written text. Finally, the learner's skill at solving problems of deductive reasoning in his native language and in his second language was studied.

We concluded from this investigation that second language acquisition calls into play a diversity of basic cognitive abilities and heuristic inferencing strategies. The efficiency of these devices develops through formal and informal learning experiences.

Ph.D. PSYCHOLOGIE

ETUDES SUR LA DYNAMIQUE DE DEVELOPPEMENT D'UNE LANGUE SECONDE: TENTATIVES D'IDENTIFICATION DES REGULARITES LINGUISTIQUES

Alison d'Anglejan-Chatillon

Sommaire

Cette recherche a été conçue pour étudier la dynamique de l'acquisition d'une langue second chez des étudiants d'anglais de deux niveaux différents de compétence. Six expériences ont été entréprises pour examiner une variété de processus cognitifs concernant l'assimilation de l'information.

Parmi les six expériences, quatre examinaient la capacité de l'étudiant à comprendre des phrases ayant soit une structure grammaticale complexe soit une anormalité sémantique ou syntaxique. Ensuite, le procédé "cloze" a été employé pour sonder l'habileté du sujet à intégrer des connaissances sémantiques et syntaxiques pour reconstituer un texte mutilé. En dernier lieu nous avons examiné la facilité de l'étudiant à résoudre des problèmes de raisonnement déductif dans sa langue maternelle et dans sa langue seconde.

Les résultats de cette recherche nous permettent de conclure que l'acquisition d'une langue second fait appel à la

fois à une diversité de processus cognitifs fondamentaux et à des stratégies pragmatiques. L'efficacité de ces processus peut se développer à la fois à travers un apprentissage formel et par le jeu des influences du milieu.

DYNAMICS OF SECOND LANGUAGE DEVELOPMENT: A SEARCH FOR LINGUISTIC REGULARITY

by

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INTRODUCTION

The past decade has been marked by a period of intensive research activity in the area of language acquisition. The question of how the child comes to understand and speak the language of his speech community has emerged as the central issue in psycholinguistics. Although this phenomenon has intrigued man from earliest times, a review of the scientific literature prior to the early 1960's (McCarthy, 1960) provides only a sketchy and inconclusive picture of the child's linguistic development and virtually no insight into the underlying processes.

Early researchers were interested in the development of speech sounds in infancy, the content and form of the child's vocabulary, the amount and rate of talking as well as deviant language behavior. The only language learning process to be studied was that of imitation to which considerable importance was attributed.

By the 1950's, information gleaned from naturalistic observation and early biographical studies was being supplemented by cross-sectional studies, and quantification techniques were in use. However, research findings remained sporadic and

diffuse (cf. McCarthy, 1960).

The predominant theory of language learning during the late 1950's was that elaborated by Skinner (1957) who tried to integrate language into a general behavioristic model supposedly comprehensive enough to encompass all forms of human learning. Language learning was viewed as the acquisition of a set of conditioned responses to specific stimuli, resulting from the systematic reinforcement and shaping of appropriate utterances by a child's mother or caretaker.

In retrospect, prior to the early 1960's advances in our knowledge and understanding of language learning as a facet of human development appear to have been disproportionately small given the salience and recognized importance of verbal behavior.

What was it that brought the study of child language learning out of the doldrums of the late 1950's and made it possible for Brown to produce, in 1973, a 400 page minutely documented account of child language learning based on empirical studies? The answer is not a simple one. From a pragmatic standpoint, one might say that the availability of research funds during that period played an important role. A second, and we believe, critical factor was the improvement in communications within the scientific community which made it possible

for research findings to receive rapid and widespread circulation so that work could progress in a systematic way with researchers from various disciplines building on findings from centres in other parts of the country or other parts of the world.

Finally, there was the tremendous impetus provided by modern linguistic theory and by the work of Chomsky (e.g., 1957, 1973) in particular. It is likely that many psychologists working in the area of language acquisition have not actually read Chomsky's work in depth. And it is true that Chomsky has not gone out of his way to place his ideas at the disposal of other social scientists, but his influence on the direction which their work has taken cannot be disputed. One might even argue that modern linguistic theory has had a positive retroactive effect on some of the earlier work in language acquisition (e.g., Guillaume, 1927; Leopold, 1939, 1947, 1949a, 1949b; Ronjat, 1913) by providing a conceptual framework into which these disparate studies can now be integrated.

Perhaps one of the most important results of Chomsky's writings has been to transform our concept of language from that of a rather amorphous, vague, and indefinable entity to something which is organized, rule-governed and amenable to description to which we can relate the learner's fragmentary

utterances. If in answer to the question "what does the child acquire when he learns language" we can answer, albeit simplistically, "a system of phonological, syntactic and semantic rules," we are in a better position to begin our research than we were when grappling with concepts of language such as those illustrated by the following examples: "Language is the expression of thought by means of words" (Greenough & Kittredge, 1906); "...the chief business of language is to communicate meanings of various kinds" (Fries, 1952); or "Language enables one person to make a reaction (R) when another has the stimulus (S)" (Bloomfield, 1933).

It is interesting that the nativistic theorizing of Chomsky (1957) has not led to the research impasse which Hebb, Lambert and Tucker cautioned against in 1971. For we find in today's orientation no tendency to relegate language acquisition to the realm of unresearchable dogma. Rather, we find a concerted attempt to discover how learning and heredity interact in the ontogenesis of language behavior. The richness and diversity of the contemporary approaches to the problem are reflected in such studies as that by Trehub and Rabinovitch (1972) investigating neonates' sensitivity to phonemic contrasts; Snow's (1972) study of the language used by mothers in their interaction with young children; and Cazden's (1965)

study of environmental assistance to the child's acquisition of grammar.

The operational definition of language learning underlying most recent research has shifted from one which considers the child's linguistic growth to be the result of reinforcement or shaping by his entourage, to what Brown (1973) has described as a creative construction process. Language acquisition, as we now see it, represents an active, biologically directed search on the part of the child for the grammatical and semantic regularities underlying the language of his speech community. Child language is no longer seen as a defective or haphazard form of adult speech, but rather as an orderly, rule-governed system which evolves through a series of predictable stages toward eventual adult competence.

Brown (1973) has documented the regular developmental sequence found in children acquiring English, and many universal similarities found among children learning a variety of native languages. However, he draws attention to the wide range of individual differences to be found in the rate of acquisition. The reason why some children progress very much more rapidly than others through the developmental stages is far from clear, although there is speculation that IQ and characteristics of family interaction might have some effect.

One of the principal goals of researchers has been to chart the evolution of child speech from early mastery of the very general rules for sentence construction, through the gradual refinement of these rules and the learning of highly language-specific characteristics which emerge as his intellect expands and the concepts which he must express grow in sophistication and subtlety (Brown & Hanlon, 1970; Sinclair-de-Zwart, 1967; Slobin, 1973).

A number of researchers have studied the interaction of cognitive and linguistic factors in an attempt to discover what determines the order of acquisition of certain grammatical features. These are important notions to explore, for if we want to know why language acquisition occurs in such an orderly sequence, in the absence of explicit teaching, we must take into consideration a diversity of factors relating both to the learner, and to what he learns. These factors will include the range of concepts the developing child needs to express, the cognitive mechanisms he brings to the learning task, the surface complexity of the grammatical form in which his concepts are realized in a given language, as well as their frequency of occurrence and perceptual salience. Drawing on research findings from studies of English-speaking children and children from other language groups, Brown (1973) predicts

that semantic and syntactic complexity will prove to be the most powerful determinants of acquisition order. He relegates frequency and perceptual saliency to a secondary position. Present attempts to study the interplay of syntactic and cognitive development through the examination of data adduced from cross-linguistic studies should advance our understanding of semantic development--an area which has evolved more slowly than other aspects of child language acquisition (Schlesinger, 1975; Stemmer, 1973).

Interest in Second Language Learning

More recently a new area of investigation has captured the interest of researchers concerned with the systematic study of language acquisition: How are second languages learned by children and by adults? Are native language learning and second language learning analagous processes? What can we find out about language learning in general through the study of second language learning?

This new interest in second language learning is a natural extension of research in native language acquisition, but it also derives directly from the impetus provided by linguistic theory. Armed with a more tractable working definition of what the second language learner sets out to acquire, i.e., an internalized set of grammatical rules, researchers

are turning their attention to the investigation of how these rules are learned, and the primary focus is on the acquisition process.

Interestingly there seems to be no direct relationship between the orientation of most of today's second language research and the very solid work on bilingualism carried out in the late 1950's and early 60's. Those studies focused mainly on the skilled bilingual's linguistic performance in restricted laboratory tasks. Certain researchers were interested in finding methods to measure or quantify the bilingual's relative skill in his two languages (Kelly, 1971). Others examined the question of how the balanced bilingual keeps his language systems separate (e.g., Lambert, 1969) and how he switches with such apparent ease from one code to the other (Kolers, 1966; Hamers, 1973). The subjects in these studies were usually skilled bilinguals and researchers do not seem to have been interested in the second language learner's performance at intermediate stages of second language proficiency. One notable exception to this general pattern was Lambert's (1956) study in which he examined developmental changes in the form of associational response patterns of bilinguals with varying levels of exposure to a second language.

Another unrelated precursor of today's second language

acquisition studies is the body of research focusing on second language teaching and on the identification of variables such as age, intelligence, aptitude, attitude, personality and motivation, which are thought to account for the broad range of individual differences in achievement observable in the second language classroom (Arendt, 1967; Gardner & Lambert, 1972). This area of investigation grew out of the need in the 1950's and 60's to develop new and better teaching methodologies when foreign languages were introduced on a widespread scale into the elementary grades of North American public schools. However, the failure of the new approaches such as the audio-visual method and technological advances such as the language laboratory to produce the anticipated improvement in the effectiveness of teaching (Scherer & Wertheimer, 1964; Smith, 1969) caused researchers and educators to reassess what they were doing in the light of new theoretical developments in the area of language learning.

Interest in the Second Language Learner

It has become increasingly apparent to many that if advances are to be made in second language teaching we must first know more about what the learning process entails and we must look for explanatory mechanisms in basic linguistic

and cognitive processes rather than in teaching methods and materials. For unlike history or geography, language is not a set of discrete facts, but rather a very complex form of human behavior. Dulay and Burt (1974) note the paradox that much of what is taught in the second language classroom fails to be learned by students, and much of what is learned was not taught.

A notion that second language learning, even within the classroom context, might reveal developmental patterns and regularities similar to those found in native language learning emerged from early error analysis studies. These studies were usually undertaken within the framework of contrastive linguistics and their objective was to identify the common second language errors caused by the interference of structures or habits from the learner's native language so that these could be eradicated through appropriate drills (George, 1972). The focus of this early work was therefore on errors which could be clearly identified as being the result of mother tongue interference (such as the following English productions of French native speakers: Yesterday I have been to visit my aunt; Where can I get travel informations?). However, researchers began to observe that in addition to interference errors there were other common systematic errors (e.g., he can sings; he is walks; where did she gets that book?)

which could not be attributed to interference and which were found in the speech of learners from a variety of language backgrounds studying the same target language (Richards, 1973). This observation led to the emergence of new theoretical ideas about second language learning which converged with the findings from research in native language acquisition. Researchers speculated that the performance of the second language learner might not be random and disorganized as previously believed. His errors in producing sentences in the target language could be attributed to his attempts to discover for himself the underlying rule system of the second language.

The following examples from a cross-sectional error analysis study of Arabic speaking students learning English (Tucker, 1974) provide a fascinating illustration of an hypothesis testing process:

1. How much from the money need?
2. How much from the money he need?
3. How much from the money he needs?
4. How much money needs he?
5. How much money is he needs?
6. How much money is he need?
7. How much money he need?
8. How much money does he needs?

Target: How much money does he need?

On the basis of such observations, it was speculated that the learner's progress could be traced through regular and predictable stages of interim competence gradually approximating that of the native speaker (Corder, 1967; Nemser, 1971). Selinker (1972) refers to the learner's evolving grammatical competence as an "interlanguage." It is a dynamic system differing from both the native language and the target language--the product of the learner's attempts to derive for himself the rule system of the new language in terms of the limited exposure he has had to it. The learner's interlanguage (Corder, 1971, refers to these successive stages as "approximative systems") may continue to evolve until it approaches native speaker competence, or it may partially or wholly fossilize at some transitional point when adequate communicative efficiency has been attained.

Contemporary Studies of Second Language Acquisition

The main thrust of second language acquisition research over the past five years has been directed toward the systematic description of diverse aspects of the approximative systems of child and adult second language learners at various stages of competence. Kessler (1971) and Swain (1971) looked at the approximative systems of young bilingual children who

were in the process of acquiring two languages simultaneously. They found that such children acquire a common core of rules which they apply to both languages, then gradually differentiate the appropriate rules for each one.

Ravem (1968, 1970) studied the acquisition of English wh-questions and negation by his own son, a native speaker of Norwegian. He found that the child produced negative sentences like those produced by English children learning their mother tongue. In learning the question system he began producing sentences reflecting Norwegian structural patterns, then gradually his utterances evolved into typical English developmental patterns. Ravem concluded that the similarities between his son and child native language learners of English in the developmental sequence of negative and interrogative sentences were more noticeable than the differences. Similar findings of a comparable developmental pattern in second language learners and child native speakers were reported by Natalacio and Natalacio (1971) in their study of the acquisition order of English plural allomorphs by Spanish speaking children. Milon's (1972) study of a Japanese child's acquisition of English negation rules also revealed strikingly similar developmental regularities despite the fact that the child was acquiring a language so different from his own mother tongue.

Dulay and Burt have undertaken a sequential series of experiments to test the hypothesis that the performance of children acquiring a second language reflects a creative construction process rather than merely an attempt to cope with the second language in terms of the first. The results of their 1972 study showed that the major portion of the learners' errors could be explained by the creative construction process rather than by native language interference. In their second study (Dulay & Burt, 1973), they investigated the hypothesis that the manner in which child second language learners organize linguistic input will reflect certain universal cognitive mechanisms. They studied the acquisition order by child learners of a set of English grammatical structures reported by Brown to be acquired in invariant sequence by child native speakers of English. They found that three groups of Spanish speaking children residing in totally different parts of the United States acquired the grammatical structures in approximately the same order. A further, more carefully controlled study, compared the acquisition order of 11 English grammatical features by Chinese and Spanish speaking children learning English in an environment that included English speaking peers. The acquisition order was approximately the same for both the Chinese and

Spanish children (Dulay & Burt, 1974).

In contrast, Hatch (1974) examined the data from observational studies of 40 different children learning English as a second language in naturalistic situations, trying to identify possible universals in second language acquisition. She outlined general patterns of acquisition for such features as negatives and questions; however, she was unable to find sequences which could be considered truly universal, since not every child acquired each item in the same order. She noted a wide range of individual differences among the children in their rate of learning, volubility, degree of mother tongue interference and in the strategies which they appeared to be using to sort out the rule system of the target language. Hatch concluded that until more careful investigations of such individual differences have been carried out, it will be premature to talk about universals of second language acquisition.

Using a somewhat different approach, Cook (1973) compared the performance of a group of adult learners of English from a variety of language backgrounds, with that of a group of child native speakers varying in age from 2 yrs. 11 mos. to 4 yrs. 9 mos. He was interested in finding out whether the two groups would use similar or different strategies in performing two experimental tasks, one involving the imitation

of sentences containing various types of relative clauses and the other ambiguous deep structure-surface structure relationships. He found no conclusive evidence that the adult second language learners and the child native speakers approached the task in a different way, despite the great discrepancy in their levels of mental maturity.

Scott and Tucker (1974), also working with adults, carried out a cross-sectional error analysis study of the written and oral English productions of groups of Arabic-speaking learners of English at two stages in their development. They found patterns in the learners' errors which reflected a dynamic rule-generated language system such as that postulated by Corder (1971), Nemser (1971) and Selinker (1972).

The above studies, together with others which will not be reviewed in detail (e.g., Cancino, Rosansky & Schumann, 1974; Dato, 1971; Hakuta, 1974; Naiman, 1974; Taylor, 1974) lend considerable support to the hypothesis that second language acquisition involves a creative construction process which is frequently reflected in developmental patterns and errors similar to those made by child native speakers. However, once again, as was noted earlier for native language learning, most of the empirical investigations have focused somewhat narrowly on the acquisition of syntax. So while we have

acquired new information about the types of sentences which learners produce at various stages of their development, and we have a growing understanding of the important interaction of second language development with a wide range of learner variables such as age, attitude, motivation and empathy (for an excellent review of this literature see Schumann, 1974), we still know relatively little about the higher order linguistic and cognitive processes which are involved in the production and comprehension of sentences.

Richards (1974) has suggested that these mental activities might include planning, monitoring, anticipating, utilizing knowledge of probabilities and collocation, employing pragmatic knowledge of the real world, applying linguistic rules of transformation, deletion, etc. It is evident that many facets of these psychological activities must be investigated before any definite statements about the dynamics of second language acquisition can be made. Ervin-Tripp (1970) pointed out that the study of the second language learning process must of necessity be a study of change. She proposed that in studying adult learners in particular, we should look for a diversity of heuristic processing strategies and examine their patterns of occurrence and co-occurrence with changes in second language ability.

Scope of the Present Study

The present research is concerned with broadening the scope of our understanding of second language acquisition by exploring the ability of adult learners of English at two distinct levels of development to perform a broad range of tasks designed to tap both linguistic and cognitive aspects of the language acquisition process. The research comprises six experimental studies, each of which is described and discussed separately.

Study One looks at the attempts of adult second language learners to cope with understanding and producing sentences in the target language and questions whether the strategies which they use are similar or distinctly different from those found with child native speakers.

In Study Two we tap the second language learner's developing awareness of syntactic and semantic rules by studying his ability to repeat normal, anomalous and random strings. We relate the findings from the two experimental groups to data for child native speakers at various developmental stages.

Study Three is an attempt to examine the second language learner's developing linguistic competence by testing his sensitivity to deviance and his unconscious attempts to compensate for it.

Study Four compares the developmental sequence for a given set of syntactic structures by the two groups of second language learners with the developmental sequence found with child native speakers.

In Study Five we use the Cloze procedure to examine the relative ability of our experimental groups to integrate semantic and syntactic information in the second language, and make comparisons with the performance of a control group of native speakers.

Study Six focuses on the second language learner's ability to solve problems in deductive reasoning presented in their weaker language in comparison with their performance on an equivalent set of problems in their mother tongue.

In the final section we integrate the findings from the six studies and attempt to draw a more detailed picture of the second language learner.

SUBJECTS

All subjects (Ss) for the six experiments were male military personnel attending the language school at the Canadian Forces Base in St-Jean, Québec.

There were two experimental groups -- beginners (BEG) and advanced (ADV) -- of twenty Ss each comprising French Canadians who were studying English as a second language. The control group (NS) also numbering 20 Ss was drawn at random from classes of English Canadians studying French as a second language.

The Ss in the experimental groups filled out a background questionnaire designed to determine their level of education and amount of exposure to English. The questionnaire and the tabulated responses are shown in Appendix 1.

The average age of the Ss in the BEG group was 19.7 years; and in the ADV group it was 24.55. Both groups had completed an average of 12 years of formal schooling. The BEG had received an average of 4.75 years of instruction in English as a second language, as compared with an average of 4.90 for the ADV group. Subjects in both groups reported that their teachers of English had followed mainly traditional grammar-translation methods, supplemented in some instances by conver-

sation practice. None had followed audio-lingual programmes during their school years. Thirty percent of the BEG and fifty percent of the ADV students reported having had occasion to improve their English outside of school through contacts in the English speaking community. When asked to evaluate their own competence in reading, writing, speaking and understanding English, the average ratings of the ADV students were consistently higher than those of the BEG. Only two out of the twenty BEG students had studied an academic or professional subject taught in English. Twelve of the ADV students reported having done so. This is an interesting finding in that our two experimental groups have had a similar amount of formal instruction in English, yet formal tests of their English language skills administered by the language school clearly placed them in separate groups. It may be that the opportunity to study a content subject in the second language rather than the number of years they have studied the language per se has been a critical factor influencing their achievement in English. This would replicate findings reported by Saegert, Scott, Perkins and Tucker (1974).

The BEG students were enrolled in a basic English course, an intensive twelve week audio-lingual programme involving approximately five hours of instruction per day. All Ss had

been given diagnostic tests of their abilities in reading, writing, understanding and speaking English before being assigned to classes, and these scores were placed at our disposal by the school testing officer. (These tests are similar in format to those used by the Foreign Service Institute in the United States.)

Pilot testing revealed that our experimental test battery was too difficult for those students with excessively low scores on the proficiency tests. We therefore set a minimum aggregate score as the criterion for selecting students for the BEG group.

The ADV students were also following an intensive twelve week course of study, but their programme differed from that of the BEG in that it emphasized the improvement of reading and writing abilities as well as speaking skills.

The 20 Ss comprising the NS group were older ($\overline{X}$ = 31.10 years) than the experimental Ss. They had completed an average of 13.80 years of formal schooling. These differences were not considered important since the purpose of the NS group was simply to establish a criterion level of performance for native speakers of English as a basis for comparison with the performance of the second language learners.

The Ss were all tested individually. They were allowed

to leave their classrooms for the two or three sessions necessary to complete the test battery. The three experimenters (Es) were female.

STUDY ONE

Elicited Imitation of Relative Clause Constructions

The potential of elicited imitation as a diagnostic tool in the study of native language acquisition has been recognized and explored by many researchers (Ervin, 1964; Fraser, Bellugi & Brown, 1963; Slobin & Welsh, 1973; Smith, 1973). The rationale for the use of this technique has been described in detail by Slobin and Welsh (1973). When asked to imitate, children are found to restructure model sentences in accordance with the stage of development of their own internalized system of syntactic and semantic rules, particularly when the task places a strain upon the capacity of their short term memory and when their rule system deviates from that of the adult native speaker.

The following examples reported by Smith (1973) show the type of restructuring found in young children's imitations of sentences which involve syntactic structures slightly beyond their level of competence:

a) Model: Mommy could have lost her purse.

   Imitation: Mommy lost her purse.

b) Model: Not Jane, but Betty called you.

   Imitation: Betty called you.

As these examples indicate, the child appears to impose a simpler familiar structure on the model sentence. Thus, the child's imitations of model sentences can provide interesting information about his level of transitional competence as well as insights into his information processing strategies.

The elicited imitation technique has been effectively exploited in studies of dialect differences (Baratz, 1969; Troike, 1969) and more recently has been extended to the investigation of second language acquisition in adults and children (Clay, 1971; Hamayan, Markman, Pelletier & Tucker, 1975; Naiman, 1974).

Cook (1973) compared young children who were in the process of acquiring English as their native language and adult foreigners learning English in their ability to imitate a series of sentences involving various types of relative clause constructions. He was looking for evidence of similar rule structuring in both groups which, he argued, might indicate a common developmental pattern in first and second language acquisition. Although Cook did note a few language processing strategies which were particular to one group or to the other, he found that in general both groups performed the task in a similar manner. Both found it difficult and their imitations departed from the target sentences in systematic ways. For

example, when asked to imitate "the hammer that is breaking the cup is big," both the children and the foreign adults tended to drop the relative pronoun and produced "the hammer is breaking the cup is big."

Cook pointed out that many of the mistakes which have long been accepted as typically foreign were also made by the child native speakers (e.g., omission of inflection from the third person singular form of the verb). However, he urged caution in interpreting these findings as evidence that first and second language learning are analogous processes.

The present study was designed to broaden the implications of Cook's findings by searching for possible evidence of child-like developmental patterns in the imitations of our BEG and ADV groups of second language learners. We were also eager to evaluate more carefully the validity of elicited imitation as a diagnostic tool with second language learners.

METHOD

Since the scores for word-perfect imitation indicated that Cook's Ss found the task difficult, we felt confident that we could use his sentences for both BEG and ADV groups. This would permit us to compare data from the two studies. The test sentences and comprehension questions which centre

on syntactic aspects of the English relative clause are shown in Appendix 2. Sentences 3-9 contain relative clauses that qualify the subject of the sentence. In sentences 10-15, the relative clauses qualify the object of the sentence. Sentences 8, 9, and 15 contrast the presence or absence of the relative pronoun.

Comprehension questions were asked after sentences 3,5, 7, and 8. These questions probed the S's grasp of the grammatical function of the relative clause, i.e., his ability to interpret embedding.

A stimulus tape was prepared to reduce the possibility that fluctuating intonation patterns or other prosodic features might influence the S's imitations. The test sentences, preceded by three practice sentences, were read at a normal speed by a male speaker. A sufficient pause was allowed between each sentence to enable the S to respond without stopping the tape recorder. However, the recorder was stopped after the S imitated each of the four sentences which were followed by comprehension questions and the questions were presented by E.

Before the tape was played, Ss were advised that E would be willing to translate any isolated vocabulary items which they might not understand, but would not translate a

complete sentence. In fact, no such requests were made since the test involved only simple words which seemed to present no problem.

The E had mimeographed copies of the stimulus sentences. Using a separate sheet for each S, she noted any instances where the S's imitations deviated from the model sentence.

Since pretests with native speakers showed that their performance was error-free, the test was only administered to the two experimental groups.

Method of Analysis

Each S's imitations of the 15 target sentences were listed by group. This made it possible to look for response patterns, within a group, to a given sentence, and to make between group comparisons.

The number of word-perfect imitations was scored for each group. The data were then rescored. Sentences containing only peripheral morphological errors such as absent plural markers and third person singular morphemes were counted as correct (e.g., This is the door that open). This was done because these errors were unrelated to the focus of our investigation, i.e., comprehension of relative clause constructions.

No formal statistical analyses were performed on these

data. The results are presented in terms of group proportions.

RESULTS AND DISCUSSION

In general, our Ss found the task easier than did Cook's. The BEG group produced word perfect imitations 174 times out of 300 attempts (58%); and the ADV group, 257 times out of 300 attempts (86%). Furthermore, when the imitations were rescored, and peripheral errors were allowed, the scores for both groups improved considerably: BEG, 214 (71%); ADV, 281 (94%). It is interesting to note that the proportion of incorrect sentences involving morphological errors was .52 for the BEG group and .67 for the ADV group which suggests that these types of errors are both frequent and persistent. They are particularly salient in the ADV group whose performance in other respects approached that of native speakers. (Pretests with native speakers showed that their performance was error-free, so we can assume 100% competence and relate the performance of the experimental groups to this target.) While the prevalence of this type of morphological error might in some instances be interpreted as mother tongue interference (e.g., the French plural morpheme is silent and the third person singular form of verbs is unmarked), Cook draws attention to the fact that his child Ss who were native speakers of English also tended to

omit inflections from the third person singular form of the verb. Unfortunately, he does not present the frequency of such errors by either the native speakers or the foreign learners who represented a diversity of native language groups. This is regrettable since the frequency of this type of error by our ADV group suggested that it may well be one of the fossilized forms discussed by Selinker (1971). Its etiology would consequently be of particular interest.

Comprehension questions accompanying sentences 3,5,7 and 8 revealed that the syntactic relationships underlying 23% of these sentences were not understood by the BEG. The ADV group, on the other hand, failed to comprehend only 2.5% of the sentences tested. In examining the relationship between comprehension of the structures and ability to repeat them correctly we found that 68% of the misunderstood sentences were also incorrectly imitated by the BEG. The ADV group failed to understand only 2.5% (2 out of 80 attempts). The two sentences which were not understood were also incorrectly imitated. We can draw the overall inference that the ability to comprehend generally precedes the ability to imitate correctly for the four sentences in question -- a pattern already noted by Fraser, et al. (1963) in their study of young children. Cook did not examine this aspect of his Ss'

performance. The small number of sentences investigated, and the paucity of errors by the advanced group preclude the possibility of discerning any more subtle developmental trends.

We next attempted to carry out a systematic analysis of the errors made by both groups in a search for regular patterns. However, we found such a large number of error categories, with so few exemplars in each (excluding the morphological errors discussed above), that we must interpret them as being idiosyncratic and not representative of any generalized patterns.

In studying the scores for correct imitation, we compared the difficulty of sentences in which the relative clause qualifies the subject (items 3,4,5,6,7,8 and 9) and ones in which the relative clause qualifies the object (10, 11, 12, 13, 14 and 15). We find that the latter were more successfully imitated by both the BEG and ADV groups. This replicated Cook's findings with both child native speakers and foreign adults. The data for Cook's Ss and our own BEG and ADV groups are shown in Table 1.

Table 1

Percentage of Errors on Subject Relative Clauses and Object Relative Clauses

	BEG	ADV	Cook Children	Cook Adults
Subject	40%	7%	99%	86%
Object	14%	3%	92%	79%

Cook relates this difference to the results of previous experiments reported by Clark (1970) which showed that syntactic complexity near the beginning of the sentence is more confusing than complexity near the end. Apparently this difference in the locus of the underlying syntactic complexity even affects the processing of the two types of sentences by our ADV group which made more than twice as many errors with subject clauses as they did with object clauses, despite the fact that their overall error rate for both types of sentences was low (6%).

Looking specifically at the sentences which caused our BEG Ss the most difficulty (we chose a criterion error rate of 50% or over), we find that four of them (items 5,6,7, and 8) out of a total of five involve subject relative clauses. Coincidentally, sentence 8 (The lady the boy is drawing is

funny) also had the highest error rate (33%) of any presented to the ADV group. The second highest error rate was only 13%. It was the only sentence which any of the ADV group failed to understand.

There appear to be three explanations, possibly cumulative, which might account for this difficulty. The first involves the notion of compression discussed by Smith (1973). According to this author, the way in which semantic information occurs in a sentence may affect the order in which the sentences are acquired by children. In low compression sentences, semantic information is distributed evenly throughout the sentence (e.g., Two of the marbles rolled away). In high compression sentences, semantic information is clustered at the NP or VP level (e.g., The old green coat has holes). Smith found that low compression sentences were easier for children to repeat than high compression ones. Sentence 8 clearly falls into the high compression category. Secondly, it involves a relative clause qualifying the subject and this would make it more difficult to process than one involving a relative object (which incidentally would also be a high compression sentence). Thirdly, the relative pronoun which would normally occur near the beginning of the sentence where the information load is high is deleted, thus causing

ambiguity and placing an additional burden on the S's information processing capacity. Bever (1970) as well as Shipley and Catlin (1967) working with children have shown the importance of surface relative pronouns (in contrast to deleted pronouns) in facilitating comprehension of relative clause constructions. Since the relative pronoun is never omitted in French, translation could not have helped our Ss if indeed they had resorted to this strategy. The sentence must be processed at the deep structure level to be understood. Another interesting insight can be found in the research of Fraser, et al. (1963). These authors tested ten structures. The most difficult to imitate and understand involved a structure contrasting direct and indirect object in which the preposition which would have given a clue to the underlying syntactic relationship was deleted. The surface structure itself provided no helpful information (e.g., The girl shows the cat the dog). It appears that the omission of words which normally can be counted on as clues to meaning poses problems to both the child in the acquisition of his native language and to the adult learner of the second language.

We next examined the Ss' responses for indications of common strategies in coping with difficulty. Cook cites the

tendency of children to repeat only the last few words of sentences which they found difficult to process. We did not find one single example of this strategy among our Ss. When unable to grasp the syntax of a sentence, they occasionally dropped one or two words from the end of the string or even from the middle; but their focus appeared to be on the beginnings of sentences rather than on the ends.

In summary, we have found certain developmental patterns and information processing characteristics which point to a similarity between first and second language acquisition. In comparing our BEG with our ADV group we found clear-cut improvement in their ability to correctly imitate sentences and to cope with linguistic complexity. However, we find evidence that the difficulties which prevent our BEG group, and in selected instances our ADV group, from producing correct imitations, are inherent in the stimulus sentence. These difficulties appear also to pose problems for children and are mastered at a relatively later point in the acquisition process. Thus, while we must assume maturity of the cognitive processes in adults, certain features of linguistic complexity appear to tax both child native speakers and adult second language learners, and to tax BEG learners more than ADV learners. Our data suggest that it is the manner

of coping with difficulty which distinguishes the adult from the child learner.

STUDY TWO

Elicited Imitation of Normal, Anomalous and Random Sentences

In Study Two we examined the relative ability of our three experimental groups to perform another sentence repetition task. Here we were interested in the effect that their differing levels of syntactic and semantic knowledge of English might have on their ability to repeat specially constructed sets of stimulus sentences. We adapted, for our investigation with second language learners, a study conducted by Miller and Isard (1963) to test the importance of syntactic and semantic rules in the perception of sentences. Their Ss, adult native speakers of English, listened to three different types of sentences, all involving the same basic vocabulary, played through a steady masking noise which partly obscured the speech signal. Some sentences were fully normal and grammatical (e.g., Bears steal honey from the hive); others were anomalous in that they had normal syntactic structure, but were meaningless (e.g., Trains steal elephants around the highways); and the remainder were random strings of words having neither the characteristic structure of English, nor meaning (e.g., From hunters house motorists the carry). The Ss were required to shadow the strings as

they were spoken. Since the stimulus sentences were partially masked by a white noise, the Ss had to try to reconstruct the obliterated portions by drawing on their knowledge of the syntactic and semantic probabilities of English. In general, Miller and Isard's Ss shadowed grammatical strings most accurately; anomalous strings, less accurately; and random strings, the least accurately. The authors attributed these differences to the fact that in processing normal sentences Ss were able to draw on both semantic and syntactic rules and in shadowing anomalous sentences the syntactic probabilities were available to them. However, the random strings were the most difficult to process since they followed neither the semantic nor the syntactic constraints of English and consequently the listener was forced to interpret the words he was hearing from an unlimited array of possibilities, a task which was made particularly difficult by the presence of the masking noise.

McNeill (1965) adapted the technique of Miller and Isard to study the developing ability of groups of children aged 5,6,7 and 8 to draw upon semantic information in processing fully grammatical sentences. Since shadowing proved too difficult a task for young children, he used a sentence imitation paradigm. McNeill predicted that children who had

not yet acquired full knowledge of the semantic features of their language would not perform noticeably better on fully grammatical sentences than on anomalous ones. However, he predicted that with increasing age their performance on grammatical sentences would improve relative to the anomalous ones as they acquired greater knowledge of the semantic restrictions of English. In addition, McNeill predicted that the children would process anomalous sentences in much the same way as adults do, since their knowledge of syntax would be sufficiently well developed and their incomplete knowledge of semantic constraints would be no particular handicap in dealing with semantic deviance.

The results of McNeill's study showed clearly that five-year olds were less able than eight-year olds to draw on semantic information in reconstructing and repeating sentences -- that is, they did not perform so well on the grammatical sentences as did the older children (see Figure 1). As predicted, incomplete semantic knowledge did not affect the processing of anomalous sentences and consequently the children's performance with such sentences improved very little between ages five and eight.

These findings are consistent with the hypothesis that the young child learns the grammatical rules of his language

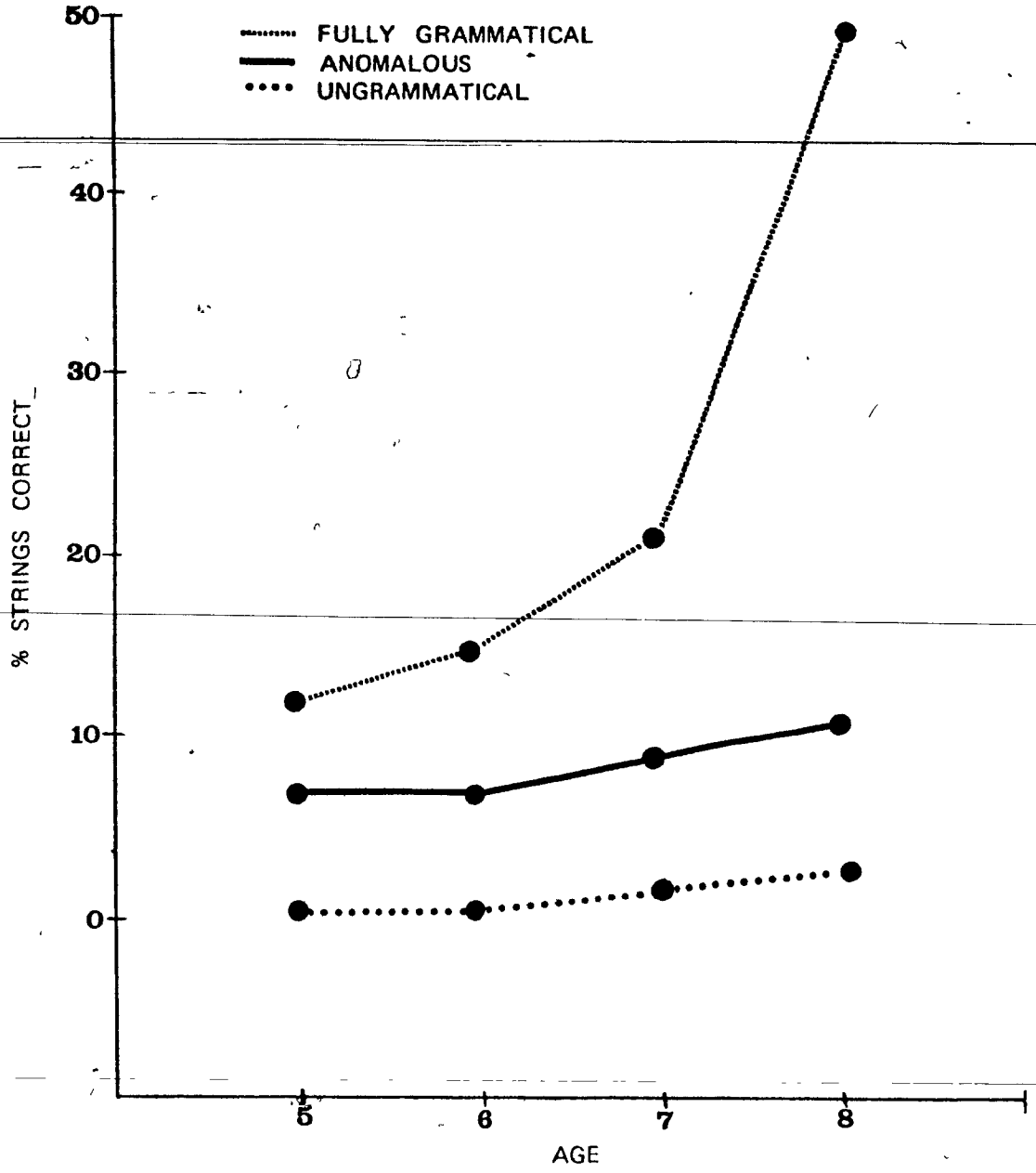

Figure 1: Percentage of strings correctly recalled by children 5, 6, 7 and 8 (reported by McNeill).

at an earlier age than he learns the semantic constraints relating to the lexicon.

The present study was conducted to find out whether second language learners would display a similar pattern of development to that found with children and to determine how the performance of the BEG and ADV groups would differ from that of native speakers.

We first conducted a pretest using sentences from Miller and Isard's study, masked by white noise. We found that second language learners, even those who had a fairly good command of the language, were unable to shadow or even to repeat the stimulus sentences. The difficulty seemed to reside in the Ss' lack of familiarity with the vocabulary items, which was accentuated by the addition of masking noise. We concluded that in order to construct a test suitable for use with our three experimental groups we would have to eliminate the masking noise and construct new sentences from common lexical items likely to be known by our Ss. The task would be for Ss to correctly imitate a series of model sentences. This would allow us to examine the differential ability of our BEG, ADV and NS groups to draw on syntactic and semantic rules in processing the three types of stimuli.

METHOD

The 30 experimental sentences (see Appendix 3) were devised in the following manner. Ten grammatical sentences were constructed from familiar vocabulary items. Ten anomalous sentences were formed by recombining words from the normal sentences in such a way that the syntactic structure was retained but the sentences were semantically deviant. A third set of ten sentences was constructed by permuting the basic vocabulary into random strings of words which as sentences were both syntactically and semantically deviant.

The sentences were arranged in random order and recorded by a male native speaker of English. They were preceded by six practice sentences, two of each type. A 15 second pause was included between each sentence so that it was not necessary to stop the tape recorder. The Ss were instructed to repeat exactly what they heard and their productions were recorded on a second tape recorder. The E had a copy of the sentences and noted deviations from the model. This written transcript helped to resolve ambiguities when the sentences were later transcribed and probably made the transcriptions more accurate.

Method of Analysis

Each S's imitations of the 30 sentences were transcribed. We then listed by group the Ss' imitations of each sentence. This allowed us to look for response patterns within a group for specific sentences and to make comparisons among the groups.

Two-way analyses of variance with repeated measures on one factor were performed on the group scores for word perfect imitation. The independent variables were group membership (BEG, ADV, NS) and sentence type (grammatical, anomalous, random). The dependent variable was the number of word perfect imitations.

RESULTS AND DISCUSSION

The analysis of variance showed a significant main effect for group (F = 80.78; 2,57 df; $p < .01$) with the NS performing better ($\bar{X}$ = 8.28 out of 10) than the ADV ($\bar{X}$ = 4.03) or BEG ($\bar{X}$ = 3.01) groups. In addition, there was a significant main effect for sentence type: (F = 148.62; 2,114 df; $p < .01$). Subjects produced more verbatim repetitions of normal sentences ($\bar{X}$ = 6.38) than they did of anomalous sentences ($\bar{X}$ = 6.16) or random strings ($\bar{X}$ = 2.78). Furthermore, and of particular interest, we found a significant

interaction between group and sentence type ($F = 7.29$; 4,114 df; $p < .01$). The Ss in the three groups were differentially affected by the type of stimulus sentence (see Figure 2). The NS performed similarly and almost perfectly on both normal ($\bar{X} = 9.95$) and anomalous ($\bar{X} = 9.95$) sentences. This suggests that the task did not really tax their information processing capacities when syntax and/or semantic information could be used. However, the absence of syntactic and semantic regularity greatly affected their ability to imitate random strings ($\bar{X} = 4.95$) despite the fact that the latter contained the same lexical items as the two other sets of sentences. The fact that our NS group performed equally well on both grammatical and anomalous sentences, in contrast with Miller and Isard's Ss who performed better on the grammatical than on the anomalous strings is likely attributable to the fact that we were forced to make our task relatively easy so that it would be appropriate for use with all groups.

In examining the performance of the two second language groups, we find only minor differences in their relative ability to process normal vs. anomalous sentences and, like the NS, a generally lower level of performance on random strings. It would seem that both groups of second language learners performed better on the anomalous sentences which

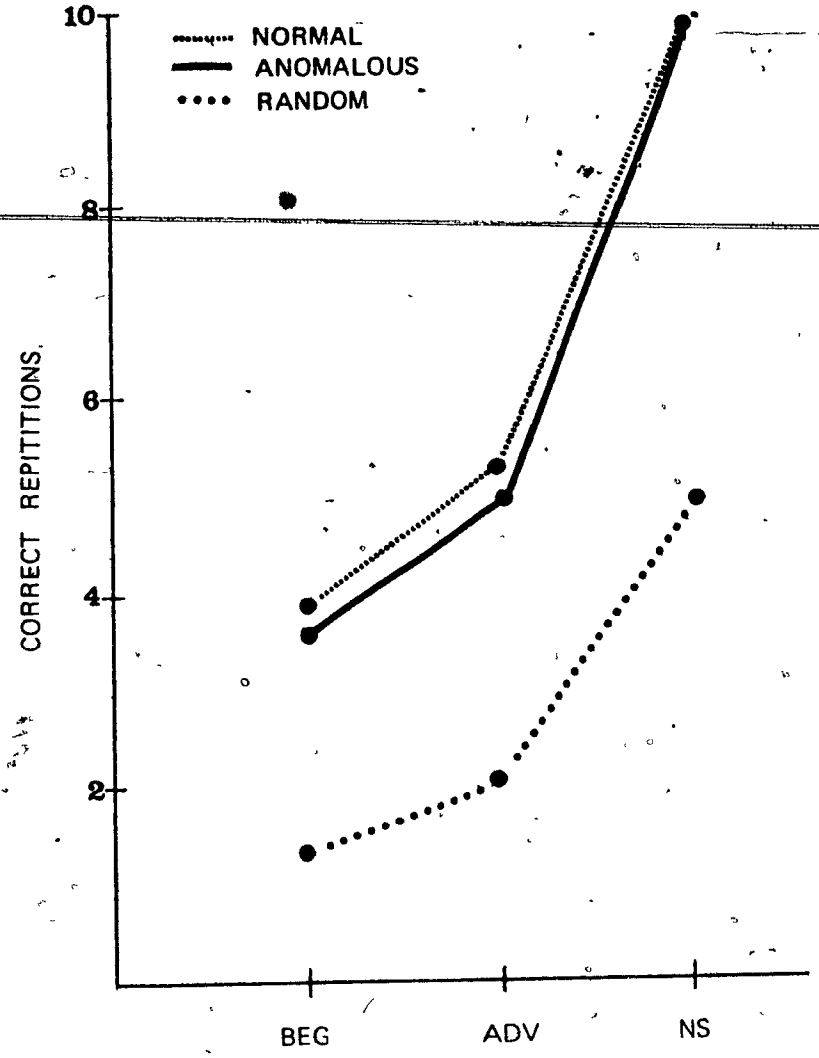

Figure 2: Number of sentences correctly repeated, including morphological errors.

had a recognizable syntactic structure than they did on random strings. However, addition of semantic normality contributed relatively little to their ability to produce word perfect imitations. Their performance can be compared to that of the younger children (five and six year olds in McNeill's study whose performance on fully grammatical sentences as opposed to anomalous ones showed little improvement relative to the older children).

In scoring the sentence-repetition protocols we once again, as in the previous experiment, became aware that a large number of the errors committed by the second language learners were what we have called peripheral morphological errors (e.g., failure to add the plural inflection to nouns; omission of the past tense and third person singular inflections from verbs). Since our main focus in this study was on the effect of syntactic and semantic rules on language processing abilities, we felt that a clearer picture of the Ss' abilities in this area would emerge if we set aside morphological errors which do not actually reflect the Ss' ability to carry out the experimental task. We therefore proceeded to rescore the data disregarding peripheral morphological errors unrelated to the test.

A second two-way analysis of variance with repeated

measures on one factor was performed on the rescored data. Scores for correct repetition of the three types of stimulus sentences including and excluding peripheral morphological errors are shown in Table 2.

Table 2

Correct Repetition of Three Types of Stimulus Sentences

	Peripheral Errors Included			Peripheral Errors Excluded		
	GRAM	ANOM	RANDOM	GRAM	ANOM	RANDOM
BEG	3.95	4.25	1.35	7.50	6.35	3.15
ADV	5.25	4.80	2.05	9.00	8.00	4.00
NS	9.95	9.95	4.95	9.95	9.95	6.80

We once again found a significant main effect for group (F = 27.81; 2,57 df; $p < .01$). The NS repeated more sentences "correctly" ($\bar{X}$ = 8.90) than the ADV ($\bar{X}$ = 7.00) or BEG ($\bar{X}$ = 5.66) groups. The type of sentence was also a significant source of variance (F = 132.36; 2,114 df; $p < .01$): The Ss were more successful in repeating grammatical sentences ($\bar{X}$ = 8.82) than anomalous ($\bar{X}$ = 8.10) or random strings ($\bar{X}$ = 4.65). This time, however, we did not find a significant interaction between group and sentence type. All groups showed only minimal

improvement in repeating normal, in contrast to anomalous, sentences. The performance of the NS on these two sentence types was almost perfect and we can assume that none of these sentences was difficult to handle. However, the fact that the BEG and ADV groups showed similar patterns of performance is more difficult to explain. Clearly the presence of a syntactic structure in the grammatical and anomalous sentences makes these types easier to process than the random strings. But the second language groups did not benefit differentially from the presence of semantic information in the normal sentences. The increment was similar for both groups and we failed to find a big improvement in the ADV group which might parallel the jump in performance between fully grammatical and anomalous sentences found with McNeill's eight-year olds. This suggests that the lag in semantic development in young children which was shown in McNeill's study may have no exact parallel in adult second language acquisition.

There are a number of plausible explanations for this finding. The most obvious one is that the adult second language learner is cognitively fully mature. While his understanding of the second language will continue to grow indefinitely as he learns new words and acquires more subtle sets of distinctions in connotative and denotative meaning,

it is likely that this development will be erratic. In some instances, he will learn a lexical item in the second language for which he already has a well defined conceptual category (e.g., words such as bachelor, highway, book). In other instances, he might learn a word and its primary meaning, but only later will he discover the more subtle extensions or constraints associated with it (e.g., see our discussion of "to answer back" in Study Three). The dynamics of his second language semantic growth will likely be related to the degree of mapping that exists between words in his native language and cognates in the target language. But his semantic development will not be confounded with cognitive growth as it is in the case of the immature child. As a consequence it will likely be less predictable.

Another explanation for the discrepancy between our findings and those of McNeill relates to the stimulus materials themselves. In choosing to eliminate the masking noise from the stimulus tape, we in fact changed the nature of the task from one involving speech perception to simple elicited imitation. The syntactic rules involved in the stimulus sentences posed no problem for the second language learners and could probably be described as rules expressing universal semantic relationships. Had our stimulus sentences involved

more complex and less predictable syntactic structures we might have found a greater distinction in our Ss' performance on the various types of sentences.

In summary, we have tested the ability of our three experimental groups to repeat sets of grammatical, anomalous and random sentences. The performance of our NS group did not conform to the pattern which one would predict from the study by Miller and Isard (1963) since the task was not sufficiently difficult. The performance by the two groups of second language learners did conform to the overall prediction that Ss would perform best in repeating grammatical sentences, less well in repeating anomalous stimuli and worst on random strings. In addition, the performance of the ADV group was better than that of the BEG group on all three sets of sentences. We did not find a developmental pattern to suggest that there is a lag in the second language learner's mastery of semantic rules as opposed to syntactic rules, and thus we did not replicate McNeill's finding with young children. These two aspects of his second language proficiency appear to evolve simultaneously and we propose that it may be inappropriate to look for a predictable pattern of semantic development in adult second language learners.

STUDY THREE

An Investigation of Linguistic Acceptability

Study Three examines the sensitivity of second language learners to linguistic deviance in English sentences. A study by Quirk and Svartvik (1965) stimulated our interest in this line of investigation. The authors tried to tap through direct and indirect means the sensitivity of native speakers to syntactic and semantic deviance. Their Ss were presented with a series of 50 tape recorded sentences, some normal, others differing syntactically or semantically from acceptable English usage. Each stimulus sentence was accompanied by instructions requiring S to carry out a simple grammatical transformation (e.g., make the sentence negative; turn the verb of the sentence into the past tense; turn the sentence into a question). It was predicted that in responding to deviant sentences (e.g., John works there either; They painted blue their door), in addition to carrying out the prescribed transformation Ss would unconsciously restructure the deviant features to conform with their own internalized grammar. Thus, responses to deviant sentences would provide information about the Ss' sensitivity to linguistic acceptability and would reveal their preferential usage. It

should be noted that the Ss in Quirk and Svartvik's experiment were not told what the objective of the test actually was. The operations were introduced to divert the informant's attention in order to tap their intuitive response to deviance. The Ss were allowed to believe that the task was a measure of their ability to carry out the grammatical transformations. In a second phase of the experiment, the Ss were asked to make conscious subjective judgments concerning the acceptability of the sentences. They listened to the stimulus sentences once again and rated each one as normal, marginal or deviant. The experiment thus provided two complementary measures of sensitivity to deviance -- one tapping an unconscious level, the other their conscious awareness.

Although this study represents an interesting and potentially rich source of information regarding the limits of linguistic acceptability, we felt that it would not be an appropriate model for exact replication with non-native speakers. Pilot tests showed it to be excessively long. In addition, some of the marginally deviant sentences which were included by Quirk and Svartvik to investigate sensitivity to regional and social varieties of British English were not suitable for use with Canadian Ss. We therefore simplified the test by eliminating sentences which were not

judged by Quirk and Svartvik's subjects as being clearly normal or deviant. This reduced the length and scope of the test.

In this experiment we examined the sensitivity of our three groups of Ss to linguistic deviance by testing their conscious and unconscious reactions to sets of selected deviant and normal sentences. We compared the performance of the second language learners with that of the native speakers and looked for differences in response patterns across the three groups.

METHOD

Part I. Twenty-two normal sentences and eleven deviant sentences were selected from those devised by Quirk and Svartvik. Each sentence was accompanied by instructions requiring the S to carry out a specific grammatical operation. The test sentences were tape recorded by a male native speaker of English. The instructions were read by a female native speaker. The final stimulus tape consisted of eight practice sentences involving the eight possible grammatical operations (e.g., turn the verb of the sentence into the past tense; make the sentence positive), followed by the 33 test sentences read by the male voice preceded in each case

by instructions to carry out a grammatical operation read by the female voice. A 15 second interval was left after each stimulus sentence for the S's response, so that it was not necessary to stop the tape recorder.

Although Quirk and Svartvik varied the order of presentation of the sentence and instructions (i.e., sometimes the instructions preceded the stimulus sentence and other times they followed the stimulus sentence) we chose not to do so. Our pretests showed that non-native speakers had trouble remembering the sentence while listening to the instructions and that they were more at ease when the instructions were presented first.

The stimulus materials are shown in Appendix 4. It should be noted that the instructions all involved basic grammatical operations which were totally familiar to the Ss and the task was comparable to some of their routine classroom exercises. This latter point was made by several of the Ss.

Before the test was begun, Ss were given written instructions which outlined the grammatical operations to be performed and explained the response procedure. The Ss' responses were recorded on a second tape recorder. The E had a printed copy of the stimulus sentences on which she

noted the Ss' transformations. This facilitated the transcription of the data.

Part II. The stimulus sentences were recorded a second time without the instructions and separated by only a five-second interval. Subjects listened to the sentences and rated the "acceptability" of each on a seven-point rating scale. The following example shows the first stimulus sentence and the rating scale:

They always come here.

completely normal ___:___:___:___:___:___:___ not at all normal

Before the second part of the test was begun, Ss received written instructions explaining the use of the rating scale. Three practice sentences preceded the test sentences.

Analysis of the Data

The Ss' responses were transcribed from the tape recordings and compared with the E's notations. Responses of each group to each sentence were compiled on separate pages so that it was possible to look for common patterns within and across the groups.

The number of exact transformations was calculated by group. An exact transformation was defined as a response

which was the same as the stimulus sentence except for the changes introduced by the grammatical operation. The data for the deviant and normal sentences were analysed separately. Separate two-way analyses of variance with repeated measures on one factor were carried out on the data for exact transformations for the deviant and normal sentences. The independent variables were group membership (BEG, ADV, NS) and stimulus sentence (1, 2 ... 22). The dependent variable was the number of correct transformations. Newman-Keuls tests of multiple comparison were used to test the significance of the differences between the means.

Similar analyses were carried out on the data from the subjective rating scales. The independent variables were again group membership and sentence. The dependent variable was the S's rating for each sentence on the seven-point bipolar rating scale. Once again the data for normal and deviant sentences were analysed separately.

Finally, we arranged the normal (and then the deviant) sentences in order of difficulty for each group of Ss, and compared the rank order among the three groups by performing a series of Spearman Rank Correlations.

RESULTS AND DISCUSSION

Normal Sentences

Correct transformations. The analysis of variance for correct transformations of normal sentences showed a significant main for group (F = 29.06; 2,57 df; $p < .05$). The NS correctly transformed a higher proportion of normal sentences (.71) than did the ADV (.58) or BEG (.39). A Newman-Keuls Test showed that all differences among the means were significant. There was also a significant main effect for sentence (F = 17.31; 21,1197 df; $p < .01$), indicating that Ss in general had differing degrees of success in transforming the various stimulus sentences. In addition, a significant group by sentence interaction was found (F = 4.65; 42,1197 df; $p < .01$) suggesting that the three groups were differentially able to correctly transform the stimulus sentences.

Figure 3 shows the performance of the three groups on the 22 normal sentences. All groups had difficulty with sentence 31 "Neither he nor they know the answer" which had to be changed into a question beginning with the appropriate form of the verb to do. This necessitated changing "neither... nor" to "either...or." It was not successfully transformed by a single member of any group. However, on a sentence such as

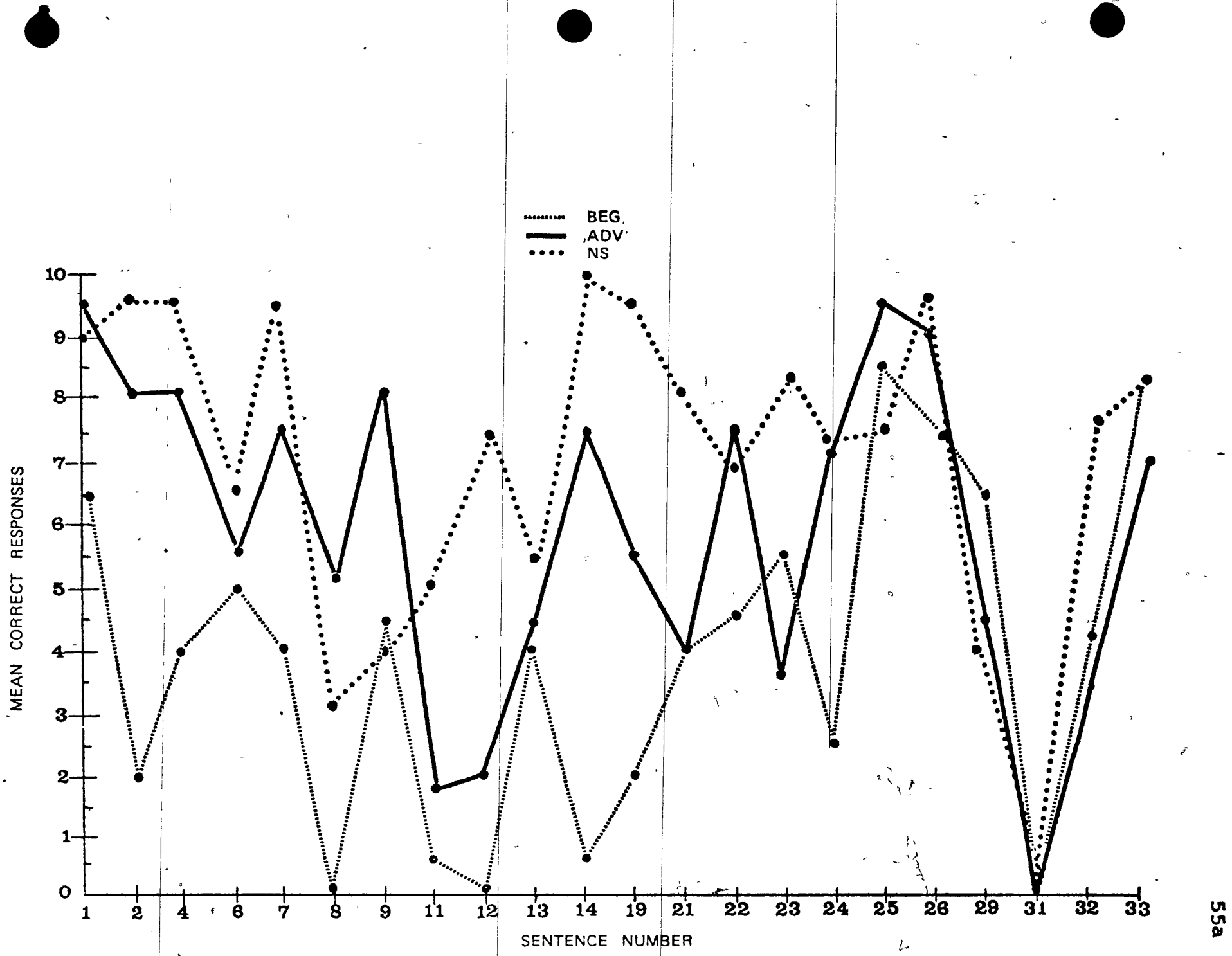

Figure 3: Relationship between group and sentence--Correct transformation of normal sentences.

14 "They own a large factory" (Replace the plural subject pronoun by the appropriate singular subject pronoun), we found a more predictable pattern with the NS performing better (100% correct) than the ADV (75%) or the BEG (50%).

Subjective Ratings. The analysis of variance performed on the Ss' ratings of the acceptability of the normal sentences showed a main effect for sentence ($F = 11.44$; 21,1197 df; $p < .01$); and more importantly a significant interaction between group and sentence ($F = 2.35$; 42,1197 df; $p < .01$). The three groups were differentially sensitive to the correctness, or normality, of the stimulus sentences. The mean group ratings for each of the correct sentences is shown in Figure 4. In general the NS appear to judge sentences as being more correct ($\bar{X} = 1.76$ out of 7) than do the ADV ($\bar{X} = 2.08$) or BEG ($\bar{X} = 2.55$); but these differences were not statistically significant.

We examined the stimulus sentences more closely to see if we could determine what features might have caused the BEG and ADV groups to perceive some sentences as less grammatical than others. The sentence judged to be most deviant by the BEG group was 8 "He dared to answer me back". While this sentence does not seem to be particularly complex from a syntactic standpoint, Ss may not have been familiar with the usage of the verb to answer back. Their reaction was therefore likely

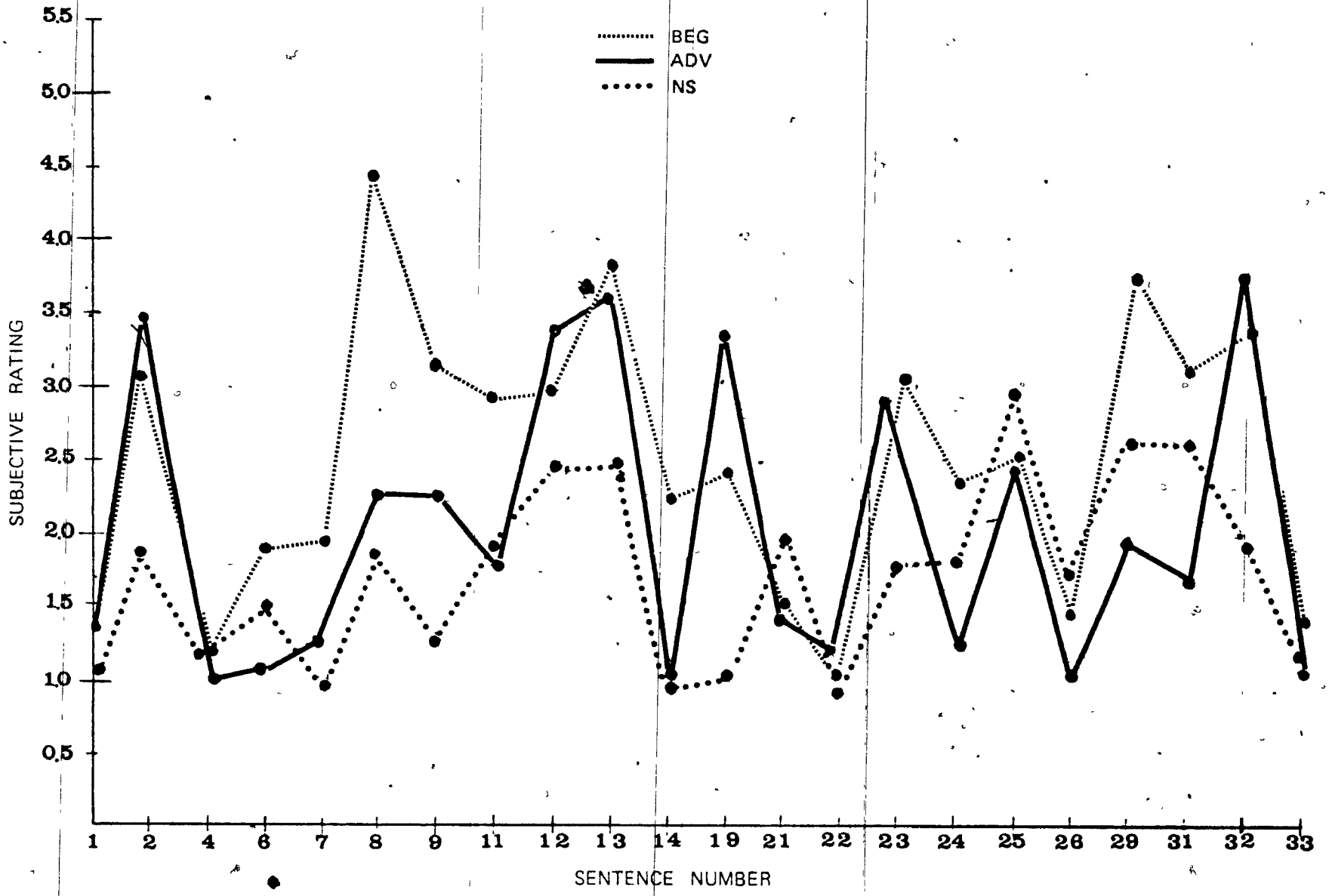

Figure 4: Relationship between group and sentence--Subjective ratings of normal sentences.

caused by their lack of familiarity with that particular semantic feature. Two other sentences (13, "It's the man to whom I spoke," and 29, "It's the girl I spoke to") were judged relatively unacceptable by the BEG. This may have been a reaction to their syntactic complexity (i.e., the use of the impersonal form of the verb to be and the unusual occurrence of the object of the deep structure at the beginning of the sentence).

It seems that the presence of either an unusual syntactic structure or an ambiguous lexical item caused the BEG to judge certain correct sentences as relatively more deviant than others such as "They always come here" which involved familiar lexical items and simple syntax.

Deviant Sentences

Correct transformations. We next looked at the ability of our Ss to transform correctly the 11 sentences which differed from normal English usage. It should be remembered that a "correct" transformation of a deviant sentence would yield a still deviant sentence. The analysis of variance showed a significant main effect for sentence ($F = 15.14$; 10,570 df; $p < .01$); and more importantly, a significant group by sentence interaction ($F = 3.79$; 20,570 df; $p < .01$).

This relationship is shown in Figure 5. It is apparent from Figure 5 that the groups were differentially able to transform the various deviant sentences. The finding is difficult to interpret since the main effect for group was not significant. No group was particularly proficient at this task -- even the NS were successful less than 50% of the time.

Subjective ratings. The analysis of variance on the respondents' subjective ratings of the deviant sentences showed a significant main effect for group ($F = 38.38$; 2,57 df; $p < .05$). The NS rated the sentences as being more deviant ($\bar{X} = 5.09$) than did the ADV ($\bar{X} = 3.78$) or the BEG ($\bar{X} = 2.80$). A Newman-Keuls test performed on the mean scores for the groups showed that all differences were significant.

The main effect for sentence was also significant ($F = 18.57$; 10,570 df; $p < .01$) suggesting that the sentences were viewed as varying in degree of deviance by all Ss. In addition our analysis showed a significant group by sentence interaction ($F = 3.75$; 20,570 df; $p < .01$). The three groups were differentially sensitive to deviance in the various sentences (see Figure 6). It is interesting to note that the BEG seemed completely unable to recognize deviance. They did not rate any of the deviant sentences on the "incorrect" segment of the rating scale (i.e., a rating greater

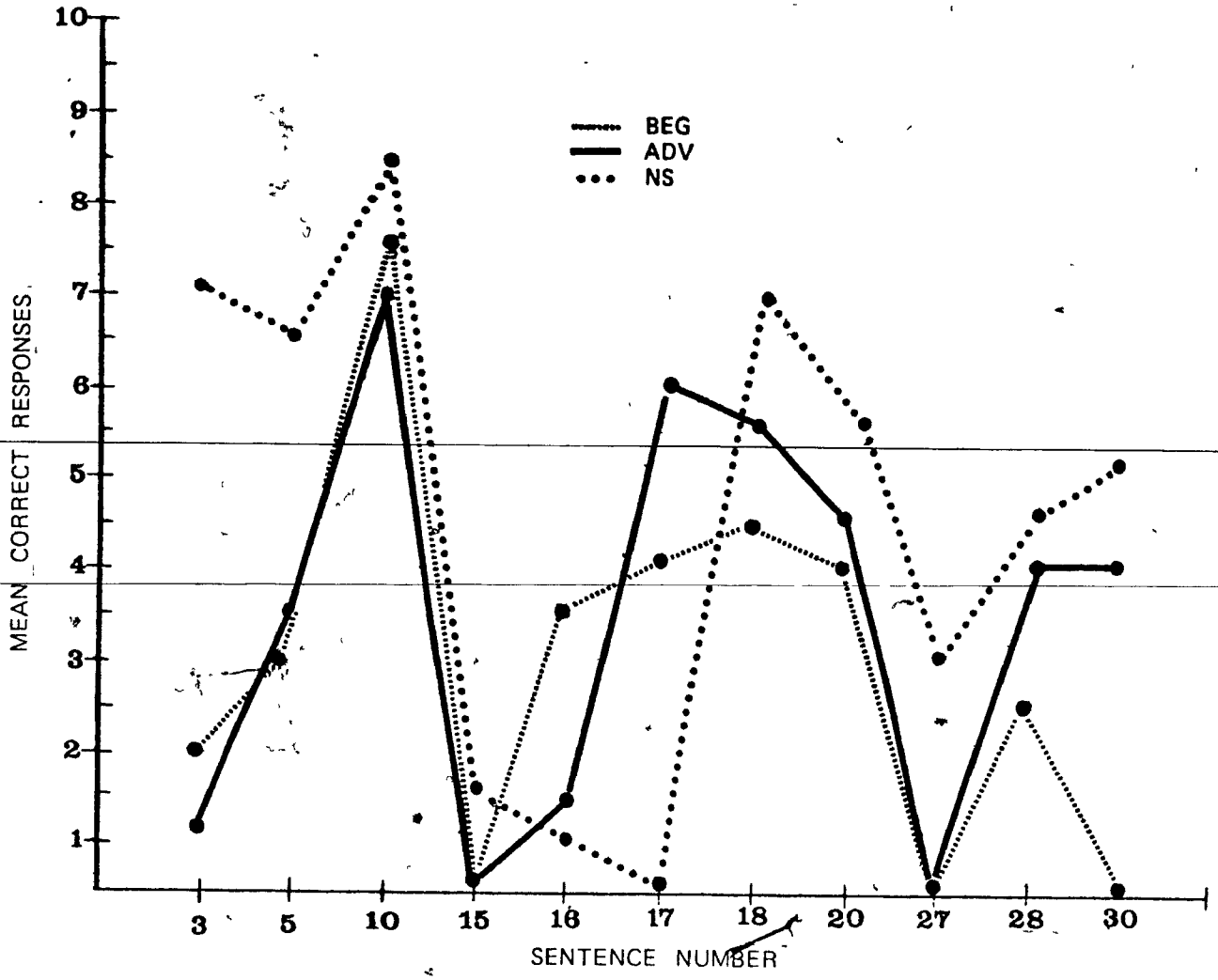

Figure 5: Relationship between group and sentence--correct transformation of deviant sentences.

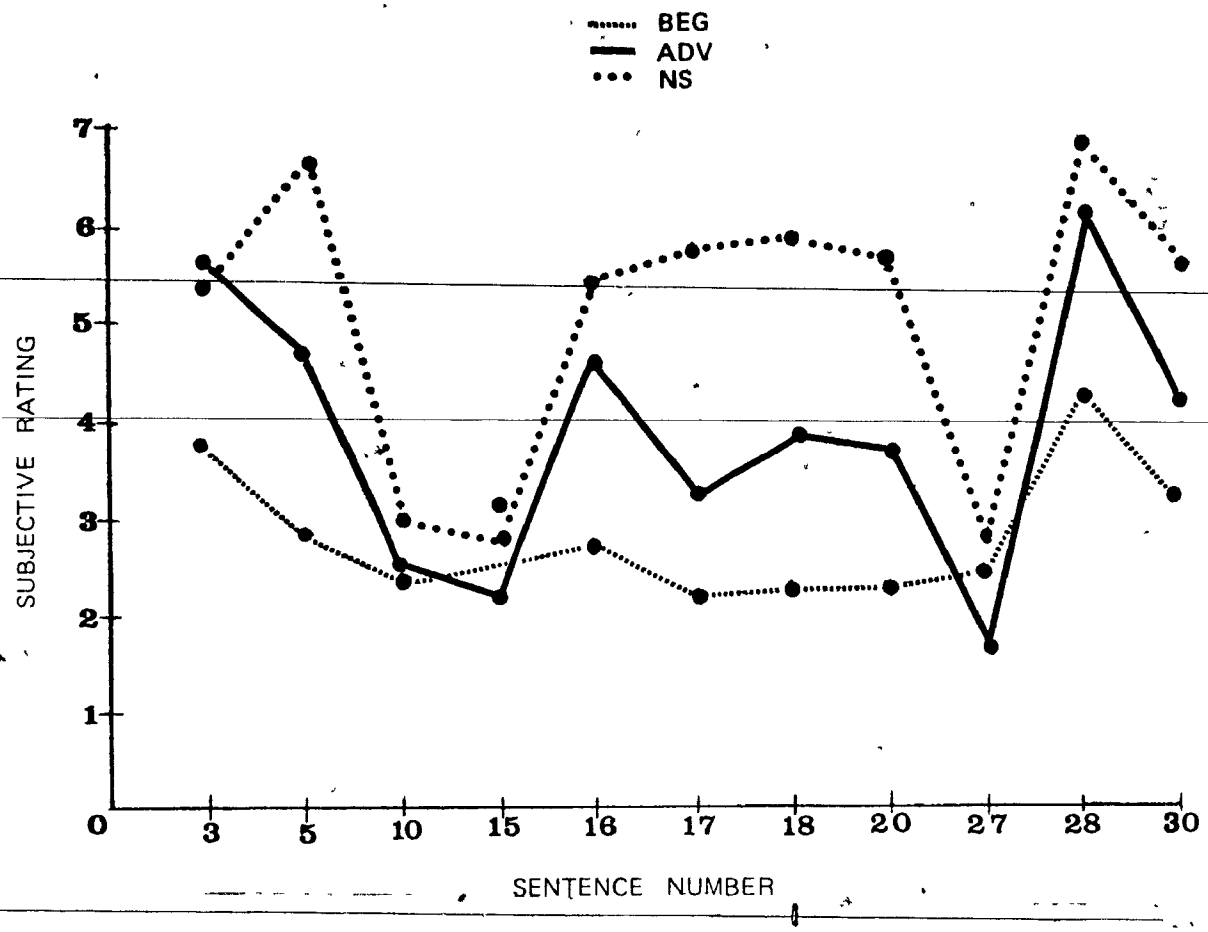

Figure 6: Relationship between group and sentence--Subjective ratings of deviant sentences.

than four). Since their group mean score for subjective ratings of normal sentences was 2.55 vs. 2.80 for the deviant sentences, it appears that they were not able to discriminate between normal and deviant sentences. We see an increasingly greater ability to make these discriminations in the ADV and NS groups. A summary of the mean scores for subjective ratings by the three groups for deviant and normal sentences is shown in Table 3.

TABLE 3

Group Means for Subjective Ratings of Normal and Deviant Sentences

	Normal	Deviant
BEG	2.55	2.80
ADV	2.08	3.79
NS	1.77	5.09

Having found significant main effects for sentence, and significant group by sentence interactions in the four analyses of variance described above, we were prompted to look more closely at the data for the three groups to ascertain whether any common patterns of response could be observed. That is,

we wanted to find out whether the order of difficulty for the various sentences was similar across the groups. We arranged the sentences by order of difficulty for each group. We then performed Spearman rank correlations on the scores for correct transformation of the 11 deviant sentences and of the 22 normal sentences, comparing the groups two by two.

The normal sentences seemed to present a similar pattern of difficulty for the ADV and NS groups (ρ = .60; N = 22, $p < .01$). There was a significant although lesser relationship between the performance of the BEG and ADV groups (ρ = .49; N = 22, $p < .05$) but there was no significant relationship between the BEG and NS (ρ = .14). This suggests that the BEG may be performing poorly on all sentences, whereas the ADV group shows a sensitivity to the characteristics of the various stimulus sentences which more closely approximates that of the NS.

The reactions to the deviant sentences were interesting. The BEG and ADV groups performed similarly (ρ = .83; N = 11, $p < .01$). None of the other comparisons reached significance. We can perhaps find some explanation for these results by looking back at the sensitivity of the three groups to deviance as measured by their mean ratings and by their ability to perform correct transformations. In the subjective

ratings, only the NS group had a mean score toward the incorrect segment of the rating scale ($\bar{X}$ = 5.09) indicating that this group alone was sensitive to deviance. The NS' relatively poor performance in transforming deviant sentences (45% correct) as opposed to normal sentences (71% correct) may be attributable to the fact that they did unconsciously restructure certain of these sentences and in doing so produced incorrect transformations. It should be recalled here that a transformed sentence was scored as correct only if it was identical to the stimulus sentence in all respects other than the transformation itself.

Since the other groups were relatively less sensitive or even insensitive to deviance they did not perform in the same manner.

We decided to substantiate this hypothesis by examining the actual response patterns of the experimental groups to the deviant sentences. We first calculated the total percentage of attempts made by Ss in each group to correct the deviant feature of the 11 target sentences when carrying out the transformations. The BEG group restructured 10% of the deviant sentences; the ADV restructured 23%; and the NS, 33%. In looking at the responses, we found considerable variation from sentence to sentence. Three sentences in particular

showed strong evidence of restructuring. The data for these sentences are shown below.

	Percentage of subjects who restructured deviant sentences		
	BEG	ADV	NS
They painted blue their door.	15%	80%	80%
He sits always there.	5%	25%	95%
They don't want some cake.	10%	25%	40%

The frequency of restructuring found in the NS group, and to a lesser extent in the ADV group indicates their greater awareness of deviance and their unconscious attempts to compensate for it. The relatively poor performance of the BEG group in carrying out the grammatical operation was probably the result of their low proficiency in the target language, rather than of any systematic attempt on their part to compensate for deviance by restructuring.

In summary, we examined the ability of our three experimental groups to perform grammatical operations on normal and deviant sentences. We found that the groups differed significantly in their ability to transform normal sentences, with the NS performing better than the ADV or BEG. In transforming deviant sentences the differences among the groups were not significant, although a trend similar to that found with

normal sentences was evident. The groups responded differentially to the various stimulus sentences in both the normal and deviant sets.

We tapped our Ss' conscious awareness of deviance by having them judge the grammaticality of the stimulus sentences using subjective rating scales. In rating normal sentences, the groups did not differ significantly; but we found a trend of increasing sensitivity to grammatical acceptability over the three groups (NS > ADV > BEG). The BEG group seemed to perceive sentences involving syntactic complexity or unusual syntactic structures as more deviant than ones involving habitual grammatical patterns. In rating the deviant sentences, the three groups were differentially sensitive to deviance. The NS showed greater sensitivity to deviance than did the ADV. The BEG seemed unable to recognize deviance, and they did not discriminate between normal and deviant sentences in their ratings. We found interesting and clear cut evidence of unconscious attempts on the part of the NS and, to a lesser extent, the ADV Ss to compensate for deviance by restructuring the deviant sentences when carrying out the transformations.

STUDY FOUR

Acquisition of Selected Linguistic Structures

In a study of the acquisition of syntax in children between the ages of five and ten, Carol Chomsky (1969) investigated the developmental pattern of a set of complex linguistic structures which appeared to be likely candidates for late acquisition. She described the structures involved as ones which deviate from a widely established pattern in English or ones whose surface structure is relatively inexplicit with respect to the grammatical relationships. She found five specific structures that were acquired in a regular sequence by the children in her study. Although a wide range of individual differences among the children was apparent in the rate of acquisition, the stability of the order of acquisition was striking and a developmental sequence of linguistic stages could be defined.

In our search for regularities in second language learning, we became interested in the idea that we might be able to trace a similar well defined sequence of development for a specific set of linguistic structures in our cognitively mature, adult, second language learners. We believed that some of the structures identified by Chomsky might be interesting ones to work with since they involved relatively subtle

aspects of linguistic complexity. Furthermore, the fact that their developmental sequence seemed constant in older children, despite the inevitable individual variation in experience, intelligence and schooling suggested that their study might provide important information about the role of linguistic complexity in second language acquisition.

For the present study, we focused on the five constructions described by Chomsky and adapted her methodology for our investigation of adult second language learners.

Test Materials

Part I. We devised a set of sentences to test our Ss' ability to discriminate between sentences such as: a) "John is eager to see," and b) "John is easy to see." These two sentences have a similar surface structure; but the underlying relationships between the words are different. In sentence (a) John is the subject of eager and also the implicit subject of the complement verb see. This basic relationship is expressed by normal subject-verb word order. In sentence (b) the word order is misleading. John is actually the implicit object of the complement verb see. The implicit subject of the second verb is elliptic in the surface structure of (b) and the listener must understand

that it is "someone else." According to Chomsky (1969), the child who has not yet learned the difference between these superficially similar sentences incorrectly processes sentences such as (b) to mean "it is easy for John to see" rather than "it is easy for someone to see John."

Our test comprised five type (a) sentences and five type (b) sentences arranged in random order. We used simple vocabulary in constructing the sentences. We informed our Ss that E would be willing to translate individual words, if necessary, but not sentences. The E read each sentence aloud, then asked a simple question probing the S's comprehension of the meaning of the sentence. The stimulus sentences and the questions are presented in Appendix 5.

Part II. In this section we focused on the syntactic construction associated with the verb "to promise." The sentences: c) "Don allowed Fred to stay" and d) "Don promised Fred to stay" have similar surface structures; but the underlying syntactic relationships differ. In (c) as in a large number of sentences involving verbs such as tell, persuade, want, order or advise, the implicit subject of the complement verb is the noun immediately preceding it. This syntactic rule is known as the minimal distance principle. In (c) Fred is the subject of stay. The verb promise is an exception to

this broad general rule because in this case, the subject of the complement verb is not the immediately preceding noun but rather is the subject of the main verb: Don is the subject of promised and of the complement verb stay. In order to comprehend sentence (d) correctly, the learner must know that the general rule is no longer applicable and that he must now use a specific rule for the verb promise.

To test our Ss' ability to distinguish the underlying syntactic structure associated with promise from the general pattern for other verbs sharing a similar surface structure, we constructed three test sentences using the verb promise which we intermingled with seven control sentences involving verbs which follow the general syntactic rule. We added two additional ambiguous sentences which could be processed according to the general syntactic rule of sentence (c) or according to the specific rule for sentence (d). The twelve stimulus sentences are shown in Appendix 6.

Each sentence was read aloud by the E and was followed by a simple question to test the S's comprehension of the underlying meaning. Again Es volunteered to translate any isolated words if necessary, but not whole sentences.

Part III. In this section we again examined our Ss' understanding of a particular syntactic structure which

violates a broad structural rule of English. We focused on the contrast between ask and tell in sentences such as the following: e) "The girl asks the boy what to paint;" and f) "The girl tells the boy what to paint." In (e) the implicit subject of paint is the girl. Sentence (f) follows the general rule for this type of sentence in English: the implicit subject of paint is the boy. Chomsky found that some children who had not yet learned that the verb ask is an exception to the general rule interpreted sentence (e) according to the general rule for (f) and gave it the meaning "the girl asks the boy what he is painting." Others appeared to use ask and tell in free variation with the meaning for tell being assigned to both. We were interested in finding out whether our second language learners had acquired the general syntactic rule underlying sentences such as (f) and whether any developmental pattern might reveal itself in their acquisition of the specific rule associated with the verb ask in sentences such as (e).

We adopted Chomsky's experimental strategy of showing Ss sets of pictures illustrating the two possible interpretations of each of six target sentences. One picture illustrated the correct interpretation; and the other one, the incorrect interpretation. The S was shown both pictures

simultaneously and the E asked "Which picture shows the girl asking the boy what to paint?" Three sets of contrasting sentences, pictures and questions were used, so that each sentence occurred once with the verb ask and once with tell. Two inverse orders of presentation were constructed to minimize the effect of order on Ss' responses. One half of each group received Order 1 and one half received Order 2. The test sentences and illustrations are shown in Appendix 7.

Part IV. Here we studied constructions involving and and although which were the ones acquired last in the developmental sequence described by Chomsky. We worked with sentences such as the following: g) "Mother scolded Gloria for answering the phone, and I would have done the same;" and h) "Mother scolded Gloria for answering the phone, although I would have done the same."

In both of these sentences, the listener must understand what it is that the speaker would actually have done. There are two possibilities: "I would have done the same" might mean "scolded Gloria" or it might mean "answered the phone." In (g) the conjunction and serves as a coordinator and "I would have done the same" refers to the first verb in the sentence. In (h) where the second clause is introduced by although, a subordinator, "I would have done the same" refers

to the second verb.

Six experimental sentences were devised, three with and and three with although. The test sentences are shown in Appendix 8. We used two orders of presentation so that the sentences which involved and in Order 1 appeared with although in Order 2. The reverse was done with the although sentences. In this way we tried to minimize the effect of context on Ss' responses.

Sentences were read aloud by the E followed by the question "What was it that the speaker would have done?" Half of the Ss in each group received Order 1 and half received Order 2.

METHOD

The complete battery of tests was administered to all members of the three experimental groups. We included the NS as a check on the validity of the tests. For each test, the E read the stimulus sentences followed by the questions. A sentence was repeated if necessary. There was no time limit set for answering. All Ss were told they could ask for translations of isolated vocabulary items if necessary, but that the whole sentence would not be translated. In fact, very few such requests were made.

The Es recorded Ss' responses on stencilled answer sheets.

Analysis of the Data

The Ss' responses were scored as correct or incorrect. Group scores were tabulated and expressed as proportions of errors. No formal statistical analyses were performed on the data.

RESULTS AND DISCUSSION

Table 4 shows the proportion of error for the three groups on the four subtests. The results of each test will be discussed separately.

Part I. Subjects in all three groups were able to process correctly the five control sentences (items 1,2,4,7,9 in Appendix 5) which reflect the broad syntactic rule that the subject of the first verb is also the implicit subject of the second verb. However, the BEG made a relatively high proportion of errors ($\bar{X}$ = .73) in processing the target sentences (items 3,5,6,8, and 10). Clearly they did not perceive the difference in deep structure between sentences such as "Ann is fun to visit" and "Mary is anxious to go." They applied the general rule in nearly all instances. This strategy is one typically found with child native language learners and has been described by Slobin (1973) as one of the operating principles in the acquisition of syntax.

TABLE 4

Proportions of Error for the Five Test Structures

	PART I	PART II	PART III	PART IV	
	easy to see fun to visit hard to understand	promise	ask	and	although
BEG	.73	.25	.50	.55	.47
ADV.	.14	.04	.13	.08	.78
NS	.01	.07	.08	.11	.66

Proportions of error for the two types of sentences are shown in Table 5.

TABLE 5

Proportions of Error for Target and Control Sentences in Part I

	Target Sentences (1,2,4,7,9)	Control Sentences (3,5,6,8,10)
BEG	.73	.01
ADV	.14	.02
NS	0	0

This structure clearly presents problems for the BEG, but it appears to have been almost mastered by the ADV group. The proportion of error in this group is relatively low ($\bar{X}$ = .14) and the errors do not seem to be concentrated on any specific items.

This specific grammatical contrast was of particular interest to us in working with second language learners. We realized when we considered the French translations of the target sentences that the underlying differences in these grammatical relationships are revealed in the surface structure of the equivalent French sentence by the choice of preposition.

In sentences where the general rule applies--that the subject of the first verb is also the implicit subject of the complement verb--we find that the complement verb in French is preceded by the preposition de (e.g., John est triste de partir). In sentences where the listener must understand that "someone else" is the subject of the complement verb, the latter is preceded by the preposition à (e.g., Le président est difficile à voir). This finding that the surface structure of the French sentences makes explicit the grammatical relationships in the deep structure whereas the surface structure of the English sentences does not is of interest. It suggests that the specific structures which we are studying in this subtest would not necessarily be candidates for late acquisition by French children, since their surface structures are not ambiguous. It is the fact that the English surface structures are relatively inexplicit that lead Chomsky to include them in her study. Unfortunately we do not have data on native language acquisition in French children which would allow us to examine this more closely.

We were interested to note that our Ss did not revert to the syntactic structure of their native language as a strategy to aid in comprehension. Furthermore, these results suggest that second language learners tend to process the linguistic

data of the target language independent of the syntax of their native language. They appear to draw upon their own incipient rule system for English, a finding which lends credence to the hypothesis that second language learning involves a creative construction process at least with respect to the development of comprehension.

Part II. Table 6 shows the proportion of error for the three groups for the target sentences involving the verb promise (items 3,5, and 9) and the control sentences (items 2,4,6,8,10 and 11).

TABLE 6

Proportions of Error for Target and Control Sentences in Part II

	Target Sentences (3,5,9)	Control Sentences (2,4,6,8,10,11)
BEG	.25	.19
ADV	.04	.05
NS	.07	.01

The pattern of errors for the BEG group indicates that they did not distinguish between target and control sentences. They still have not mastered the minimal distance principle

and they are generally responding to sentences in an erratic way. An examination of the individual scores for members of the BEG group revealed no systematic pattern of responses. The surface structure of the French translations of these sentences is similar and affords no clue to the differing deep structures.

The error scores for the ADV and NS groups were minimal and probably reflect lapses of attention on the part of the Ss rather than a misunderstanding of the test structures.

The responses to the two ambiguous sentences (items 1 and 12) are interesting. These results are presented in Table 7. For sentence 12 "The teacher asked the child to leave the room," we found a similar pattern of response in all groups. The tendency to choose child as the subject of the complement verb is consistent with the minimal distance principal and with the most likely semantic interpretation. All Ss, even the BEG who have not yet mastered the general syntactic rule for such sentences, were apparently led to interpret the sentence similarly by the strength of the semantic information which it contains: teachers are, in fact, much more likely to ask children to leave the room than the converse.

TABLE 7

Proportions of "Child" Responses and "Teacher" Responses to Sentences 1 and 12

	Sentence 1		Sentence 12	
	Child	Teacher	Child	Teacher
BEG	.80	.20	.90	.10
ADV	.65	.35	1.00	–
NS	.45	.55	1.00	–

In responding to sentence 1 "The child asked the teacher to leave the room", Ss in the three groups appear to have reacted differentially. For the BEG, semantic information was again powerful, even when it suggests an interpretation which is at variance with that based on the syntactic form of the surface structure. If our BEG Ss had applied the minimal distance principle they would have chosen teacher as the subject of the complement verb. The semantic information seemed to be overwhelming, even when it was competing with a broad syntactic rule. These findings seem to support Macnamara's (1973) contention that second language learners, like young children, probably use meaning as a clue to language, rather than language as a clue to meaning. He speculated that they guess at the probable meaning that the speaker is trying

to convey and attempt to map this onto the linguistic structures of the language. The content of the sentences is more salient than the form.

In the responses of the ADV group, we found growing awareness of the potential conflict between the most likely semantic interpretation of the sentence (that it was the child who should leave the room) and that suggested by its syntactic form (that the teacher should leave the room). Responses influenced by meaning rather than syntactic form predominated in the ADV group (.65 vs .35). The NS were almost equally divided (.45 vs .55) showing that both semantic and syntactic constraints exerted a strong pull on the Ss' interpretation of the sentence.

Part III. In this section we were again dealing with the ability of our Ss to process sentences which violated the minimal distance principle. The Ss' responses to the target items (sentences using ask) and to the control items (sentences using tell) are shown in Table 8.

The performance of the ADV and NS groups was essentially similar. Both appear to apply the minimal distance principle but recognize that ask and tell questions, despite their similarity in surface structure, are derived from two different deep structures involving a different set of

underlying relationships.

TABLE 8

Proportions of Errors for Target ("ask") and Control ("tell") Sentences in Part III

	ask	tell
BEG	.50	.17
ADV	.13	.13
NS	.08	.13

The BEG group performed similarly to the two other groups when dealing with tell sentences which follow the broad syntactic rule. However, they differed from the other groups in their handling of the ask sentences which violated the minimal distance principle. Their high proportion of error ($\bar{X}$ = .50) on these sentences suggests that their responses may be random. They appear to have not yet learned that ask sentences constitute exceptions to the general rule. Furthermore, unlike the ambiguous sentences which we used in Part II of our test, semantic information does not in this case suggest one interpretation rather than the other. Here, Ss must rely totally on syntax which led the BEG to respond incorrectly. One can only propose tentative explanations for the performance of the BEG on this portion of the test

since we cannot know for certain whether their error rate (50%) should most accurately be described as random performance, or as an incipient knowledge of the correct syntactic rule.

Part IV. Table 4 shows the proportion of error for the three groups on the sentences using and and the sentences using although. The scores for the BEG group indicated that these Ss processed and and although similarly. They appeared not to know the function of these words in the stimulus sentences. The ADV and NS groups demonstrated their understanding of constructions using and. However, they frequently seemed to interpret although as having the same grammatical function as and, and failed to realize that the deep structures differed although the two surface structures were similar. The fact that both the ADV group and the NS group made an even higher proportion of errors than the BEG probably indicates that the two words are used synonymously as coordinators in the dialect of English spoken by these groups.

We were curious about the high frequency of error among the NS and actually questioned some Ss in depth about their understanding of the although structure. A number of respondents (including some who were university educated) insisted that they had never come across this interpretation of although.

Conversely, other Ss were quite familiar with it. In French there are two subordinating conjunctions (quoique and bien que) which are roughly equivalent to although. However, judging from performances on other subtests, it seems unlikely that this knowledge contributed significantly to our BEG Ss' relatively lower error rate. One might predict from the pattern of results that as our BEG acquire greater knowledge of the target language, their error scores on this test would actually increase.

SUMMARY

We have studied the sequence of acquisition by our adult second language learners of a set of complex linguistic structures which are acquired by most native speakers of English between the ages of 5 and 10 in a stable, predictable sequence. We have found a similar developmental pattern for the acquisition of these structures in our second language learners. An analogy can be drawn between the performance of our BEG and the youngest children in Chomsky's group. Our ADV Ss performed similarly to the NS on the less difficult items and mid-way between the two groups on some of the more difficult items. Our data, shown in Table 4 can be compared with those reported by Chomsky summarized in Table 9.

TABLE 9

Developmental Stages in Children's Acquisition of Five Test Structures Reported by Chomsky

		easy to see	promise	ask	and	although
STAGE 1:	age 5.9-7.1 n = 4	-	-	-	-	-
STAGE 2:	age 5.9-9.5 n = 9	+	-	-	-	-
STAGE 3:	age 6.1-9.9 n = 12	+	+	-	-	-
STAGE 4:	age 7.2-10. n = 7	+	+	+	+	-
STAGE 5:	age 7.6-9.9 n = 4	+	+	+	+	+

\+ Success

\- Failure

Some interesting language learning strategies came to light in the course of this study. Second language learners, even those in the BEG group, deal directly with the linguistic data of the target language using their incipient knowledge of the syntactic and semantic information of this code. They appeared to draw on semantic information whenever possible to resolve ambiguity and to provide clues to certain underlying relationships in the target language when these are inexplicit in the surface structure. We found no indication whatsoever that our Ss referred to their native language in attempting to comprehend the test materials, even when this strategy might have provided important clues and short cuts to the correct responses.

STUDY FIVE

Integrating Syntactic and Semantic Information Under Conditions of Reduced Redundancy

In the present study we used the "cloze" technique to investigate the ability of our experimental and control groups to integrate syntactic and semantic information when processing a text in which the normal redundancy of the language was considerably reduced. The "cloze" procedure, devised by Taylor (1953) was originally used to study the readability of written materials. It involves the systematic deletion of every nth word in a prose passage. Subjects are asked to fill in the blanks with the words from the original passage. Their ability to do so provides an index of the level of difficulty of the text.

In subsequent studies (e.g., Oléron, 1960; Fillenbaum, Jones & Rapoport, 1963), interest centered on how well Ss were able to perform when the rate of deletion was varied systematically (e.g., when every 2nd or every 5th or every 10th word was deleted). In addition, researchers studied the relationship between the grammatical category of the deleted word and Ss' success in providing correct completions. They hoped to find out which types of words (e.g., functors vs.

content words) were more difficult to retrieve.

More recently, Es have begun to use the "cloze" technique to study the second language proficiency of non-native speakers (Oller, 1973). Stubbs and Tucker (1974) found that the results obtained with the "cloze" correlated positively with those from other discrete-point measures of the various skills involved in second language proficiency. It was found to be both a convenient and a sound test of second language abilities.

According to Spolsky (1968), one of the many merits of the "cloze" technique, in comparison with other diagnostic measures of second language ability, is the fact that it seems to be independent of any specific set of teaching materials and can be used to tap both knowledge and integration of underlying linguistic rules, rather than other more superficial aspects of performance. He noted that non-native speakers, even those who are relatively competent in a second language and who might score comparably to native speakers on certain objective measures of their proficiency in vocabulary or grammar, do not perform so well as the latter on reduced redundancy tests such as the "cloze." He attributed this to the fact that the non-native speaker generally possesses a relatively less rich knowledge of the semantic and lexical probabilities of the second language upon which he can draw. The "cloze"

technique appears to be a powerful predictor of the extent of this knowledge.

This was confirmed in a study by d'Anglejan and Tucker (1973) who used the "cloze" procedure to measure the efficiency of cross-cultural communication between groups of highly skilled professional translators and monolingual speakers of French and English. They found that the translators who were French native speakers performed significantly better on the French versions of the "cloze" than they did on the English versions. The converse was true for the English translators. These findings heightened our interest in the potential of the "cloze" technique as a sensitive measure of the English language competence of Ss such as ours whose backgrounds, experiences and training have been quite varied.

In the present study, we compared the overall ability of the BEG, ADV and NS groups to correctly fill in the blanks in a "cloze" passage. In addition, we looked at the proportion of items correctly completed for each of the deleted words and attempted to establish a hierarchy of difficulty for the various grammatical categories represented. We were interested in discovering whether this hierarchy might prove to be a rather general one which would emerge from responses to any "cloze" passage, or whether it might vary according to the passage,

as well as to the degree of competence and the language background of the Ss involved. We therefore compared some of our findings with those of Stubbs and Tucker (1974) and with those of Fillenbaum, Jones and Rapoport (1963).

We then examined the relationship between form class predictability and verbatim predictability for the various grammatical categories to test the findings reported by Fillenbaum et al. They found that Ss were able to produce replacements of the appropriate grammatical category equally well for blanks representing "semantic" categories (e.g., nouns, verbs, adjectives) and for those replacing "syntactic" categories (e.g., functors such as articles, prepositions and conjunctions). However, their Ss were less able to produce correct verbatim responses for semantic than for syntactic categories. These results may reflect general principles of information processing in that the choice of alternatives for syntactic type words is generally much narrower and more context-bound than it is for semantic type words. The range of alternatives for the latter is much greater, and they are subject to fewer, or less powerful contextual constraints.

METHOD

The prose passage selected for our study was that used

by Stubbs and Tucker (1974). It contained a total of 294 words and was taken from the English Studies Series (Vol. 2, Selection 26, p. 147) by M. J. Clarke. The text is presented in Appendix 9. A few sentences were left intact at the beginning and at the end of the passage to provide context for the reader. Every fifth word was deleted for a total of 50 blanks. The length of each blank was uniform thoughout the entire passage so that no clue whatsoever to the missing word would be provided.

Each S was given a copy of the test and a set of instructions. A time limit of 30 minutes was set.

Analysis of the Data

The tests were first scored for verbatim replacement. A response was scored as correct only if it was identical to the deleted word. Spelling mistakes were tolerated but morphological errors of number tense or person were scored as incorrect. Closures of more than one word were automatically discounted. Since Stubbs and Tucker have reported a significant positive correlation (r = .97) between scores for exact replacement and those for contextually appropriate replacement, we chose the former criterion which has the advantage of being more objective and expedient.

A one-way analysis of variance was performed on the data.

The independent variable was group (BEG, ADV, NS). The score for verbatim replacements served as the dependent variable.

Secondly, the number of errors was tabulated for each of the principal grammatical categories represented by the deleted words. The proportion of error for each grammatical category was calculated for the three groups. A series of Spearman rank correlations was performed to compare the relative order of difficulty of the grammatical categories for each of the three groups and for the group of non-native speakers described by Stubbs and Tucker.

We next calculated scores for correct form class replacement. Responses were scored as correct when they were of the same grammatical category as the deleted word (i.e., a verbatim response was not required). This provided an index of our Ss' sensitivity to contextual restrictions. We then related these correct form class scores to the Ss' verbatim scores to obtain an index of the probability that Ss would provide a verbatim response to an item given that its form class had been correctly identified (V/FC).

RESULTS AND DISCUSSION

Verbatim Replacements. The analysis of variance performed on the data for verbatim replacements showed significant variation among the groups ($F = 147.62$; 2,29 df; $p < .01$). The NS produced a higher number of exact replacements ($\bar{X} = 32.05$ out of 50) than did the ADV ($\bar{X} = 22.45$) or the BEG ($\bar{X} = 9.10$). Although a Newman-Keuls Test revealed significant differences among all groups it is interesting to note that the performance of the ADV group was more similar to that of the NS than to that of the BEG.

Error Analysis. We next carried out an analysis of the errors made by each group. Errors were classified according to the grammatical category of the deleted word and the categories were ranked for each group by order of difficulty. The rank order of difficulty of the nine grammatical categories for the three groups is shown in Table 10.

A series of Spearman rank correlations was carried out to make paired comparisons of the rank orderings of the three groups. We found a significant positive correlation between the BEG and ADV groups ($\rho = .67$; $N = 9$, $p < .01$) and an even higher correlation between the performance of the ADV and NS groups ($\rho = .93$; $N = 9$, $p < .01$). The correlation between the performances of the BEG and NS groups was not significant.

Table 10

Proportion of Error According to the Principal Grammatical Categories Represented by the Deleted Words[1]

	BEG		ADV		NS	
1.	1.00	Indefinite Pronouns (3)	.95	Indefinite Pronouns (3)	.85	Coordinating Conjunctions (3)
2.	.89	Nouns (4)	.78	Coordinating Conjunctions (3)	.82	Indefinite Pronouns (5)
3.	.88	Prepositions (5)	.70	Nouns (4)	.45	Nouns (4)
4.	.87	Coordinating Conjunctions (3)	.68	Main Verbs (8)	.40	Auxiliaries (6)
5.	.87	Main Verbs (8)	.52	Auxiliaries (6)	.40	Main Verbs (8)
6.	.85	Adverbs (3)	.47	Adverbs (3)	.35	Indefinite Relatives (1)
7.	.85	Indefinite Relatives (1)	.40	Indefinite Relatives (1)	.28	Adverbs (3)
8.	.78	Auxiliaries (6)	.37	Prepositions (5)	.27	Personal Pronouns (10)
9.	.70	Personal Pronouns (10)	.37	Personal Pronouns (10)	.15	Prepositions (5)

[1] The number of exemplars of each grammatical category is shown in parenthesis.

This pattern of correlations seemed once more to suggest that the ADV group was reacting to the experimental task in a manner qualitatively similar to the NS. The responses of the two groups revealed a similar (although not identical) hierarchy of difficulty for the nine grammatical categories represented by the deleted words. However, the performance of the ADV group remained inferior to that of the NS in terms of verbatim replacement scores. As for the BEG, their pattern of responses seemed to be idiosyncratic and to differ both qualitatively and quantitatively from that of the NS.

We were curious whether the similarity in the performances of our ADV and NS groups might reflect their sensitivity to a hierarchy of difficulty inherent in this particular test, or might bring to light some general principles of information processing which operate under conditions of reduced redundancy (Spolsky, 1968). We therefore compared the performance of these Ss whose native language is French, with that of the group tested by Stubbs (1973) which comprised native speakers of Arabic, Amharic, Armenian and Turkish. We again performed a series of Spearman rank correlations on the orderings of difficulty for seven grammatical categories (we collapsed some of the data for the original subcategories) comparing our three groups with Stubbs' Ss. None of the correlations

reached significance. Since all Ss were tested on the same prose passage and since background information on Stubbs' Ss indicated that their level of English was such that many were about to embark on a programme of university studies in that language, it is surprising that their performance showed so little similarity to that of our ADV groups.

There are several possible explanations for this finding: the first is that Stubbs' Ss were actually much less skilled in English than our ADV group. In terms of mean scores for verbatim replacements Stubbs' group scored just about midway ($\overline{X}$ = 15.64) between our ADV group ($\overline{X}$ = 22.35) and our BEG group ($\overline{X}$ = 9.10). If they were performing in an idiosyncratic manner comparable to our BEG then we should not be surprised to find little similarity among the patterns of responses for the groups. On the other hand, we cannot rule out the possibility that performance on the "cloze" both in terms of the ability to make verbatim replacements and in terms of differential response patterns for the various grammatical categories, may be more greatly influenced by the contrast between the Ss' native language and the language of the "cloze" passage, than by any fundamental principles of information processing under reduced redundancy conditions. The lack of clear-cut evidence regarding the comparability of the groups makes further

speculation impractical.

We next performed another type of error analysis to look at the relationship between the grammatical category of the deleted words and the ability of the Ss to provide: a) verbatim replacements; and b) replacements of the same form class as the missing words. This was prompted by the study by Fillenbaum et al (1963) which showed that native speakers could supply appropriate form class responses equally well for semantic-type deletions (e.g., nouns, adjectives, verbs) and syntactic-type deletions (e.g., functors such as articles, prepositions, auxiliaries, conjunctions). However, the same Ss performed much more poorly on semantic-type deletions when verbatim replacements were analyzed.

The ability of the three groups to provide verbatim and correct form class replacements for nine grammatical categories is shown in Figure 7. We see that all groups performed quite similarly in providing correct form class replacements. Sensitivity to basic linguistic structures in the target language may well develop very quickly when the target language and the native language of the learner are relatively similar (e.g., French and English), but much more slowly when the two languages involved are very different (e.g., Japanese and English).

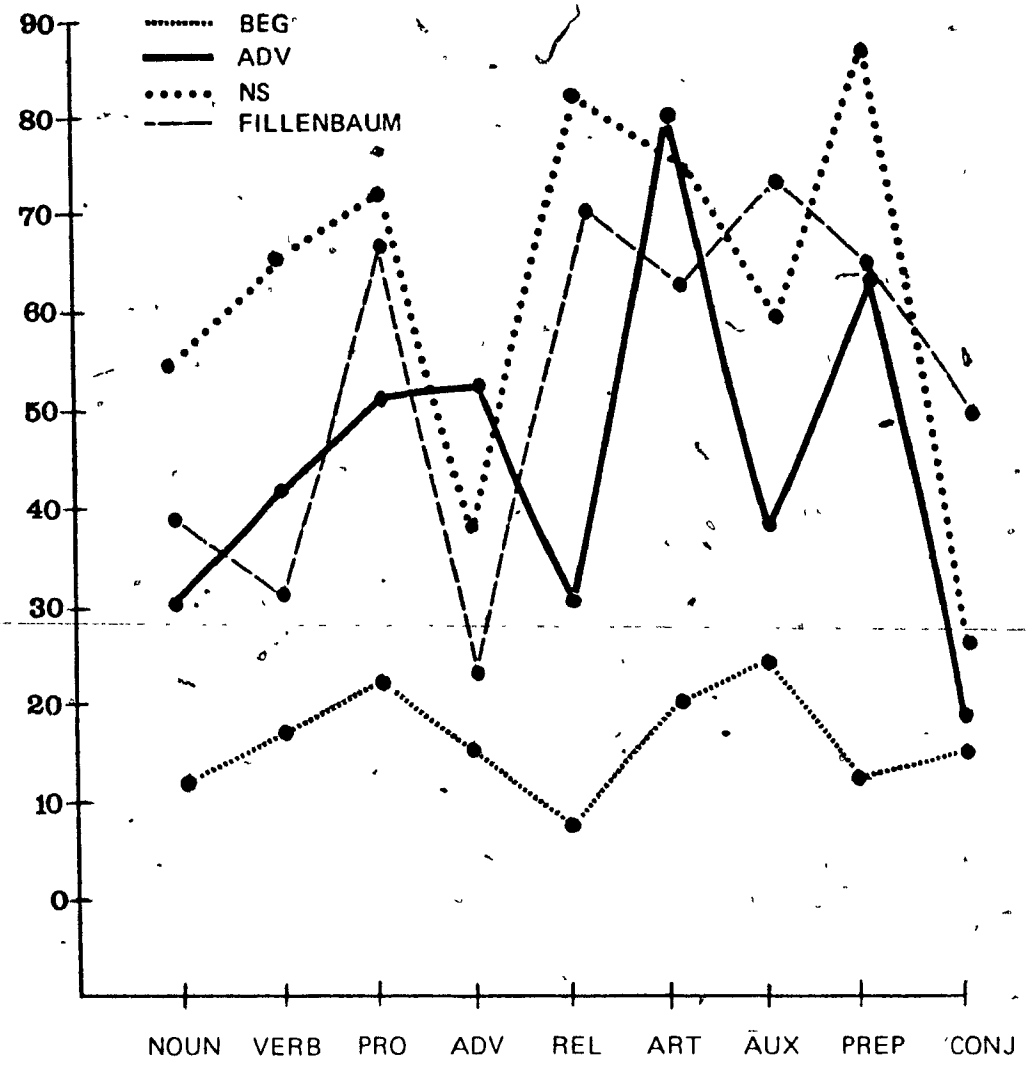

Figure 7: Proportion of verbatim replacements for nine grammatical categories.

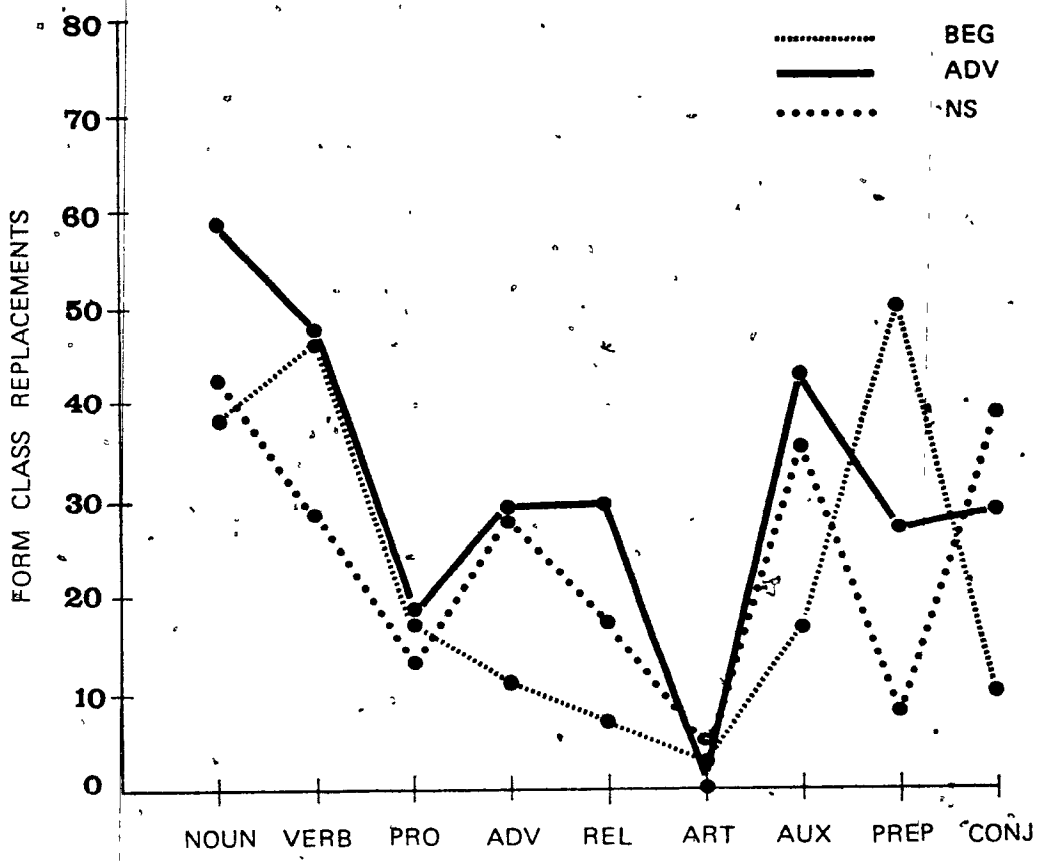

Figure 7: (cont'd) Proportion of form class replacements for nine grammatical categories.

However, the graph for verbatim replacements shows a different pattern of responses. The BEG generally performed poorly on all grammatical categories. The ADV group performed less efficiently than the NS; but their pattern of responses for the various grammatical categories was not dissimilar. These findings suggest that even BEG have a well developed sensitivity to the basic syntax of the language. However, their differentially poorer performance in providing verbatim replacements reveals their lack of knowledge of the semantic features of the language. They appear to know what kind of word is needed to complete a blank in a "cloze" passage, but their limited experience with English has provided them with insufficient knowledge of the semantic probabilities of the language to make verbatim substitutions.

An appropriate analogy can perhaps be drawn between the performance of our experimental groups and the child subjects studied by McNeill (1965). In experiments involving a sentence repetition task under reduced redundancy conditions (the speech signal was partially masked by white noise) he found that five-year-olds and eight-year-olds were equally able to draw on the syntactic rules of their language. However, only the eight-year-olds had sufficient knowledge of the semantic restrictions of English to perform more efficiently on

sentences which were semantically and syntactically normal than they did on ones which were grammatically normal but semantically anomalous. The performance of our BEG group might be likened to that of the five-year-olds. Both seemed to have developed an awareness of basic syntactic structures and general rules concerning form class membership whereas the ADV Ss display a linguistic competence in English which indicates that they, but not the BEG, have gone through a stage of semantic development analogous to that found in McNeill's eight-year-old native speakers.

These findings do not concur with those reported in Study Two (Elicited imitation of normal, anomalous and random sentences) where we failed to find the predicted lag in semantic development as compared to syntactic development in our BEG and ADV groups. However, it should be remembered that our stimulus materials in Study Two proved to be too simple and did not actually tax the Ss' skills in speech perception. The present task, like that described in McNeill's study, involved the processing of sentences under conditions of reduced redundancy. Our Ss' differing pattern of performance on the two tasks may reflect the different demands placed on them in the two situations.

Form class vs. Verbatim replacement. In our final analysis, we calculated a probability coefficient to measure the likelihood that Ss would be able to provide verbatim replacements when they were able to correctly identify the form class of the deleted word. This was done (following Fillenbaum et al, 1963) by dividing the number of verbatim replacements by the number of correct form class replacements (V/FC) for each of the various grammatical categories. These results are shown in Figure 8. The general pattern was similar for the three groups over most categories. One exception occurred for the category "prepositions" where the performance of the BEG differed noticeably. The BEG were sensitive to the type of word required when propositions were deleted, but had differentially greater difficulty than the other groups in supplying the verbatim response. This should not be surprising since clearly there exists no exact mapping of the prepositions of French onto those of English. Indeed, if we compare the two languages, some obvious discrepancies come to mind: e.g., loin de = far from; près de = close to. If, as has been suggested, the second language learner strives to simplify the task of acquiring the rules of the target language by applying the basic strategy of formulating general rules and applying them in as many

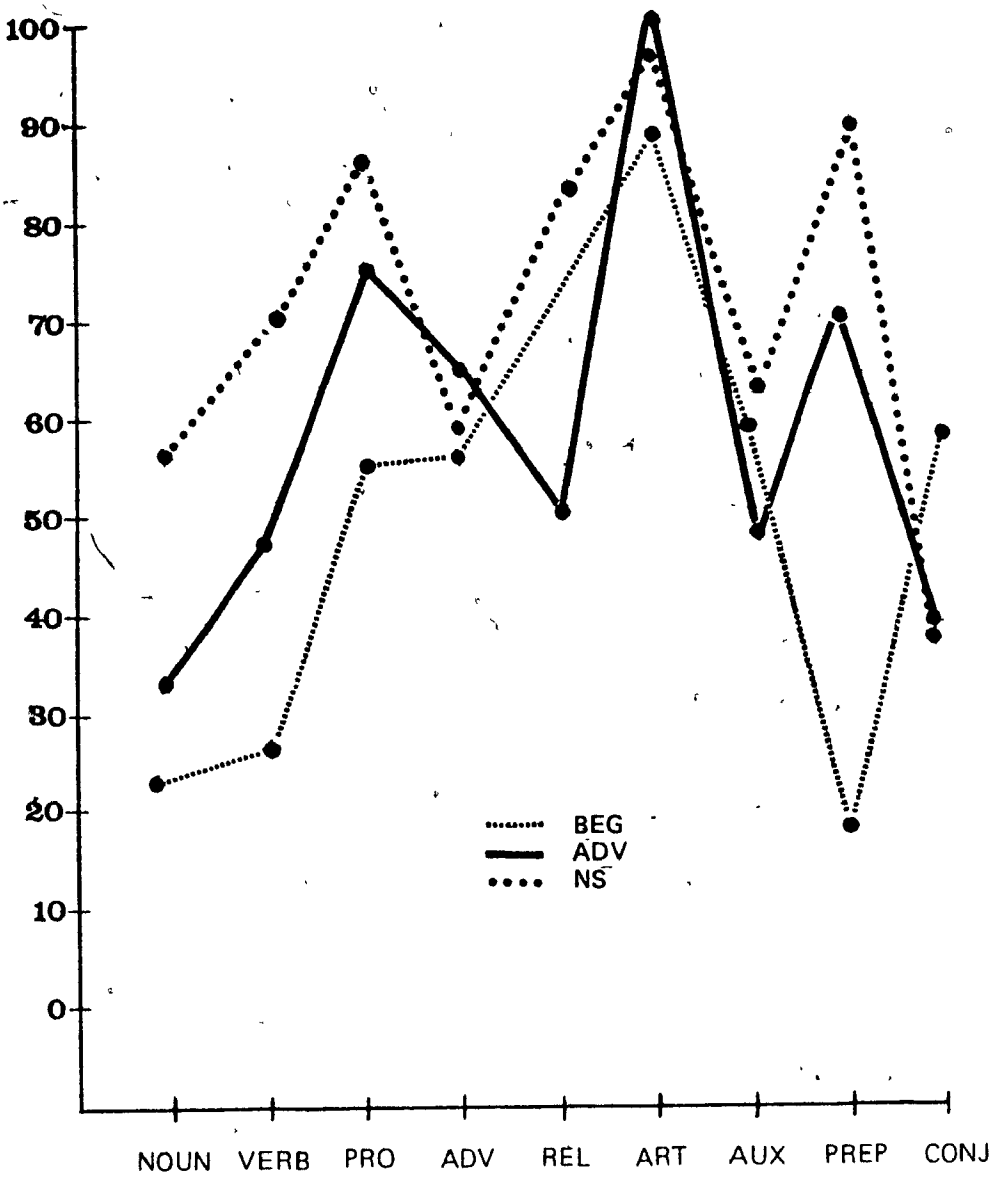

Figure 8: Predictability of correct verbatim replacement given correct form class replacement for nine grammatical categories (V/FC).

situations as possible, many of his errors can be accounted for. The ability to use prepositions which tend to be highly specific and context bound is likely acquired through experience, and the learning process probably cannot be streamlined or accelerated through the use of the basic operating principles for language learning (cf., Slobin, 1973).

This is one instance where explicit teaching might be conducive to optimal learning and where a specifically constructed version of the "cloze" might be used for both diagnostic and pedagogical purposes.

In summary, we have examined the ability of our three groups of Ss to utilize syntactic and semantic information under conditions of reduced redundancy. We found, as did previous researchers, a predictable pattern of results in which NS performed better than ADV or BEG. However, we found the performance of the ADV group to be generally more like that of the NS than that of the BEG. All three groups have shown a similar ability to recognize the form class of words deleted from the "cloze" passage; however, the BEG differed considerably from the other two groups in terms of their ability to provide correct verbatim replacements for the missing words. This suggested that they were comparable to the more advanced speakers in terms of their syntactic

development in English; but that they lacked sufficient exposure to English to be aware of the subtleties of the semantic system.

STUDY SIX

Solving Problems in Deductive Reasoning

In this study we looked at the ability of our two groups of second language learners to solve elementary problems of deductive reasoning in their weaker language and in their mother tongue. We wanted to examine the effect of working in a second language on the information processing skills of incipient bilinguals.

According to Clark (1969), solving a problem in deductive reasoning involves four identifiable stages: a) comprehension of the deep structure of the propositions; b) comprehension of the question; c) a search for the information asked for in the question; and d) the formulation of an answer. Language plays an important role in this process, one which transcends the simple comprehension of the words themselves and calls upon higher order representational and integrative schemes.

In previous research investigating reading in a weaker language, Macnamara (1967) reported that Ss had greater difficulty in understanding a passage in their weaker language even if the passage involved familiar vocabulary and syntax. Therefore, in the present study, our interest centered less on our Ss' comprehension of specific words

and structures than on their ability to store, retrieve and manipulate the information presented in this context free, low redundancy type of problem.

The second question to which we addressed ourselves was whether the bilingual's ability to solve problems presented in his weaker language increases significantly with greater exposure to the language.

We are familiar with the extensive research literature relating to the study of the psychology of reasoning (see, for example, Wason & Johnson-Laird, 1972), and we have adapted some of the stimulus materials from those studies for use in this investigation. We purposely did not attempt to integrate our study into any specific theoretical framework, since this was extraneous to answering the strictly pragmatic questions which prompted the experiment. However, our data are available to any researchers who might be interested in pursuing this theoretical line of investigation.

Materials

To investigate the ability of our Ss to solve problems of deductive reasoning involving simple language, we chose to work with the set of three-term series problems or linear syllogisms described by Clark (1969). These problems involve

extremely simple vocabulary (e.g., If Bill is better than John, and John is better than Tom, then who is best?), and were therefore appropriate for use with our BEG and ADV groups. The problems varied in complexity from the simplest form described above to somewhat more complex types involving negative-equative propositions (e.g., If Bill is not as bad as John, and John is not as bad as Tom, then who is best?). In certain instances the question was congruent with the propositions of the problem. In others, the question and propositions were incongruent (e.g., If Bill is better than John, and John is better than Tom, then who is worst?).

Appendix 10 shows the format of the 32 problems that we used. Equivalent sets were constructed with the adjective pairs good/bad and tall/short. This was done to avoid monotony. Familiar proper nouns were used in the problems, and they were varied so that they gave no clues to the answers to the problems. The problems were typed on blank IBM cards in the following form:

If Bill is better than John,
and John is better than Tom,
then who is best?
Bill Tom John

Each S received the following array of stimulus items:

a) in English, 16 problems involving tall/short; 16 involving good/bad; b) in French, 16 problems involving grand/petit; 16 involving bon/mauvais. The order of presentation was counterbalanced so that half of the Ss in each group received the English problems first while the other half began with the French set. Likewise the choice of the tall/short and good/bad problems was counterbalanced so that all Ss had all types of problems, half expressed with good/bad and half with tall/short. We purposely separated the English and French sets to avoid confusion; but the problems within a set were shuffled for each S to minimize practice effects.

METHOD

The Ss were seated beside the E, and the first set of problems was placed face down on the table. The procedure was explained by E and S solved a few practice problems. These cards were then replaced near the bottom of the deck. When S said he understood the task, the test began. The S turned over the top card on the deck. As he placed it face up, E activated a chronometer by depressing a lever. When S gave the answer to the problem, E removed her finger from the lever and the latency was recorded on an answer sheet beside the appropriate problem number. The response was also

entered. When both E and S were ready, the next card was turned over and this routine was followed until the entire set of problems had been completed. Subjects were then free to return to their classes, to eat lunch or to perform some unrelated task before being presented with the second set of test items.

Analysis of the Data

The Ss' responses were scored and the number of errors for each group was calculated. A two-way analysis of variance was carried out on the mean error scores. The independent variables were group membership (BEG or ADV) and language of testing (English or French). The dependent variable was the error score.

We next calculated mean latency scores by averaging the latencies for the correct responses only. Latency scores for the eight types of problems in French and in English were tabulated and we performed Spearman rank correlations on the order of difficulty for each group to ascertain whether the difficulties inherent in the problems affected Ss similarly in their native language and in their second language.

RESULTS AND DISCUSSION

The analysis of variance performed on the error scores for the two groups showed a significant main effect for language ($F = 5.74$; 1,38 df; $p < .05$). The Ss in general made fewer errors in solving problems presented in French ($\bar{X} = 5.67$ out of 32) than they did when the same problems were presented in English ($\bar{X} = 7.05$). The main effect for group was not significant, nor was the group by language interaction. This suggests that the members of our two groups were equally able to solve such problems. The incidence of error was relatively low and the ADV group's greater knowledge of English did not result in their making significantly fewer errors. An interesting analogy can be drawn between this finding and experimental evidence reported by Tuinman and Brady (1973). In a reading comprehension task given to children, these researchers found that thorough pretraining on vocabulary items from a reading passage did not raise the comprehension scores of children in grades 4 to 6. Clearly, a certain minimal knowledge of the relevant vocabulary is a necessary condition for successful performance on information processing tasks, but it appears that this knowledge per se is not sufficient to improve performance beyond a certain level. One would assume that with increasing maturity the performance

of the children would eventually improve. But it is not clear whether the performance of our second language learners would follow a similar pattern, since there was no significant difference between the performance of the BEG and ADV groups in spite of the latter's superior command of the second language. Since we do not have a comparison group of skilled bilinguals with whom to make comparisons, the question must remain unanswered.

In terms of latencies, the mean scores for the two groups were very similar. Table 11 shows mean scores for latencies and errors for the two groups on the English and the French problems. Since we could not measure the time taken by Ss to read the problems in French or in English, we are unable to interpret precisely why the latency scores for English were higher than those for French. However, we do find a similar pattern when we look at the latency scores and the error scores for the two groups. The Ss, in general, took more time to solve the problems in their weaker language and also made significantly more errors; even though the problems involved very simple vocabulary, the surface structures for the English and French forms were similar, and the task itself was basically an easy one.

The fact that it proved to be more demanding in English

TABLE 11

Mean Latency Scores for English and French Problems

Expressed in Seconds

	BEG	ADV
French	10.28	10.09
English	11.56	11.20

Mean Error Scores for English and French Problems[1]

	BEG	ADV
French	5.75	5.60
English	7.85	6.25

[1]Total number of problems in each language = 32

than in French seems to replicate Macnamara's (1967) finding that solving problems via a weaker language is more difficult than solving problems presented via the native language, even when all the elements of each problem are fully understood. His suggestion that the difficulty might lie in the area of the S's ability to chunk information and to store it in short term memory seems a plausible explanation for our data. The native speaker is able to bypass some of the processing tasks and to construct meaning directly. Second language learners are less able to do so. The fact that our test problems involved familiar vocabulary and structures does not imply that our Ss would necessarily have developed the accessory information processing skills to enable them to store, retrieve and manipulate these items as efficently as they do in their native language. They may employ certain native-like short cuts and strategies but their level of ability when functioning in their second language may still not equal their ability in their native language, and consequently a greater potential for error would exist at every or at any of the stages involved in searching for a solution to the problem.

We next looked at the effect of the systematic variation of certain characteristics of the stimulus problems on our Ss' performance in each language. The test set involved eight

basic problem types. From Clark's (1969) data we were able to establish a rank order of difficulty for native speakers in terms of latency scores. (Table 12 shows mean latency scores for Clark's Ss and our own BEG and ADV groups for the 8 types of problems.) We then carried out paired comparisons with Clark's data and those from our own Ss' performance in English. None of these comparisons were significant. When we compared their performance in French with Clark's data for the equivalent problems in English an interesting pattern emerged. We found a high positive correlation ($\varphi = .93$, $p < .01$) between the performance of Clark's native speakers and our own ADV group in French. A second high positive correlation showed up in the performance of the ADV and BEG groups ($\varphi = .88$, $p < .01$) and a lesser, but still significant, correlation ($\varphi = .81$, $p < .05$) between the performance of Clark's NS and the BEG. We view these findings as an indication that our Ss showed a sensitivity to the linguistic complexity inherent in the sentences which was similar to that shown by Clark's Ss when processing questions in their native language. The lack of correlation between our Ss' performance in English and that of Clark's group may perhaps best be interpreted as a reflection of erratic information processing difficulties affecting various higher levels of second language learners' performance

TABLE 12

Overall Mean Latency Scores for Eight Types of Problem in French and in English

Form of Problem	Clark	Overall Mean FRENCH BEG	FRENCH ADV	ENGLISH BEG	ENGLISH ADV
I	5.49	9.72	8.69	9.69	10.95
II	5.91	8.46	9.43	10.63	10.94
III	5.33	9.07	8.75	10.43	10.19
IV	5.63	9.98	9.93	12.26	11.54
I'	6.59	11.35	11.71	11.78	12.23
II'	6.22	10.11	10.42	12.25	10.59
III'	6.52	13.69	11.97	14.21	12.56
IV'	6.19	10.42	10.40	12.06	10.92

and confounding the normal information processing patterns.

In summary, we have tested the ability of our BEG and ADV groups to solve problems of deductive reasoning in their native and second languages. We have found a general tendency for both groups to perform well but they make significantly more errors and take more time in solving problems in English. In addition, the similar performance of the two groups in English seems to indicate that greater familiarity with the language of the stimulus problems is not, in itself, sufficient to produce a significant difference in the level of performance.

When working in French, the Ss show sensitivity to an order of difficulty inherent in the problems which is similar to that reported for native speakers of English solving the equivalent English problems. The erratic pattern of performance on problems presented in the weaker language points to the confounding presence of higher order information processing difficulties. Although it was not possible in the present study to pinpoint the exact locus and nature of these problems, it might be possible to do so in future studies by adapting some of the procedures proposed by Carpenter and Just (1974).

INTEGRATIVE DISCUSSION

In this thesis we have attempted to broaden our understanding of the dynamics of second language acquisition by studying the performance of adult students of English at two different measured levels of proficiency. We conducted six experimental studies designed to tap a range of language processing abilities and to elicit diverse learning strategies. We compared the performance of our experimental groups with each other, with a control group of native speakers and, where possible, with published data from studies of child native speakers. Our intention was to explore the processes and strategies which occur and co-occur in the various tasks at a given point in our learners' development. These experimental studies should therefore not be interpreted as a series of sequential studies but rather, following the suggestions of Ervin-Tripp (1973) and Reibel (1971), as an attempt to investigate simultaneously several facets of linguistic behavior. In this final discussion we shall integrate the findings from the various studies by describing the linguistic development of the BEG in relation to that of the ADV learners as reflected by their performance on the test battery.

Let us examine first the results of Study Six, Solving Problems in Deductive Reasoning, for this is the only test

on which the performance of the BEG equalled that of the ADV learners. Although both groups were significantly less accurate in solving problems in their second language (78% correct) than in their mother tongue (82% correct), their overall performance was good. These findings suggest that second language learners attain a high level of ability in this sort of task more quickly than in other aspects of their performance. There was no indication (e.g., excessively high latency scores in the second language condition) that either the BEG or the ADV Ss needed to translate the English problems into French to solve them. Furthermore, to indicate their response Ss had only to select one name among the three alternatives which were presented to them. The Ss' high level of performance may have been due to the fact that their full attention could be devoted to decoding and organizing the information, without having to simultaneously encode a response in the form of a sentence. The specific nature of the difficulty which makes the solving of problems in the second language more prone to error could not be resolved in the present experiment.

In Studies One and Two the type of response called for proved to be more demanding, for the Ss had to process the content of a stimulus sentence while simultaneously encoding

the appropriate response. The task of repeating sentences which involved various forms of relative clause constructions (Study One) was more difficult for the BEG group than it was for the ADV whose performance more closely resembled that of the NS. Both groups were affected by the linguistic complexity inherent in the stimulus sentences which seemed to tax their information processing capacities. However, there is a clear-cut distinction between the way adult second language learners such as ours, and child native speakers respond to such a task. Neither the BEG nor the ADV Ss made any attempt to impose a simple structure on the syntactically complex model sentences. This suggests that as cognitively mature adults, and as native speakers of a language which is syntactically quite similar to English, our Ss may have been unconsciously alert to the possibility of embedding and may have looked for clues to it in the surface structures of the stimulus sentences. When clues were present in the form of explicit subject or object relative pronouns (e.g., The ball that the girl is bouncing is small) both groups repeated correctly more sentences than when the pronouns were deleted (e.g., The lady the boy is drawing is funny). We infer that their experience with French which consistently expresses pronouns in the surface structure of relative clause constructions

caused them to look for similar features in English. The difference in scores for correct repetition between the BEG and ADV group probably reflects the improved ability of the latter group to recognize the structure of the stimulus sentences, to store the information of the sentences in short term memory and to re-encode it in the appropriate form.

In Study Two we again used the sentence imitation paradigm, but introduced varying degrees of deviance in some of the target sentences. The responses of our experimental groups to the mixed array of grammatical, anomalous and random sentences which they were asked to imitate in this study showed interesting patterns. The ADV group was more successful than the BEG when repeating simple active declarative sentences (e.g., Visitors park cars at the gate) which were less complex than the ones used in Study One. In fact, their scores approached those of the NS group. The anomalous sentences (e.g., The old dog read rats together) which involved the same simple syntactic structures, but which were semantically deviant, also presented greater difficulty for the BEG than for the other two groups. However, the scores for correct imitation by the ADV group were closer to the BEG than to those of the NS. Scores for correct imitation of the random strings (e.g., Slowly large cat dinner the drank) were the

lowest of all three types of stimulus for the three groups. The performance of the ADV Ss on these random strings was even closer to that of the BEG than it was on either of the other two sentence types. Thus, we found that the ability of the ADV to perform almost as well as the NS on the normal sentences did not hold for the other two sentence types.

All Ss experienced most difficulty in repeating random strings. This seems strange since the strings involved only six words, and repeating six items should certainly not tax the short term memory capacity of adult native speakers. One plausible explanation is that Ss expect and look for syntactic and semantic regularity in sentences. Random strings were not repeated back by rote because Ss spent time looking for structure. By the time they perceived that the model sentence lacked semantic and or syntactic organization, the original words were erased from short term memory. The NS might have been affected relatively less than the second language learners because they would be able to scan the input and recognize the lack of structure or meaning more quickly and more accurately.

We found evidence both in this study and in Study Three that second language learners do not have the same degree of sensitivity to deviance as do NS. Furthermore, the findings

from Study Two suggest that this inability to quickly recognize deviance depressed performance on the experimental task. These results appear to confirm rather dramatically the hypothesis that sentence imitation, and indeed even sentence perception, involves a high level of integrative activity on the part of the listener (Rivers, 1971).

Let us look more closely at the question of the second language learner's sensitivity to deviance by reviewing the results of Study Three. The reader will recall that we examined the ability of our Ss to perform grammatical operations on normal and deviant sentences. We found that the BEG were the least able of the three groups to carry out the grammatical operations on both normal and deviant sentences, reflecting their overall lower level of ability. In transforming normal sentences, the performance of the ADV group was more similar to that of the NS than to that of the BEG; however, in working with deviant sentences, the pattern was reversed and the ADV group's performance was closer to that of the BEG. As noted previously, it is difficult to interpret the significance of these results owing to the tendency on the part of the ADV and NS in particular to restructure some of the target sentences when carrying out the grammatical operations.

The pattern of subjective ratings to normal and deviant

sentences is of greater potential interest. The groups did not differ significantly in their ratings of normal sentences, although the BEG viewed the sentences as slightly less normal than did the other two groups. All mean ratings were on the normal segment of the scale. The pattern of responses was different for the rating of the deviant sentences. Neither the BEG nor the ADV groups could reliably identify syntactic and/or semantic abnormality. Their mean ratings were again confined to the normal segment of the scale.

These second language learners appear to recognize normal sentences and to be able to carry out basic grammatical operations, but they do not possess the native speaker's ability to identify deviance. Inspection of the ADV group's mean ratings for the deviant sentences in Study Three shows that the performance of this group differed significantly from that of both the BEG and the NS. It appears that the ability to recognize deviance might be a reliable correlate of developing competence in the second language. The potential importance of this skill was pointed out in our discussion of the results of Study Two. If the creative construction process does characterize second language learning, and if the learner does proceed by a continual process of hypothesis testing to modify his utterances until they conform to acceptable

utterances in the target language then we must assume that this process is accompanied by, and may be contingent upon, a corresponding growth in the ability to recognize semantic and syntactic normality in the input data. It should be remembered, of course, that we are talking about an unconscious or intuitive level of mental activity and not the learner's ability to explicitly state the rules which guide him in the construction or interpretation of sentences. The importance of this growth in sensitivity to regularity and deviance in the target language as a predictor of progress in productive skills might be an important area for future empirical study.

In Studies One and Two, we noted that the adult second language learner performed most of the experimental tasks less efficiently than the NS. However, the information processing strategies which we were able to discern appear to reflect basic cognitive processes and we found no indication that the second language learners performed in a qualitatively different way from the NS. In Study Four, we looked more closely at the learning process by examining the sequence of acquisition by our Ss of a set of complex grammatical structures (e.g., easy to see/happy to oblige; promise; ask/tell; and/although). In this task S listened to stimulus sentences and replied to questions designed to probe his comprehension

of the syntactic relationships in the sentences. He did not have to produce a sentence in his reply--a name, a word, or a gesture was a sufficient indication of his comprehension.

We found a developmental pattern in our data similar to that reported by Chomsky (1969) for child native speakers. We were intrigued that this pattern should emerge despite the inevitably wide range of individual differences among our Ss in terms of their personal experiences. This suggested that the degree of linguistic complexity inherent in the sentences is indeed, as Brown (1973) speculated, a critical factor in determining the order of acquisition of certain grammatical features. We found that the BEG Ss consistently performed more poorly on the comprehension questions than did the ADV Ss while the performance of the ADV Ss more closely resembled that of the NS. We were particularly interested in some of the language learning strategies which were revealed in this study. Contrary to expectation, the second language learners, even those in the BEG group, appeared not to process the target sentences by relating them to similar structures in their native language. In certain instances to do so would have been advantageous since the more explicit surface structures of the French sentences would have provided clues to the appropriate interpretation of the target sentences. Subjects

in both groups appeared to deal directly with the data of the target language. The BEG Ss tended to rely on semantic information more than on syntactic information to provide clues to the likely interpretation of certain ambiguous sentences. The ADV Ss were more inclined to utilize a combination of syntactic and semantic information.

These findings suggested that second language learners interpret sentences in the target language by utilizing basic language processing principles such as applying broad general rules. In addition, they draw on pragmatic strategies such as guessing at the most probable interpretation on the basis of their knowledge of reality. However, they do not attempt to apply language-specific rules appropriate to their mother tongue to the interpretation of sentences in the target language. The lack of any evidence which would suggest an attempt to map native language structures onto those of the target language again supports the hypothesis that a creative construction process operates in the development of comprehension in the second language. Our data do not permit us to extrapolate these findings to any prediction about production in the second language.

In Study Five we extended the scope of the investigation to include the written language. The "cloze" procedure taps

abilities of a very different sort from those described so far. In this experiment we were dealing with comprehension of a passage of connected discourse rather than isolated sentences. Furthermore, the systematic deletion of every fifth word in the stimulus passage makes the "cloze" test a highly demanding measure of the learner's integrative skills. The power of this test with respect to other variables in the present investigation was revealed by the results of a multivariate analysis of variance which we performed on the dependent variables from each of the six studies. The "cloze" score for verbatim replacement appears to be the most powerful contributor to the total variance between the BEG and ADV groups. We were not surprised by this finding since it concurs with data reported in previous research (see introduction to Study Five).

The BEG group was less able than the ADV or NS to provide verbatim replacements for the deleted words. Although the differences among all three groups were significant, the performance of the ADV group was more similar to that of the NS than to that of the BEG. This is an important finding, given the power of the test, for it confirms the general pattern of results running through the series of experiments. It also indicates that the set of diagnostic test results which we

used as the basis for selecting the experimental groups did indeed discriminate accurately the Ss' general level of proficiency. The data from the language background questionnaires indicated that Ss in both groups had received similar amounts of formal instruction in English during their school years. However, they differed in the amount of informal exposure to English which they had received. The ADV Ss attributed a higher proportion of their present skill to informal contacts in the English community than did the BEG. In addition 60% of the ADV as opposed to only 10% of the BEG Ss had studied a content subject in English. The "cloze" test appears to have provided a sound estimate of the Ss' overall achievement in English resulting from both formal and incidental learning.

What does the performance of the ADV group relative to the BEG tell us about the progress which the former group has made toward the mastery of English? They have obviously acquired a superior ability to make use of the transitional probabilities of English. On the basis of Studies Two and Three we could probably also assume that the ADV Ss are more able than the BEG to recognize the types of replacements that would produce deviant rather than normal sentences. Carton (1971) proposed that the "cloze" procedure effectively taps a person's ability to draw inferences from a variety of sources.

The learner can try to draw inferences from his native language by searching for cognates in the target language and by noting regularities in tense markers, plural markers and other such language specific features. In addition, he can try to draw inferences based on his experiences and knowledge of the real world. This varied set of heuristic inferencing strategies appears to have been developed to a greater extent in the ADV than in the BEG group. Since both groups had received a similar amount of formal instruction in English can it be that the greater opportunity, or perhaps the necessity, for incidental learning of English has enhanced the ADV Ss' ability to use inferencing as an effective language acquisition strategy?

It has been found that the ability to successfully provide verbatim replacements on the "cloze" test in one's mother tongue is related to cognitive style (DeFazio, 1973). Certain individuals--those who are field independent--are said to have a relatively highly developed sense of identity, to show greater cognitive clarity and to be adept at abstracting and internalizing rules for organizing perceptual stimuli. It seemed reasonable to hypothesize that field independent individuals might show greater skill than those who are field dependent in the perception and integration of the regularities

underlying a second language.

Therefore we administered the Embedded Figures Test, a measure of cognitive style to our BEG and ADV groups, and performed correlations between the scores from this test and the scores for verbatim replacement on the "cloze". We failed to find significant differences between our two experimental groups on the Embedded Figures Test, and the correlations of these scores with those from the "cloze" were not significant.

These inconclusive results may be attributable to the fact that we were working with a heterogeneous group of Ss which included a majority of individuals who could not be defined as clearly field independent. Had we attempted to select only Ss with extreme scores on the Embedded Figures Test, as did De Fazio, we would have ended up with an insufficient number of individuals to constitute an experimental group. We are interested in pursuing this line of investigation as it may well provide important information about the nature of individual differences in verbal aptitude and clues as to why some second language learners develop a high level of proficiency in a second code, while others do not.

It appears from this series of studies that the second language learner approaches the learning task equipped with an effective set of basic language processing strategies.

He is prepared to find structure in the target language and he is alert to embedding. His capacities to process information in the second language are taxed by syntactic complexity, but he develops an increased ability both to recognize and to cope with complexity. He experiences greater difficulty in processing sentences in which the surface structures are not explicit with respect to basic grammatical relationships than ones in which these relationships are expressed in the surface structure. Tasks which involve both the decoding of a stimulus sentence and the immediate encoding of a response in the form of a sentence are more demanding than those which require a single word or a non-verbal response.

Both BEG and ADV learners deal directly with the linguistic data of the target language using their fragmentary knowledge of the syntactic and semantic information of this code. They do not refer to their native language in attempting to comprehend sentences, even when this strategy might provide clues and short cuts to the correct interpretation of target sentences. They use semantic information whenever possible to resolve ambiguity and to provide clues to underlying relationships in the target language. The ability of both BEG and the ADV learners to judge correctly normal sentences precedes their ability to make reliable judgements about the

acceptability of deviant sentences.

The ability to provide verbatim replacements on the "cloze" test appears to tap the learner's skill at drawing on basic cognitive processes and diverse heuristic inferencing strategies. This skill at making effective use of inferencing strategies may be an important learning device in second language acquisition.

We have been impressed by the high level of mental activity on the part of the learner which has been revealed by these tests. Second language learning appears to be a dynamic process, characterized by a diversity of basic and pragmatic strategies and shaped by both formal and informal learning experiences.

Four directions for future research are suggested by the present findings:

1) An investigation of the nature and locus of the difficulty in solving problems of deductive reasoning in a second language;

2) An investigation of the relationship between the ability to recognize deviance and advances in comprehension and production in the second language;

3) An investigation of the importance of learning to

draw inferences as a language acquisition device;

4) An investigation of the relationship between cognitive style and second language achievement.

SUMMARY

This investigation was carried out to broaden our understanding of second language acquisition by exploring the ability of adult learners of English at two distinct levels of proficiency to perform a broad range of tasks designed to probe linguistic and cognitive aspects of the language acquisition process. We related the performance of the second language learners to that of a group of native speakers of English and, where possible, to published data from studies of child language acquisition.

In Study One, Ss were asked to repeat complex sentences involving relative clause constructions. The ADV Ss performed better than the BEG, but both groups found sentences in which the relative pronoun was deleted more difficult to process than ones in which the relative pronoun was explicit. Subjects did not attempt to impose a more simple syntactic structure on the complex model sentence, as young children are reported to do. This suggests that, as cognitively mature adults, they may be unconsciously alert to the possibility of embedding and their difficulties in repeating the target sentences may be attributable to short term memory limitations rather than to an inability to perceive the

structure of the stimulus sentences.

Study Two investigated the ability of the BEG, ADV and NS to repeat normal, anomalous and random strings. The NS performed better than the other groups on the three types of sentences. When repeating normal sentences, the ADV did better than the BEG and almost as well as the NS. This pattern did not hold for the other two sentence types. In repeating anomalous and random strings, the performance of the ADV group diverged from that of the NS and was more like that of the BEG. The ability to quickly recognize syntactic or semantic deviance in the stimulus sentences may be a determining factor in the successful accomplishment of the experimental task. The NS were clearly more skilled than the second language groups in recognizing deviance, but even they found repeating random strings more difficult than repeating sentences which were semantically and/or syntactically normal.

The sensitivity of second language learners to normality and deviance in English sentences was again the focus in Study Three. We first asked Ss to carry out simple grammatical operations on normal and deviant sentences. We found that the BEG were generally less able than the other two groups to transform sentences. In transforming normal sentences the performance of the ADV Ss was more similar to that of the NS

than to that of the BEG. In working with deviant sentences, the pattern was reversed and the ADV group's performance was closer to that of the BEG. When asked to make subjective judgements about the acceptability of the normal sentences, the groups responded similarly. However, in rating the deviant sentences neither the BEG nor the ADV groups could reliably identify syntactic or semantic abnormality. These findings, together with those from Study Two, suggest that learning to recognize deviance might be an important factor in developing competence in a second language.

In Study Four we examined the sequence of acquisition by our experimental groups of a set of complex grammatical structures. We found a developmental pattern similar to that reported for child native speakers of English. Some interesting language learning strategies were revealed. Both BEG and ADV Ss appeared to deal directly with the linguistic data of the target language using their incipient knowledge of its syntactic and semantic regularities. In interpreting ambiguous sentences, BEG tended to rely on semantic information more than on syntactic information. Subjects in the ADV group were more inclined to draw on information from both sources. We found no evidence that Ss attempted to translate or to map native language structures onto those of the target language,

even when it would have been advantageous for them to do so.

The "cloze" procedure was used in Study Five to examine the ability of BEG, ADV and NS groups to comprehend a low redundancy passage of English prose. The BEG were less able than the ADV or NS to provide verbatim replacements for the deleted words. We found evidence that performance on the "cloze" provides a sound measure of a Ss' skill at integrating syntactic and semantic information and at drawing inferences from a variety of sources. This ability to draw inferences may be a critical language acquisition device.

In Study Six, we compared the ability of our second language learners to solve sets of simple problems in deductive reasoning in their mother tongue and in their second language. Both groups were significantly less accurate in solving problems in their second language although their overall performance was good. The BEG performed as well as the ADV Ss, an indication that second language learners attain a high level of ability in this type of task more quickly than in other aspects of their performance. The reason for the higher incidence of error in the second language condition could not be resolved in the present experiment.

The data from our studies lead us to conclude that second language acquisition is a dynamic process which calls into play a diversity of basic cognitive abilities and heuristic inferencing strategies. This process is shaped by both formal and informal learning experiences.

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APPENDIX 1

Background Questionnaire

1. Nom _____

2. Age (BEG $\bar{X}$ = 19.70; ADV $\bar{X}$ = 24.55; NS $\bar{X}$ = 31.10)

3. Dernière année scolaire complétée

   (BEG $\bar{X}$ = 12.0; ADV $\bar{X}$ = 12.0; NS $\bar{X}$ = 13.8)

   (Number of years of schooling)

4. Dans quelle ville ou village avez-vous fait vos études? _____

5. Dans quelle ville avez-vous été recruté? _____

6. A partir de quelle classe avez-vous suivi des cours d'anglais?

   (BEG $\bar{X}$ = 4.75; ADV $\bar{X}$ = 4.90)

   (Number of years of formal study of English)

7. Quelle était la méthode d'enseignement dans vos cours d'anglais?

   a) Audio-visuelle ____ BEG = 0 ADV = 0

   b) Grammaire et traduction ____ BEG = 7 ADV = 13

   c) Conversation ____ BEG = 0 ADV = 0

   d) Un mélange de a, b et c ____ BEG = 13 ADV = 7

8. Avez-vous eu l'occasion d'apprendre l'anglais en dehors de l'école en fréquentant des anglophones?

   OUI ____ BEG = 6 ADV = 10 NON ____ BEG = 14 ADV = 10

9. Lorsque vous êtes arrivé à St-Jean vous aviez déjà une certaine connaissance de l'anglais. Est-ce que vous l'aviez acquise surtout en classe ou par contact avec

APPENDIX 1 (continued)

un milieu anglophone? Mettez une croix à l'endroit approprié sur l'échelle ci-dessous.

J'ai appris tout mon anglais en classe ___:___:___:___:___:___:___ J'ai appris tout mon anglais en dehors des classes

BEG $\overline{X}$ = 2.85 ADV $\overline{X}$ = 3.75

10. Evaluez votre connaissance de l'anglais dans les quatre domaines suivants:

Je lis l'anglais... BEG $\overline{X}$ = 3.85 ADV $\overline{X}$ = 2.60

Parfaitement ___:___:___:___:___:___:___ Pas du tout

J'écris l'anglais... BEG $\overline{X}$ = 3.95 ADV $\overline{X}$ = 3.65

Parfaitement ___:___:___:___:___:___:___ Pas du tout

Je parle l'anglais ... BEG $\overline{X}$ = 4.15 ADV $\overline{X}$ = 3.15

Parfaitement ___:___:___:___:___:___:___ Pas du tout

Je comprends l'anglais... BEG $\overline{X}$ = 3.40 ADV $\overline{X}$ = 2.45

Parfaitement ___:___:___:___:___:___:___ Pas du tout

Avez-vous déjà étudié une matière scolaire ou suivi un cours professionel (e.g., radar) qui était enseigné en anglais

Oui BEG = 2 ADV = 12

Non BEG = 17 ADV = 8

Blank BEG = 1 ADV = 0

APPENDIX 2

Sentences Used in Study One

1. The sun is shining.
2. The horse is pulling the cart.
3. The girl that is washing the dog is little. (Little girl or little dog?)
4. The food that is cooking is nice.
5. The hammer that is breaking the cup is big. (Big hammer or big cup?)
6. The boy that is helping the man is wearing a shirt.
7. The ball that the girl is bouncing is small. (Small ball or small girl?)
8. The lady the boy is drawing is funny. (Funny lady or funny boy?)
9. The dog eating the bone is black.
10. This is the man that drives the bus.
11. This is the door that opens.
12. This is the knife that cuts the meat.
13. The girl is watching the boy that is climbing the tree.
14. This is the horse that the boy rides.
15. This is the paper the man reads.

APPENDIX 3

Sentences Used in Study Two

1. Teachers use books in the classroom.
2. The young children played games together.
3. At generals cars classroom the use.
4. Happily young dog rats the read.
5. The young men drank books happily.
6. Students write words on the blackboard.
7. Soldiers make cars in the blackboard.
8. Together fat men books the chased.
9. The large girl chased games slowly.
10. Generals park books on the autoroute.
11. The old men ate dinner slowly.
12. On soldiers visit gate the park.
13. Soldiers drive jeeps beside the autoroute.
14. The large dog drank water frequently.
15. Teachers write jeeps around the gate.
16. The pretty cat played dinner frequently.
17. Beside jeeps war world the write.
18. The pretty girl read books quietly.
19. Quietly pretty children water the played.

APPENDIX 3 (continued)

20. Generals make war around the world.

21. Frequently old girl games the ate.

22. In books students blackboard the make.

23. The fat children ate water quietly.

24. Visitors park cars at the gate.

25. The old dog read rats together.

26. Around teachers words autoroute the drive.

27. The fat cat chased rats happily.

28. Students drive war at the classroom.

29. Slowly large cat dinner the drank.

30. Visitors use words beside the world.

APPENDIX 4

Stimulus Materials Used in Study Three.

1. Turn the sentence into a question beginning with the appropriate form of the verb to do

   THEY ALWAYS COME HERE

2. Turn the verb of the sentence into the present tense

   JACK ADMIRED SINCERITY

3. Make the sentence negative in the usual way

   I WAS SAT OPPOSITE BY A STRANGER

4. Turn the verb of the sentence into the past tense

   HE WANTS SOME CAKE

5. Turn the sentence into a question beginning with the appropriate form of the verb to do

   JOHN WORKS THERE EITHER

6. Replace the singular subject pronoun by the appropriate plural subject pronoun

   IT'S IN THE FRONT OF THE STATION

7. Turn the sentence into a question beginning with the appropriate form of the verb to do

   YOU PAINTED YOUR FENCE BLUE

APPENDIX 4 (continued)

8. Make the sentence negative in the usual way

HE DARED TO ANSWER ME BACK

9. Turn the verb of the sentence into the present tense

WHOM DID YOU SEE?

10. Turn the sentence into a question beginning with the appropriate form of the verb to be

HE IS SILLY AND CRYING

11. Turn the verb of the sentence into the present tense

NEITHER HE NOR I KNEW THE ANSWER

12. Make the sentence negative in the usual way

THE OLD MAN CHOSE HIS SON A WIFE

13. Turn the sentence into a question beginning with the appropriate form of the verb to be

IT'S THE MAN TO WHOM I SPOKE

14. Replace the plural subject pronoun by the appropriate singular subject pronoun

THEY OWN A LARGE FACTORY

15. Turn the verb of the sentence into the present tense

NEITHER I NOR HE FELT A THING

APPENDIX 4 (continued)

16. Turn the sentence into a question beginning with appropriate form of the verb to do

THEY PAINTED BLUE THEIR DOOR

17. Turn the sentence into a question beginning with the appropriate form of the verb to do

HE SITS ALWAYS THERE

18. Turn the verb of the sentence into the past tense

FRIENDSHIP DISLIKES JOHN

19. Make the sentence negative in the usual way

THE WOMAN SAT OPPOSITE ME

20. Turn the verb of the sentence into the past tense

THEY DON'T WANT SOME CAKE

21. Turn the sentence into a question beginning with the appropriate form of the verb to do

BILL COMES HERE TOO

22. Replace the singular subject pronoun by the appropriate plural subject pronoun

IT'S IN FRONT OF THE COLLEGE

APPENDIX 4 (continued)

23. Turn the sentence into a question beginning with the appropriate form of the verb <u>to do</u>

THEY PUSHED THE GATE OPEN

24. Make the sentence negative in the usual way

HE NEEDS TO GO AT LUNCH TIME

25. Turn the verb of the sentence into the present tense

WHO DID YOU WANT?

26. Turn the sentence into a question beginning with the appropriate form of the verb <u>to be</u>

SHE IS CLEVER AND PRETTY

27. Make the sentence negative in the usual way

BOTH I AND MY FRIEND SAW THE ACCIDENT

28. Make the sentence negative in the usual way

A WIFE WAS CHOSEN HIS SON

29. Turn the sentence into a question beginning with the appropriate form of the verb <u>to be</u>

IT'S THE GIRL I SPOKE TO

30. Replace the plural subject pronoun by the appropriate singular subject pronoun

THEY ARE OWNING HUNDREDS OF ACRES

APPENDIX 4 (continued)

31. Turn the sentence into a question beginning with the appropriate form of the verb to do

NEITHER HE NOR THEY KNOW THE ANSWER

32. Turn the sentence into a question beginning with the appropriate form of the verb to do

HE PUSHED OPEN THE DOOR

33. Make the sentence negative in the usual way

I HAVE A BLACK BUICK

APPENDIX 5

Sentences Used in Study Four -- Part 1.

1. Mary is anxious to go. Who will go?
2. The salesman is happy to oblige. Who will oblige?
3. The President is difficult to see. Who will see?
4. Peter is pleased to stay. Who will stay?
5. The scientist is interesting to interview. Who is doing the interviewing?
6. Christine is easy to influence. Who is doing the influencing?
7. John is sad to leave. Who will leave?
8. The Russian is hard to understand. Who does not understand?
9. Jack is eager to return. Who will return?
10. Anne is fun to visit. Who will visit?

APPENDIX 6

Sentences Used in Study Four -- Part 2

1. The child asked the teacher to leave the room.

   Who should leave the room?

2. The man told Donald to open his window?

   Who will open the window?

3. Fred promised Harry to leave quickly.

   Who will leave?

4. Bill persuaded Jack to read his letter.

   Who will read the letter?

5. Andy promised Jim to lend him his bicycle.

   Who does the bicycle belong to?

6. Donald warned Henry to drive carefully.

   Who should drive carefully?

7. Fred advised Tom to leave quickly.

   Who should leave?

8. Mike asked Sam to lend him his car.

   Who does the car belong to?

9. Jim promised Peter to read his letter.

   Who will read the letter?

10. Joe ordered Bill to come quickly.

    Who will come?

APPENDIX 6 (continued)

11. Don allowed Fred to stay.

    Who will stay?

12. The teacher asked the child to leave the room.

    Who should leave the room?

APPENDIX 7

Sentences Used in Study Four -- Part 3

1. Anne scolded Gloria for answering the phone, and I would have done the same.

   What would I have done?

2. The lady fired her chauffeur for driving fast, although I would have done the same.

   What would I have done?

3. Mary criticized her friend for arriving late, although I would have done the same.

   What would I have done?

4. The General blamed the soldier for risking the boy's life, and I would have done the same.

   What would I have done?

5. Bill hit the man for taking the money, although I would have done the same.

   What would I have done?

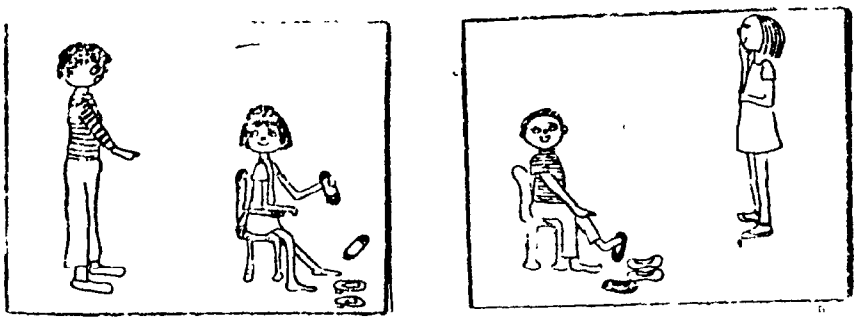
6. The chief rewarded the fireman for entering our building, and I would have done the same.

   What would I have done?

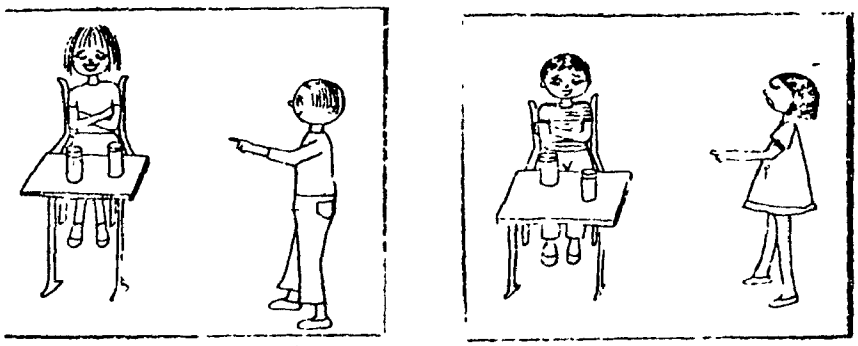
APPENDIX 8

Pictures and Sentences Used in Study 4 -- Part 4

Which picture shows the girl asking/telling the boy what to paint?



Which picture shows the boy asking/telling the girl what shoes to wear?



In which picture did the girl ask/tell the boy what glass to choose?

APPENDIX 9

Cloze Passage Used in Study Five

A very good way to find out what another person is thinking or feeling is to ask him. He may not answer, ____(or)____ if he does answer ____(he)____ may not answer truly, ____(but)____ very often he will. ____(The)____ fact that the information ____(which)____ people give about themselves ____(can)____ be deceptive does not ____(entail)____ that it is never ____(to)____ be trusted. We do ____(not)____ depend on it alone; ____(it)____ may be, indeed, that ____(the)____ inferences which we draw ____(from)____ people's non-verbal behaviour are ____(more)____ secure than those that ____(we)____ base upon what they ____(say)____ about themselves, that actions ____(speak)____ more honestly than words. ____(But)____ were it not that ____(we)____ can rely a great ____(deal)____ upon words, we should ____(know)____ very much less about ____(each)____ other than we do. ____(At)____ this point, however, a ____(difficulty)____ arises. If I am ____(to)____ acquire information in this ____(way)____ about another person's experiences, ____(I)____ must understand what he ____(says)____ about them. And this ____(would)____ seem to imply that ____(I)____ attach the

APPENDIX 9 (continued)

same meaning ___(to)___ his words as he ___(does)___.
But how, it may ___(be)___ asked, can I ever ___(be)___
sure that this is ___(so)___? He tells me that
___(he)___ is in pain, but ___(may)___ it not be that
___(what)___ he understands by pain ___(is)___ something
quite different from ___(anything)___ that I should call
___(by)___ that name? He tells ___(me)___ that
something looks red ___(to)___ him, but how do
___(I)___ know that what he ___(calls)___ "red" is
not what ___(I)___ should call "blue", or ___(that)___
it is not a ___(colour)___ unlike any that I ___(have)___
ever seen, or that ___(it)___ does not differ from
___(anything)___ that I should even take to be a colour? All
these things would seem to be possible. Yet how are such
questions ever to be decided?

APPENDIX 10

Form of 16 stimulus problems used in Study Six; each was paired once with "Who is best?" and once with "Who is worst?"

I	(a)	A better than B; B better than C
	(b)	B better than C; A better than B
II	(a)	C worse than B; B worse than A
	(b)	B worse than A; C worse than B
III	(a)	A better than B; C worse than B
	(b)	C worse than B; A better than B
IV	(a)	B worse than A; B better than C
	(b)	B better than C; B worse than A
I'	(a)	A not as bad as B; B not as bad as C
	(b)	B not as bad as C; A not as bad as B
II'	(a)	C not as good as B; B not as good as A
	(b)	B not as good as A, C not as good as B
III'	(a)	A not as bad as B; C not as good as B
	(b)	C not as good as B; A not as bad as B
IV'	(a)	B not as good as A; B not as bad as C
	(b)	B not as bad as C; B not as good as A