

FORMATION OF THE PLURAL IN ENGLISH: A STUDY OF
NATIVE SPEAKERS OF ENGLISH AND
NATIVE SPEAKERS OF SPANISH

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NATIVE SPEAKERS OF ENGLISH AND
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by

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PREFACE

The purpose of this investigation was to study one restricted area of language acquisition--the formation of English plurals.

Emphasis was placed on carefully controlled sampling, data collection and analysis procedures in an attempt to provide a methodological model which might prove useful to other investigators in their research. This was a descriptive study, and accordingly, all data are reported, amenability to theoretical integration at no point having determined the highlighting or exclusion of any of the information.

Whatever interpretations or allusions to theory may be found in the text, while judged relevant enough for inclusion, are incidental to the main purpose of this research, and should be so viewed. The principal aim of this study was the collection of "hard data" and the provision of unequivocal descriptions of those data. That is, the importance of these data lies not in their relevance to any notions particular to this endeavor, but, rather, precisely in their totally empirical foundation.

Two linguistic samples were used--native speakers of English and native speakers of Spanish in San Antonio, Texas. An attempt was made to approximate the longitudinal process of acquisition of plurals through apparent time by having as Subjects pupils in the first, second, third and tenth grades.

Chapter I presents a critical examination of the literature

dealing with first language acquisition deemed most relevant, as well as a similar discussion of material concerned with second language acquisition. This review provides not only the background for this study, but also much of the rationale for the research design which is outlined in Chapter II. The two final chapters are dedicated to the presentation and discussion of the findings of this investigation.

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Complimentary words alone would not suffice to express the debt of gratitude owed Mrs. Ona Kay Stephenson who added personal care and interest to her unmatched professional skills in the preparation of the final manuscript.

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CHAPTER I

CRITICAL SURVEY OF RELEVANT LITERATURE AND RATIONALE FOR THIS STUDY

Language acquisition on the whole has been viewed in terms of two distinct paradigms. On the one hand, one finds researchers who concentrate their efforts on examining the specific question of the acquisition of a first language. The major focus of the work of these investigators has by and large been restricted to the study of stages underlying the acquisition process and to the process of acquisition itself, in a maturing child's first or native language. On the other hand, professionals concerned with the pedagogical aspects of teaching a language different from that already spoken by a specific learner population, have directed their attention to those questions related to problems and techniques of relevance in the formal training setting. It is apparent that the endeavors of those engaged in the latter activity are based on certain assumptions, either implicit or explicit, relative to the nature of the acquisition process itself. Professionals approaching language phenomena from such distinct viewpoints seldom consider themselves to be in opposition (if, indeed, they ever consider each other at all). However, as one reads the positions they hold as evidenced by their writings, a dichotomy bordering on contradiction is often apparent.

Our purpose here will be to examine the current status of

theoretical formulations and/or research into first language acquisition as revealed in the relevant literature, followed by an examination of discussions related to second language acquisition, in order to provide a background for the research problem which is outlined and discussed in the following chapters, namely, the acquisition of noun plural endings in English by native and non-native speakers of the language.

1.0 The Acquisition of a First or Native Language

. . . men everywhere have language . . . successive generations seem to acquire it without special training from parents or siblings. . . . Language would be a rare achievement if parents had to give special lessons in phonology, morphology, or syntax, for few parents have the slightest notion what these skills consist of. That children can acquire language so readily can mean only that they have some innate pre-disposition for this kind of learning, and this in turn can mean only that evolution has prepared mankind in some very special way for this unique human accomplishment (Smith and Miller, 1966, p. 3). [*Italics ours.*]

The above quotation briefly summarizes the position taken by scholars who have analyzed those processes assumed to be involved in a child's acquisition of his first or native language. To view the appeal to ". . . some innate pre-disposition . . ." as more than a mere exercise in avoidance of an issue by assigning to it a label which is then accepted as explanation, it is necessary to examine more closely the evidence provided in support of the argument.

Studies of child language usually begin sometime between the ages of eighteen and twenty-four months (cf. Brown and Bellugi, 1964) since it is during this period that multiple word utterances are first manifested (i.e. the grammatical study of child language necessarily

requires word combinations). Investigations dealing with earlier phases or stages of language acquisition--e.g. phonetic production, intonation--have been conducted (Lewis, 1951; Irwin, 1947), but for the most part, child language has been considered from what Carroll (1960) has called ". . . the period after true language acquisition has started" (p. 30).

The basic assumption underlying more recent studies of child language involves the necessity for positing some kind of innate property or potentiality in humans which enables them to acquire this form of behavior (Lenneberg, 1967; Smith and Miller, 1966). This has been judged viable in light of the following:

. . . the ability to learn language appears to be species-specific, to possess a critical period, to develop independently of general intelligence, to have an orderly chronological development not easily attributable to concomitant changes in the reinforcing environment, and to show peculiar pathologies whose character strongly suggests that linguistic competence resembles other ethological phenomena more closely than it resembles any kind of operant learning. Furthermore, natural languages resemble one another in surprising ways that are not easily attributable to similarities in the cultural pressures operating on historically unrelated languages (Bem and Bem, 1968, p. 299).

Chomsky (1965) and others (e.g. Katz and Fodor, 1964) have emphasized that

. . . Since a fluent speaker is able to use and understand any sentence drawn from the infinite set of sentences of his language, and since, at any time he has only encountered a finite set of sentences, it follows that the speaker's knowledge of his language takes the form of rules which project the finite set of sentences he has fortuitously encountered to the infinite set of sentences of the language (Katz and Fodor, 1964, p. 482).

This notion provides linguists with a principal argument for the inadequacy of imitation-repetition-retention-type acquisition models. The notion of a "creative ability" has taken precedence over earlier predominating S-R models (with, or without, mediators) in attempting to account for the obvious fact that children do produce and understand novel utterances--they do not merely imitate or repeat sentences (or fractions thereof) provided them by environmental agents. Anisfeld (1965) states that "One has to assume that the child utilizes the linguistic data he receives from his speech community to abstract rules and regularities which in turn guide his productive use of language" (p. 5).

Just how this process takes place is the source of much speculation and discussion. McNeill (1966), for example, adopts the Chomsky-Katz reference to this innate or built-in propensity for language in humans as a 'language acquisition device.' As he describes it:

Primary Linguistic Data → LAD → G

He goes on to explain:

The contents of this box--the properties of LAD--will explain the linguistic intuitions of adults because it determines the properties of G, or grammatical competence. The internal structure of LAD is given by the linguistic universals. . . . The hierarchy of categories would be an example of a . . . universal.

. . . The advantage to a child of having universals such as the hierarchy of categories is that he can progress toward the grammatical classes of adult English step-by-step. He does not have to notice, hypothesize, and test all distinctions at once. A simple dichotomy or trichotomy will serve at first. The rest of the distinctions are taken up in an order determined by the hierarchial arrangement of categories. If the

same hierarchy underlies both adult grammar and a child's development, the child would be able to progress rapidly and surely to full linguistic competence (p. 38).

It should be emphasized that McNeill is proposing a model; there is no empirical evidence to support or refute his proposal. In contrast to McNeill's approach is the empirically based approach offered by Eric Lenneberg (1967). Lenneberg has conducted considerable research into various neurological disorders in an attempt to provide a method of investigating the biological bases for language capacities.

. . . the existence of our cognitive processes entails a potential for language. It is a capacity for a communication system that must necessarily be of one specific type. This basic capacity develops ontogenetically in the course of physical maturation; however, certain environmental conditions also must be present to make it possible for language to unfold. Maturation brings cognitive processes to a state that we may call language-readiness. The organism now requires certain raw materials from which it can shape building blocks for his own language development. The situation is somewhat analogous to the relationship between nourishment and growth. The food that the growing individual takes in as architectural raw material must be chemically broken down and reconstituted before it may enter the synthesis that produces tissues and organs. The information on how the organs are to be structured does not come in the food but is latent in the individual's own cellular components. The raw material for the individual's language synthesis is the language spoken by the adults surrounding the child. The presence of the raw material seems to function like a releaser for the developmental language synthesizing process. The course of language-unfolding is quite strictly prescribed through the unique maturational path traversed by cognition, and thus we may say that language-readiness is a state of latent language structure. The unfolding of language is a process of actualization in which latent structure is transformed into realized structure. The actualization of latent structure to realized structure is to give the underlying cognitively determined type a concrete form (pp. 375-376).

It should be noted in Lenneberg's discussion that he, too, is merely

suggesting a model, a hypothesis, which attempts to account for language acquisition as a process analogous to the biochemical processes involved in the breakdown and synthesis of nutrients. Lenneberg seems to find need of an analogy in order to strengthen his claim by demonstrating that despite the fact that there is very little, if any, concrete physiological data on which to base his case, analogous processes do occur in humans, thus rendering his model, at least, logically acceptable. As Lenneberg himself states:

This book attempts to reinstate the concept of the biological basis of language capacities and to make the specific assumptions so explicit that they may be subjected to empirical tests. In many instances I have not been able to do more than to formulate questions and to show that they are not spurious. There is no research as yet that provides answers to them. . . .

This book must be understood as a discussion rather than a presentation of the biological foundations of language. The exact foundations are still largely unknown (p. viii).

The specification of the process proposed by Lenneberg includes the characterization of the human organism "as . . . traversing . . . highly unstable states" (p. 376). As the organism passes through the maturational stages involved in its development, various states of disequilibrium are maintained for a period of time during which a re-alignment or rearrangement occurs, which, in turn, brings about still another state of disequilibrium, and so on, "until relative stability, known as maturity, is reached" (p. 376).

The state of disequilibrium identified by Lenneberg as "language-readiness," which provides humans with a potential for "primary language synthesis" has a duration of approximately ten years. "It

begins around two and declines with cerebral maturation in the early teens. At this time . . . cerebral reorganization of functions is no longer possible" (p. 377). Within this period, Lenneberg goes on to specify a normal age level of 4-1/2 to 5 years maximum as the period when language is "fully established" (p. 156). Some have chosen to interpret this statement as a claim that a five-year-old child has acquired all of the Portuguese or Swahili he will acquire as a native language during his entire life. It should be fairly obvious from Lenneberg's remarks on acquisition of vocabulary, however, that his reference is to processes and strategies rather than to specific linguistic forms or signals. To wit, "New words may be acquired throughout life, because the basic skill of naming has been learned at the very beginning of language development" (Lenneberg, 1967, p. 158). It should be noted that what must be acquired in order for language to be "fully established" are not particular names, but rather, the "skill of naming." By extending this notion--i.e. the "skill of naming" as a function of postulated processes and strategies rather than specific linguistic forms or signals--to other aspects of language acquisition, Lenneberg's proposal can be viewed in a more appropriate perspective.

The final point which merits emphasis in discussing Lenneberg is his insistence on the unique role of the environment.

Certain social phenomena among animals come about by spontaneous adaptation of the behavior of the growing individual to the behavior of other individuals around him. Adequate environment does not merely include nutritive and physical conditions; many animals require specific social conditions for proper development. The survival of the species

frequently depends on the development of mechanisms for social cohesion or social cooperation. The development of typical social behavior in a growing individual requires, for many species, exposure to specific stimuli such as the presence of certain action patterns in the mother, a sexual partner, a group leader, etc. Sometimes mere exposure to social behavior of other individuals is a sufficient stimulus. For some species the correct stimulation must occur during a narrow formative period in infancy; failing this, further development may become seriously and irreversibly distorted. In all types of developing social behavior, the growing individual begins to engage in behavior as if by resonance; he is maturationally ready but will not begin to perform unless properly stimulated. If exposed to the stimuli, he becomes socially "excited" as a resonator may become excited when exposed to a given range of sound frequencies. Some social behavior consists of intricate patterns, the development of which is the result of subtle adjustments to and interactions with similar behavior patterns (for example, the songs of certain bird species). An impoverished social input may entail permanently impoverished behavior patterns (Lenneberg, 1967, pp. 373-374).

In light of what sociologists and sociolinguists such as Basil Bernstein have suggested regarding the limiting factors on language development imposed by given environmental conditions (cf. B. Bernstein, 1960; 1964), the emphasis that Lenneberg places on extra-organismic variables in his account of language acquisition seems not only reasonable, but is, in fact, the sine qua non for an adequate conceptualization of language development. For, in addition to the genetic or built-in factors, and, it should be added, partial genetic blocks (Williams, 1956), we must also take into consideration the environmental conditions surrounding language acquisition.

But, how is theorizing such as that herein previously described about first language acquisition processes relevant to our understanding of second language acquisition? The answer is, quite simply, that

we don't know. Nonetheless, whereas whatever empirical relations are revealed by research into first language acquisition may not be directly relevant, they will certainly be of relevance to our understanding of second language acquisition. Furthermore, the terminological convenience of referring to first as opposed to second language acquisition should be viewed in its appropriate light, i.e. as differentiating observations of a phenomenon taking into account environmental and/or temporal considerations, and not as implying the operation of different processes (i.e. cognitive). The untenable character of this latter proposition--i.e. the operation of different processes--should be obvious.

The varying degrees of emphasis on environmental conditions surrounding first and second language acquisition--e.g. the home, the classroom, the control exerted in the classroom setting which is generally absent in the home, the number of contact hours per day in the two settings--seem to rule out a priori any possible link between the two (i.e. first and second language acquisition). On the other hand, it may be that it is precisely for this reason, i.e. the reification of the terms used, that underlying relationships have been missed. It is conceivable that the search for discrete characteristics of two instances of a single phenomenon may have blinded investigators to the properties of the phenomenon germane to any of its instances. McNeill (1965), albeit implicitly, acknowledges this danger, for he suggests that while there may be a great deal of difference between the environmental conditions associated with the acquisition process in the two

cases, he states, ". . . if we know something of how a young child acquires his native language perhaps we can devise artificial ways to recreate this process in an older second-language learner" (p. 2).

2.0 Second Language Acquisition

Discussions concerning second language acquisition have traditionally reflected the practical concerns of teaching a "foreign" language to persons who are normally past puberty and who, as a result, have already completed the process of cerebral maturation described by Lenneberg (1967, p. 376). These discussions have generally concerned themselves with methodological questions. The polemics involving "grammar-translation" or "reading" versus "direct," "natural," "audio-lingual" or "mimicry-memorization" approaches serve to exemplify this general concern. Carroll (1953), however, points out that such distinctions are largely superficial ones which really miss the point because they say little or nothing about "the way an individual learns, or about the nature of the things he learns" (p. 169). It must be emphasized here that while Carroll is probably accurate in claiming that these distinctions rarely include any explicit discussion about how we learn or the nature of what is learned, he fails to mention the rather obvious fact that any method of instruction of necessity must involve certain assumptions about the learning process and the nature of the material to be learned. The proponents of a particular method may be unable to state or even recognize these implicit assumptions, but this by no means signifies a lack of them. Any method of instruction includes by its very nature assumptions about the learner, the

learning process and the material to be learned.

Carroll (1953) discusses some of the factors related to the learner population which he considers necessary to evaluate any given program of instruction. Among these are the student's age, his intelligence, his "aptitude for language," his motivation, his prior experience with languages (including his own) (p. 170). What Carroll fails to indicate is that these same variables may well be crucial not in the evaluation stage of a program, but rather, in the construction of a program where a clear specification of independent variables should be present if evaluation is to have any meaning whatever. In addition, it seems quite clear that the kinds of information upon which the construction of any program would be based should include insights gained both from linguistic analysis and from psychological research into the learning process, pattern recognition strategies, and so forth. Since we implicitly involve ourselves in assumptions about many variables whenever we set forth a method of instruction, it seems wise to consider the implications of the claims we make regarding such a method. For, once identification of the assumptions implicit in our method is made, critical evaluations can be based on data rather than on personal preference or bias.

It should prove profitable to examine a few of the statements which have been used at one time or another to justify a method as "linguistically," "psychologically" and/or "pedagogically" sound. It will be noticed that the underlying assumptions are seldom explicitly stated; when such assumptions do receive some attention, it is often

in terms of vague concepts which contribute very little to the discussion.

As the "mimicry-memorization" approach came into vogue, certain claims about its superiority and efficiency were based on the notion that it was more "natural." Carroll (1960), for example, states:

In "modern" courses the student is introduced to speech patterns which vary in controlled ways; by practicing these patterns he is expected to incorporate the grammatical structure of the language into his repertoire of foreign language verbal behavior in somewhat the same way that the child does on learning his native language (1960, p. 30).

While we do not have Carroll's exact explanation for "in somewhat the same way a child does" (and given this imprecision, any interpretation is acceptable), we may safely assume that he is referring to the hypothetical processes or stages in first language acquisition which he proposes correspond in some analogous way to the "incorporation of controlled patterns" in the case of second language learning. What then are the implications of Carroll's claim? First, and most obviously, there seems to be an allusion to "ease of acquisition" in Carroll's reference to children who somehow incorporate the grammatical structure of the language into their repertoires. There seems to be an appeal of the sort:

We all know how quickly and effortlessly children seem to learn their native languages. They don't need to concern themselves with explicit grammatical rules. They simply mimic the speech provided by their environment and memorize what they mimic without any conscious effort to do so. Second language learning can be much less painful if fashioned after the first or native model.

Carroll also seems to be making a strong claim about how a first language is acquired. For if pattern practice is to be a part of the second-language learning experience, and the method employed is in some way analogous to the way that the child learns his native language, then the native language must necessarily be acquired through the practice of patterns which are present in the environment of the developing child; these patterns are somehow incorporated. Since it is fairly obvious that the environment does not provide "controlled" patterns under the normal conditions surrounding first language acquisition, "control" involves us in a further assumption based on certain principles of learning theory which claim that control is necessary for optimum effect. So, while Carroll may find the disputes between various methodologies "superficial" (1953), the implicit assumptions underlying any methodology must be carefully examined before proceeding with a criticism; and, when offering an alternative to a methodology found to be inadequate for one reason or another, it is essential that the proponent consider the assumptions underlying his proposed alternatives.

One of the recent developments in "foreign" language teaching has been the trend toward decreasing the age level at which students begin to learn a "foreign" language in the schools. It is interesting to examine the justifications which have been provided for such a trend. Huebener (1964) offers such a rationale:

The inadequacy of foreign language teaching in our country heretofore has been due largely to two major weaknesses: too late and too little. Most students did not learn the

language until they reached high school and the great majority pursued the subject for only two years. Everyone, however, knows that learning a language is a long process, extending over many years and requiring constant practice.

The simplest, the most natural, and the most effective way of learning a language is to begin early. The young child's speech organs are flexible; his mind is uninhibited. He takes a natural delight in learning speech patterns, and he imitates readily. Pedagogically and psychologically the reasons for teaching young children a foreign language and the culture of the people who speak that language are of the soundest (1964, Foreword).

While Huebener is not very specific in his argumentation, it is his use of vague notions which causes greatest consternation, because his appeal to abstractions such as "uninhibited mind" and "natural delight" give the false impression that something has been explained. What, in fact, has Huebener contributed to the justification of beginning second language teaching at an early age? And, more importantly, what are the implicit assumptions underlying his argument?

Huebener begins by making a categorical statement to the effect that there are two things wrong with second-language teaching. He continues then to "prove" this statement (1) by appealing to the reader's common sense--"everyone . . . knows," and (2) by indulging in a bit of circularity: language learning takes a long time . . . so we must begin early . . . because it takes a long time. . . . The possibility that "the long process" is in some way related to the late start or the method is not considered.

As mentioned above, Huebener's appeal to notions such as "uninhibited mind" and "natural delight" tell us very little about language acquisition in younger children. Huebener concludes by again

supplying a categorical, "the reasons ... are of the soundest." Implicit to the whole argument presented by Huebener (weak as it may be) is that there is some relationship between children and their native languages and children and "foreign" language acquisition. There is even a hint of developmental stages when Huebener speaks of the flexibility of speech organs in children, and a child's "uninhibited mind," but he never develops these into any sort of strong case.

Along the same lines, Halliday et al. (1964) devote a sizeable portion of their discussion to questions of second language teaching methodology and its implications in their general elaboration of linguistics and language teaching. Their principal thesis calls attention to the relationship which "should" exist between linguistic science and language teaching (cf. DeCamp, 1968, discussed later in this Chapter).

These two broadly contrasting approaches (the teaching of English and the study of questions which have to do with the way language 'works,' as distinct from the way a given language might best be taught) interconnect, and it is the main business of this book to show how they do so. Or perhaps we should say, to show how they should do so, for . . . such interaction as there has been has in general taken place in a rather haphazard fashion (1964, p. vii).

But it is not only this tenuous bridge between linguistics and language teaching that requires greater bolstering; another bridge must be constructed--between research concerning acquisition processes in a child's first language learning experience and the presentation of a "foreign" language in a formal training setting. Halliday et al. allude to this notion when they state:

. . . It is important to separate the consideration of how languages can be learned from how they can or should be taught; we are concerned for the moment with the individual human being who is doing the learning rather than with the person who is attempting to do the instructing (1964, p. 181).

Halliday et al. correctly point out the weakness in many proposed methodologies--failure to recognize how learning takes place and the nature of the learner as crucial to a consideration of teaching. Considerations of learning processes and learner characteristics are of great importance, of course, but what Halliday et al. fail to point out is that any methodology proposed for teaching a second language must inevitably rest on certain basic assumptions about the learner and the learning process, regardless of whether such assumptions are ever explicitly considered by proponents of the methodology.

Concerning the less than optimal circumstances surrounding second language acquisition vis-à-vis the child's acquisition of his native language, Halliday et al. state:

All these favourable circumstances--an early start, extensive experience at frequent intervals, and strong motivation--are present in the highest degree for the normal child, during his acquisition of the primary language, at least for the understanding of speech and the ability to speak intelligibly and acceptably. . . . When it comes to learning any secondary language, on the other hand, the reasons for doing so are often less obvious (p. 182).

It is apparent that references to "early start" and "extensive experience at frequent intervals" add very little to our knowledge of the language acquisition process. What does it mean to say that an infant starts early, and that he is afforded a great deal of experience at

frequent intervals in acquiring his native language? Unless the authors are suggesting the recapitulation of ontogeny, which would obviously be a difficult proposal to implement, to maximize gains in second language learning, these two "favourable circumstances" are irrelevant to the analysis of the problem. The reference to "strong motivation" also begs the question although it does represent an inference about causality which, unlike the other two "favourable circumstances" mentioned, escapes the level of common sense. Further, when contrasting first language experience with the learning of a second language, Halliday et al. mention that "the reasons for doing so" are not obvious in the latter case. Since this statement cannot possibly refer to the first two circumstances cited by the authors, we can only speculate that it is used in a somewhat analogous way to the authors' use of the expression "strong motivation" inasmuch as inferences about causality are common to both statements. It could be stated, parenthetically, that we are left with the implication that since in the case of second language a "reason" for learning is lacking, it must exist in the case of first language, and probably this is what was implied by the reference to motivation. Nonetheless, it should be noted that the statements about "strong motivation" and "reasons for doing" something do imply a cause for facility or difficulty in language learning, first and second respectively, and to this extent appear to explain the differential aspects of the phenomena in question. That this interpretation of what the authors stated is not out of line with their general position can be seen if we consider

another statement made in the same context as the original quotation.

"Acquiring a positive reason for learning a language will thus (italics ours) help a pupil to learn it, while a negative motivation may make it impossible for a pupil to learn at all effectively" (p. 182).

Here again we are confronted with a word which purports to explain something. What is motivation? How does motivation in itself serve to explain language acquisition? The practice of "explaining away" certain questions by simply assigning them a label is once again invoked. The "common sense" of the uninitiated and even of some of the initiated will provide instant reassurance that the problem has been "handled." Repeated use of these label-explanations in the literature often makes the initiated as vulnerable to the false security as his innocent counterpart. We are reminded here of Galileo's unfortunate experience with the Papacy when, because Aristotle had once explained the truth about the position of the earth vis-à-vis the other planets, a re-examination of the question with the innovation of the telescope was redundant, heretical and sheer folly. Huebener's "uninhibited mind," and "motivation" as described by Halliday et al., are but two of a wealth of examples in the literature related to second-language teaching, learning, methodology, etc. (cf. also Finocchiaro, 1964, pp. 19, 29).

It seems appropriate at this point to examine in light of the growing literature relevant to first-language acquisition, some of the basic notions developed for second-language acquisition; for, if these notions are necessarily based on assumptions regarding what is known

about language--the process and the nature of what is learned--such information is of interest. Jakobovits (1968), for example, addresses himself to some of these questions. Research into first language acquisition in turn owes a great deal to the headway in linguistic theory which has been made in recent years regarding the nature of language. For, once a model of language is developed, a model accounting for the acquisition of language can be attempted. And, once a model for acquisition is proposed in some explicit form, it can then be tested and critically evaluated in some meaningful way. Without explicitness, all of the above becomes impossible, and we are left with only our label-explanations which, by their being able to explain away everything, actually explain nothing.

First let us examine certain assumptions relative to the acquisition process. Later we shall review the assumptions regarding the nature of language implicit to any proposed methodology.

2.1 The Process

Most of the recent methodologies designed for teaching a second language require that the teacher "give practice--intensive, but varied--so that the new language habits will become firmly fixed" (Finocchiaro, 1964, p. 31). As Jakobovits (1968) has pointed out, such emphasis, if it is to have a basis in the general notion of how a language is acquired, would necessarily imply (1) that children imitate novel forms when exposed to them, and (2) that by practicing the novel forms, these will become "firmly fixed" (p. 100). Weir (1962) quite clearly demonstrates that small children do, in fact, engage in

language practice; her data were interpreted as evidencing the rehearsal of particular utterances used sometime during previous interaction with the child's mother, for example, and the repeated attempts at uttering these previously heard bits and pieces of English. But, what is not clear is which of the many utterances to which the child is exposed during any given day will he "choose" to practice, how accurately does he perform them, and, what evidence is there for these rehearsed constructions, whether accurate or not, actually becoming a "firmly fixed" part of the child's repertoire. As Lenneberg (1967) has rather convincingly shown, imitation by children seldom conforms to the level of correctness assumed necessary in a second language learning context (p. 316). And, cases of hypercorrection evident in the first language acquisition process indicate that practice in itself offers no guarantee that the form will be "firmly fixed." Further, Ervin (1964) has claimed that "children gain little from overt practice; a child's own production of speech will not be critically involved in the process of acquisition" (in Smith and Miller, 1966, p. 81).

The notion of transfer, including positive, zero, and negative as described, for example, by Stockwell and Bowen (1965), is another of the basic principles of second language teaching. Transfer is sometimes referred to in the negative sense as "interference," and attempts to deal with it are often labeled "contrastive approaches." Transfer is thus described by Stockwell and Bowen (1965):

. . . A student may have some habitual responses which are contrary to the responses required for a new skill which he is trying to master (negative), or which are similar to the

new responses (positive), or which have no relation to them (zero). This notion of transfer is applicable throughout the structure of the language: the sound system, the grammar, the vocabulary (p. 9).

They describe a hierarchy of difficulty of Spanish for English speakers which is based on a comparison of the sounds of Spanish and English--the phonemic contrasts, the allophones and their environments, the distribution of each phoneme and the frequency of each phonemic contrast (p. 8). And, by comparing the two languages in question according to these criteria,

. . . we will discover the differences between the languages. We then need a reasonable way to establish a hierarchy of difficulty among these differences--a scale from most difficult to least difficult. Such a hierarchy will provide us with a basis for deciding how much drill is needed on each point, and will be one of the major factors in deciding what the optimum order of presentation will be (p. 8).

There seem to be two principal difficulties with accepting such an approach. The first objection to the notion of transfer or interference is discussed by Brière (1966):

. . . the majority of linguists have based their predictions of degrees of difficulty in learning phonological categories primarily on the theoretical constructs of 'systems of distinctive versus redundant features,' 'phoneme class membership,' and 'distribution of the phoneme classes.' In almost all cases the predicted hierarchies of difficulty are based on theoretical rather than pragmatic classes (p. 769).

It is clear that a set of naturalistic observations--i.e. field work--followed by analysis and the development of higher order constructs--i.e. the model imposed on the data by the trained linguist including such notions as those mentioned by Brière--offer no special claim on

"truth"; they merely serve as an attempt to account for certain linguistic observations. A method for teaching a second language to any language group requires data directly relevant to the question of acquisition--what Brière seems to refer to as "pragmatic" information. What makes for a parsimonious and elegant linguistic description does not necessarily tell us what is the best way to approach the teaching situation. As Jakobovits (1968) has pointed out:

. . . the fact that it is possible to predict errors or confusion as in contrastive analysis of phonology, is not necessarily an indication that transfer effects will operate in the acquisition of the new task. Thus, the fact that the [l] and [r] sounds are predictable areas of confusion for a Japanese learning English says nothing about the way in which he will eventually learn the distinction (p. 104).

What is perhaps most disturbing about the use of such concepts is not that those who use them may be mistaken, but that the methodologies which result therefrom may be, by their very nature, doomed to failure, and worse, may actually act as deterrents to the very acquisition they attempt to facilitate. If, for example, we consider the notion that a specific order in the acquisition process must be followed--i.e. what is learned during an earlier stage is a necessary prerequisite to what may be learned in a subsequent stage--it may be that an early emphasis on certain phonemic distinctions or inflectional variations in a second language, for example, misses the point, since it is very possible that before such distinctions can be acquired, a pre-determined set of other distinctions (or the actualization of other strategies) must antedate them in the order of acquisition.

Obviously, this is an empirical question.

An order of presentation has, of course, been followed in second language teaching, usually that order provided by the textbook or the material being used. But, what determines this order? On what basis is it decided by the textbook writer or the language teacher that the first lesson for an English speaker attempting to learn Portuguese be devoted to the acquisition of the distinction between two so-called "to-be" verbs, "ser" and "estar"? Without attempting to assign motives to their decisions, we might simply ask whether such a decision is based on empirical evidence for this distinction being crucial to the initial stage of acquisition, thus permitting or facilitating subsequent acquisition stages; whether it is based on a contrastive analysis of English and Portuguese grammar which shows that the two systems simply differ in this respect; whether it is based on the pragmatic evidence that this distinction (which has high frequency in the language) is one seldom successfully acquired by the students, and, using Huebener's reasoning, it seems to be a distinction requiring a long time to learn, so that it is placed in the first lesson in order to give it maximum exposure throughout the language course; or whether it is based on considerations of what is most expedient in terms of the ease of constructing exercises for the acquisition of material in subsequent lessons. It should be noted that the last alternative is not at all the same as the first, although ideally, they might be expected to coincide. The difference between the two as herein described is that in the first, the concern is with whether a

particular distinction such as "ser-estar" can serve as an initial stage in the learning process--whether the student can successfully acquire this distinction without having passed through certain other previous stages, and whether this distinction is a necessary prerequisite in terms of acquisition processes for the material in the second lesson which is devoted, for example, to the gender of nouns. If the answer to all, or any, of these questions proves to be in the negative, valuable time may not be the only loss; we may be building a cumulative deficit into the process which might well be nearly impossible to overcome later. In the last case, on the other hand, the concern is with the construction of a well-integrated set of materials: what is presented in the first lesson is extremely useful to the writer of the book in constructing drills for the practice of the material presented in the second lesson. The widespread disagreement regarding such matters as the early or late introduction of the subjunctive seems to indicate the fact that personal bias (subjective opinion) and internal consistency within the materials act as principal criteria for decisions regarding order of presentation.

The second alternative mentioned above is that of basing a second-language teaching methodology on a contrastive analysis of the two languages. It may well be that only the more superficial aspects are the more apparent ones in the juxtaposition of two phonemic inventories or two verb systems. While it is clear that differences exist between any two given languages, what is not clear is how these differences must be approached in the attempt to train a speaker of one

of the two languages in the other. Interference as it is usually portrayed may not be of crucial importance in the acquisition process. Recalling again Lenneberg's discussion of the "skill of naming" as opposed to the acquisition of given names, and McNeill's discussion of hierarchical categories in the acquisition process, it may be that second-language teaching is concentrating its efforts on those aspects of a particular grammar which can by their very nature have little bearing on the overall result. Interference between two linguistic systems may take place in an entirely different way than that normally recognized (cf. Brown, 1969). In approaching historically closely related languages, which are those most often dealt with in the second-language teaching situation in the U.S., the notion that interference might occur on any but a very superficial level may be more difficult to accept, since the apparent similarities far outnumber the differences, and these differences tend to be of a rather superficial nature (e.g. English -tion, Spanish -ción, Portuguese -ção). Furthermore, not much is heard about a "contrastive approach to lexicon," and many earlier second-language teaching methods have been criticized because of their including long lists of "vocabulary items" with their respective glosses in the native language of the learner population. And, yet, a moment's reflection will reveal that juxtaposition of two sets of phonemes along with their allophones and distribution is not really so different from juxtaposing two sets of dictionary entries along with their various distributions.

The familiar example of the second-language learner who can,

without a flaw, produce a sentence from one of the dialogues he has been told to memorize, but who, when confronted with an opportunity for "creativity" in the second language--e.g. a novel utterance presented for his comprehension--fails dismally, is but an indication of a more serious problem. Such a student has failed to capture whatever it is that enables a native speaker of the language to produce and comprehend novel utterances, the "creative ability" discussed earlier. The occasional exception to the foreign language students' inability to capture these "underlying processes"--i.e. one who successfully internalizes the second language to the point of performing novel utterances--does not, of course, necessarily justify the language program in which he is enrolled. Rather, this student may succeed in spite of the training, or in addition to it--that is, he achieves what the program has established as a goal, yet, not necessarily through the means provided by the program to achieve that goal.

If the notion is accepted that man is endowed with a special apparatus which is triggered in some way by the environment, the result being language, the possibility of certain of the basic strategies employed in first language acquisition being involved in second language acquisition must at least be entertained.

The restructuring that must inevitably take place in acquiring a second language is probably not limited to phonological charts nor to inflection of verbs, both areas the source of much concern in the teaching of a second or foreign language. McNeill's (1965) suggestion for second language instruction involving the use of "child sentences"

is not so radical an approach as it appears upon initial inspection.

He states:

. . . Adults and older children are not lacking in an ability to formulate hypotheses. Indeed, they are far better at it than 2-year-olds. Rather, we assume that adults and older children can no longer formulate the appropriate hypotheses; we assume that they lack expectations about the base structure of language. There must be numerous ways to provide adults with information on base structure, but one technique that comes to mind is to present not well-formed sentences in the second language, but child sentences; not a complete grammar of the second language, but grammars developed by children. There might be important advantages in doing this. As we have seen, child speech deviates from adult speech in that it presents mainly deep features and leaves out surface features, and deep features are just the aspects of second-language competence that may be most difficult to acquire. One can imagine second-language instruction consisting of a progression of child grammars, perhaps each representing a stage some six months later than its predecessor. A sequence of child grammars has the merit, at least, of reproducing the steps successfully taken by a child in acquiring full adult competence and may have the additional theoretical advantage of making overt features of the second language that have gone completely underground in the speech of adults (p. 35).

That second language teaching has not been extraordinarily successful is fairly widely acknowledged. Increased contact hours, new equipment, etc. have seemed to have little effect on the basic problem of attempting to equip the student with a native-like capacity in the language. McNeill's approach provides a new alternative, one of a substantive nature, based on the nature of human acquisition processes, critical periods, order of acquisition, etc., thought to underly these processes. We have no assurance that McNeill has provided the solution, but the risk seems very small given the fact that previous attempts have enjoyed limited success.

2.2 The Nature of Language

Changing our emphasis from the process involved in acquisition to the nature of language as provided by linguists' accounts (although it is recognized that the two are so intimately related that a separation is possible only for purposes of discussion), we will limit ourselves here to an examination of one particular point: the attempt to put the theoretical propositions which currently predominate into the development of materials and into the classroom situation. The reason for this final emphasis is that the basic notions regarding the nature of language and its implications for the kind of process necessary to acquire language, which in turn has implications on the kinds of pedagogy designed to cope with these processes have appeared throughout our previous discussion. As explained above, the development of a theory of language acquisition must of necessity rely on a theory of the nature of language. So, as previously mentioned, many recent developments in psycholinguistics have come about largely because of the statements which the linguists in recent years have been able to formulate regarding a theory of language.

It will be recalled that an earlier reference to Halliday et al. indicated that their principal interest was the relationship which should ideally exist between linguistics and language teaching. A more recent approach toward bridging the gap between the theoretical linguist and the classroom situation was proposed by DeCamp (1968). DeCamp states that during the 1940's language teachers were eager to pick up and use in the classroom whatever became available from the

linguists. There was an attempt, at least on the part of some language teachers, to keep abreast of developments in linguistics, and to put them into practice in their classes. He points out that teachers today are not so well able to adapt developments in the world of the linguists to their classroom situations, despite the fact that institutes, workshops, etc. in abundance have made Chomsky and "transformational grammar" familiar to them. While it is probably true that teachers today only rarely attempt to implement some aspect of transformational grammar in their classrooms, it is questionable

(1) whether the close relationship between linguists and language teachers discussed by DeCamp is at all feasible at this point in time, and (2) whether immediate implementation of certain aspects of transformational grammar as DeCamp advocates would provide for great positive changes in the results attained.

In answer to the question posed by DeCamp, "But where are the language textbooks written by Chomsky, Halle, Postal, Klima, Fillmore, Ross, or even textbooks which seem to be very much influenced by them?" (p. 3), it seems appropriate to ask why those textbooks coming from the period when "the lag between theoretical discovery and classroom application was very short" (p. 3) are no longer useful. The answer to the latter question would presumably be provided by pointing out that the theory has changed considerably since that time--the older theory is no longer considered adequate. We might then ask what makes us confident that the new linguistic theory will ultimately offer a better solution. This question arises, not out of fear nor out of a

denial of the possible relevance of generative theory to language teaching as DeCamp suggests (p. 5), but rather out of three basic considerations. (1) Language teaching materials developed in close conjunction with linguistic theory during the 1940's were never shown to be unquestionably superior to other materials--many evaluations which seemed to favor these materials over others either were biased in terms of the tasks to be evaluated or failed to control the variables involved (cf. Carroll, 1953). (2) The notion that these materials were not overwhelmingly successful in providing language competence was not widely acknowledged during their predominance; the real criticism has appeared only quite recently--post hoc. That is, the argument that these materials did not enjoy unprecedented success because the linguistic theory upon which they were based was inadequate came only after another theory was proposed. The fact that much language teaching was a failure could only be blamed on incompetent teachers, inadequate laboratories, insufficient contact hours, etc. because the methods, based as they were on a linguistic orientation, were, by definition, appropriate and good. Now that a new linguistic theory has come to the fore, what leads us to believe that we will be somehow more "right" this time both in terms of the theory itself, and its application to the language teaching situation? This brings us to the final and perhaps most important of the three questions. (3) What does any linguistic theory in itself really have to say about the best way to go about teaching a particular aspect of the grammar of Language X? The theory provides us with insights into the nature of

Language X and even suggests what kinds of processes would probably be involved in the acquisition of this language as formulated, but the decisions about how to present language in order to simulate these processes are not inherent to the linguistic theory itself.

So, while we would agree that some attempt should be made to study the question of applying recent developments in linguistic theory to the preparation of materials and techniques compatible with the theory, it seems clear that this process of adaptation does not directly follow from the linguistic theory itself. A good deal of other information must be brought to bear, and even if the current theory should prove to be adequate as a linguistic theory, this by no means ensures successful adaptation and incorporation into the pedagogical armamentarium. Linguistic theory constitutes only one of the variables interacting with a host of others, and it is the result of this interaction which determines success in the teaching-learning setting, not the theory alone. Notions of imitation, repetition, etc. did not arise from immediate constituent analysis alone although the latter undoubtedly provided certain guidelines. The relationship of linguistic theory and successful teaching methodology depends on a goodly number of intervening factors about which linguistics per se has little to say. "Getting generative grammar into the classroom" as a goal seems both simplistic and premature.

3.0 This Study

In light of the preceding discussion, it seems clear that one of the current needs (cf. also Diebold, 1965, pp. 248-249) is for some

basic research into the observable and measurable linguistic behavior of children engaged in both first and second language learning. Implicit to this assertion is the necessity for appropriate instruments which will make feasible the undertaking of this endeavor. We must first study the linguistic behavior of children engaged in this activity; observation broadly conceived is not enough, however. We must determine what it is that we must observe. The data to be gathered should bear some relationship to theory, and in turn, analysis of the data should shed some light on the adequacy of propositions which follow logically from the theoretical postulates, thus providing the empirical grounds for revisions in the theory or parts thereof. It should be noted, however, that the importance of data should not be defined in terms of their amenability to theoretical integration. As Sidman (1960) has pointed out: ". . . good data are notoriously fickle. They change their allegiance from theory to theory, and even maintain their importance in the presence of no theory at all" (p. 7).

The conclusions we reached as stated in the above paragraph led us to choose to investigate one specific area of language acquisition, namely, the noun plural endings in English. Above all, our aim was, as Sidman would put it, to gather "good data." The populations studied consisted of native speakers of Spanish and native speakers of English. Specific questions upon which we hoped to be able to shed some light included: What differences, if any, are manifest in the sequence of acquisition of noun plurals by native as opposed to non-native speakers of English? What indications of

"interference" as predicted by a contrastive analysis of Spanish and English can be observed as regards the particular linguistic parameter examined? And, in a more general sense, what implications, if any, do answers to the above have for the teaching of a second language?

3.1 Precursors

The choice of the formation of English noun plurals as the linguistic parameter for this study was not an arbitrary one. Rather, it was predicated on the fact that while considerable research has already been carried out in this area with native speakers of English, the findings can hardly be considered conclusive. Furthermore, in extending the study of the acquisition of English noun plurals to native speakers of another language, interpretations of the results would have been made difficult, if not impossible, had similar data not also been gathered under similar conditions for a comparable sample of native speakers of English.

1. Berko, Jean (1958)

Using pre-school and first grade native English speaking children, Berko collected data on a number of English morphological patterns. While we incorporated in part the techniques used in her study, our instrument and procedures differ from Berko's in several significant ways:

(a) Berko used only native speakers of English. Our study sought to provide relevant data for both native and non-native speakers of English.

(b) Berko apparently did not control for the socio-economic status of her Subjects and admits to having failed to accumulate any data at all on the aptitude or I.Q. of the Subjects. We set out to control both of these variables, the former following the general procedures developed by Parsons (1951) and endorsed by Labov (1966) for application to linguistic research, and the latter through a selection procedure of within-group norms. It should be emphasized here that there is no basic assumption implicit to our insistence on controlling these two variables that they would alter our data in any way if left uncontrolled. The assumption is, rather, that we do not know their role, and thus, if we do not control them, interpretations of our results will always remain open to question.

(c) Berko examined several different morphological processes--plural of nouns, possessives, third person singular present tense verb forms, past tense, progressive, and adjective comparative and superlative forms--using a total of only 28 test items. We submit that greater reliability might be attained by reducing the number of linguistic parameters and by increasing the number of items used to study them. We have tested for the acquisition of only one linguistic parameter--the plural of nouns in English. It seems reasonable in an exploratory study of this nature that we examine only one linguistic parameter, since by so doing, and further, by controlling other variables--aptitude, socio-economic status and age (grade level)--we can better investigate the feasibility of examining language acquisition using the instrument designed for that purpose.

(d) Berko used the same instrument for all Ss--i.e. the same items, in the same order. In all presentations of her instrument, the same ordering of items was observed. This fact raises some questions about the results she obtained. There is no way to determine what influence, and, if any, its degree, the juxtaposition of particular items had on the responses of the Ss. If, for example, the responses to two items in sequence should in theory reveal two different grammatical rules and both are inflected in the same way by the S, the first judged "correct," and the second, "incorrect" by Berko's measure, can we say that this provides us information regarding the Subject's internalized grammar, or rather, that it is the result of the first item influencing the response to subsequent items? In short, the order of items introduces a variable which Berko did not control and makes her results difficult to interpret. Again, it should be emphasized that our position is not that the constant serial order affected her results; it is, rather, that we simply do not know whether it did or not.

The problem of the serial position of items when nonsense syllables are used as research tools has been extensively studied (e.g. Ebbinghaus, as early as 1885, and Underwood, as late as 1968) in learning research in psychology. These investigators were interested in studying the learning process through having their Ss memorize lists of nonsense syllables under different conditions. In linguistic research when this particular tool (nonsense syllables) is used, the problem is compounded by the fact that groups of individual

items are designed to test particular hypotheses which are generated from the general theory. Hence, it is even more essential that the possible bias introduced by serial ordering be avoided. In Berko's study, while we may intuitively "feel" that a mixture of plurals and verbs, for example, provides sufficient variation to avoid the problem of one item affecting the response to the next, or even one occurring two items later, we have no empirical evidence for this supposition since all Ss were presented the items in the same order. In short, this fact, coupled with those mentioned in (b) and (c) above, casts serious doubt on the reliability of Berko's results. What can really be said about such results when so many variables remained uncontrolled?

In this study we have randomized the items in creating three versions of the instrument which were then randomly matched with Ss (cf. Procedures in Chapter II), in an attempt to provide greater reliability by eliminating the possibility of a previous item systematically or randomly affecting the response on a following item or items.

2. Kernan, Keith T. and Blount, B. G. (1966)

This study carried out in Ciudad Guzmán, Mexico was essentially a Spanish-language replication of Berko's study of English morphology with a few minor changes, mainly in the realm of Subject selection and Subject characteristics. Like Berko, these investigators attempted to sample many different facets of the grammar, in this case of Spanish, among native speakers of that language. In the part of the study specifically related to pluralization of nouns in Spanish (to which only three items of their test were devoted), the authors reported

that vowel-final nonsense syllables were pluralized correctly 93.8 per cent of the time and consonant-final nonsense syllables 44.7 per cent of the time. Since this study so closely followed Berko's format, however, it suffers from the same limitations discussed above regarding Berko.

3. Anisfeld, Moshe and Tucker, G. Richard (1967)

Anisfeld and Tucker (1967) criticize Berko's study mainly because of its limitations regarding an in-depth examination of the plural (e.g. no inclusion of recognition tasks). What they fail to take into account, it seems, is that Berko was not studying only the plural, but rather, attempted to study a sizable portion of English morphology with a 28-item questionnaire. While we would tend to agree with Anisfeld and Tucker that Berko did not carry out an in-depth analysis of English plurals, we must recognize that although this was the purpose of the research of those two authors, it was not, apparently, Berko's. There are always "other things" an investigator can examine; it is up to him to define the limits of his investigation. Anisfeld and Tucker were interested in differences between production and recognition tasks, between tasks with and without illustrations, between tasks involving either production or recognition of plurals from stimulus-singulars or of singulars from stimulus-plurals; but, it is important to emphasize that they were always examining the plural. Berko, on the other hand, was apparently more interested in a general overview of English morphology. It is suggested here that the criticisms made by this writer regarding Berko's study (cf. pp. 33-36) are

more relevant since they point out the limitations within the study itself. That is, accepting Berko's purpose as stated--an investigation of the acquisition of English morphology--as the question to which answers would be provided by the data, the methodological weaknesses in the study tend to render the results inconclusive.

about the lines delineated below. It was recommended that the study be divided into two parts, Phase I and Phase II, as will be made clear in the following discussion.

1.0 PHASE I

The points mentioned in Phase I will be reviewed. The points which included are as follows:

1. From studies on a wide variety of languages, there has been a general agreement among linguists that the features of the segment closest to a glottal constriction are most influenced by coarticulation (e.g. Blount, 1963, p. 201; Blount, 1964, p. 204 and 205). Further, the greater the distance from the constriction, the lesser the effect expected, except in the case of nasals where the articulating segment may be affected by the nasal cavity and not necessarily be juxtaposed to the constriction.

The rules for the formation of the English /r/ are the English rules to that it is not a simple /r/ but a complex one. The fact that the /r/ is a complex one is not surprising since it is a complex one in the English language.

CHAPTER II

DESCRIPTION OF INSTRUMENTS AND PROCEDURES

In order to carry out this study, a research plan was developed along the lines delineated below. It was considered appropriate to divide the plan into two parts, Phase I and Phase II, as will be made clear in the following discussion.

1.0 PHASE I

The points examined in Phase I and the rationale for each being included are as follows:

1. From studies on a wide variety of languages, there has traditionally been rather general agreement among linguists that the features of the segment closest to a given segment are those which seem to exert greatest influence (if any is exerted) on that segment--i.e. assimilation (e.g. Bloomfield, 1965, p. 372; Jespersen, 1964, pp. 168 and 264). Further, the greater the distance from the segment in question, the lesser the effect expected, except in such cases as vowel harmony where the conditioning segment may occur at a greater distance, and not necessarily be juxtaposed to the segment in question.

The rules for the formation of the plural in Spanish resemble the English rules in that in both languages a suffix is attached, and the form said suffix takes is conditioned by the final segment of the singular form of the noun. Given this, we would not expect, among

speakers of either of the two languages in question, that a final consonant cue would be replaced by cues from either the preceding vowel or the initial consonant. We would obviously feel less confident about making such a prediction regarding pluralization were we discussing a language such as Swahili in relation to English; since in Swahili the plural is formed by adding a prefix, and the class of the prefix of the singular determines the plural prefix, predictions regarding cueing would be, at best, highly speculative. It should be noted that in Stockwell and Bowen's terminology this latter case would probably be labeled a case of "zero transfer." As far as we can determine, however, the use of "zero" does not by any means refer to descriptions of data; it refers, rather, to our lack of knowledge. That is, "zero transfer" does not mean that one element has no effect on another, although Stockwell and Bowen seem to imply that this is the case; the possible usefulness of this notion is not obvious to this writer. But, the question is, even if our intuition regarding Spanish and English points strongly in one direction, we cannot rule out other possibilities on grounds other than empirical ones.

We cannot assume that in the acquisition process the cues for signaling a particular response are the same ones which linguists have isolated in their descriptions. This becomes particularly evident when an attempt is made to explain the "causes" of "interference" in the process of the acquisition of a second language based on "contrastive analyses." For example, if a native Spanish speaker gives [kits] as a plural for English "kid," can we say it is because he has no

distinction between /s/ and /z/ in his inventory in Spanish? or, because the distribution of [z] in Spanish is determined by following voiced consonants, and this distribution is carried over to English? or, because he generally devoices final voiced stops in English since they do not occur in final position in Spanish, and this devoicing brings about an assimilating devoicing of the plural suffix? or, because all of the above are involved? or, none? What about a native speaker of German who provides [kits] for the plural of English "kid"?

Therefore, while our principal interest is testing for the acquisition of the rules of English noun plural endings on the part of both native speakers of Spanish and native speakers of English, we cannot fail to first consider the possibility of something other than the final consonant acting as a signal for the triggering of one or another form of inflection, in this case, the noun plural morpheme. We must check for the possible determining effects of other variables-- the vowel preceding the final segment, and the initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segment. What effect, if any, do they have on the \underline{Ss} ' responses? While intuitively we expect there to be no significant effect from the particular vowel or initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments, we cannot make this assumption; our instrument must provide a check for this possibility. Now, to do a complete check of this possibility, it would be necessary to test all final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments holding each of them constant, one at a time, and combining them with every possible preceding vowel and every possible preceding $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segment, or: 22 initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ X 9 $\left[\begin{array}{l} -cons \\ +voc \end{array} \right]$ X 24 final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments, minus any

meaningful trigrams. Obviously, this would have involved a tremendous number of items, and further, the necessary randomization of the items, and the preparation of different test lists, etc., in order to make administration of such a test feasible in terms of the attention span of the Ss and the results at all meaningful, would have greatly increased the complexity of the design. And, since the testing of this particular hypothesis was not the question to which we were most interested in directing ourselves, we proposed, by using a sample of all possible combinations, to test first for the possible influence of the initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segment. Phase I served this purpose, and the instrument used is found in Appendix B.

Our hypothesis in Phase I was: Initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments in a three-segment nonsense syllable do not influence the choice of noun plural suffixes attached to that nonsense syllable when said syllable is presented to Ss as a noun. Should any significant correlations have been found between particular sets of initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments and the suffix added to the nonsense-syllable noun to form the plural, these results would have enabled us to refute the hypothesis and would have been, in themselves, extremely interesting (with the added dimension of native English and non-native speaker differences); they would have required a follow-up by further testing along these same lines. For, further consideration of rules for forming noun plurals in English depended on verification of the Phase I hypothesis; if this hypothesis could not be verified, further work would have been meaningless. If, on the other hand, no significant correlations were

found between initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments and plural suffixes, the hypothesis--initial segments do not influence the choice of noun plural suffixes--would be accepted. It is important to emphasize that the acceptance of the hypothesis was based on--and really only possible because of--empirical testing, not a linguist's intuition.

The remainder of the nonsense syllable--the $\left[\begin{array}{l} +voc \\ -cons \end{array} \right]$ and final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ combinations--was held constant in order to test for only one variable (cf. Appendix B). Each of the three final -VC combinations was composed of a $\left[\begin{array}{l} +voc \\ -cons \end{array} \right]$ segment and a $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segment. The use of three "different" final segments provided us with the opportunity to verify that the Ss were responding to the stimuli, for had we limited our final segment to one, the probability of a response set would increase, and as a result, we would have been less able to determine whether the Ss actually were performing the desired task or merely imitating the interviewer's first example.

2. A test of the instructions provided by the experimenter and the use of this kind of instrument.

Were the instructions adequate to provide the Ss a clear understanding of the task they were being asked to perform? For, if the Ss were unable to perform the requested task, it is possible that (a) the instructions were ambiguous or inadequate, or (b) the instrument itself was inadequate. This latter possibility seemed remote since Berko, Anisfeld and others had employed a very similar device, and Ss found no difficulty whatever in responding to the requests of the experimenter.

3. An assessment of the illustrations made to depict the nonsense syllables for the data collection in Phase II.

Since the illustrations were to be used in Phase II, Phase I provided us the opportunity to assess their appropriateness for our purposes--i.e. assisting in eliciting the plural forms of nonsense syllables provided by the experimenter. Any illustrations found to be inappropriate--e.g. too distracting for a S to concentrate on his task--during Phase I would have been discarded before Phase II data collection was begun.

4. A general test of the appropriateness of this test for the age groups making up the sample.

The Phase I instrument was administered to a group of Ss having the same characteristics as the experimental sample. That is, the Phase I sample included first, second and third grade level Ss having the same general characteristics--i.e. general aptitude and socio-economic status--as the experimental group. It should be noted that tenth graders who formed part of the experimental sample in Phase II were not included in Phase I testing; implicit is the assumption that should no evidence for such interaction between initial consonants and plural suffixes be found among first, second and third grade Ss, looking at this matter in developmental terms, we would not expect to find it among tenth graders. The Phase I instrument itself and the procedures used (as discussed below) were designed to resemble as nearly as possible the Phase II data collection, so that we could evaluate general procedural feasibility for the latter.

1.1 The Phase I Instrument

In order for Phase I to provide us with all the information related to the above-mentioned objectives, several considerations were of prime importance in the construction of the instrument.

The Phase I instrument was to be as long or longer than the Phase II instrument so as to test for such variables as fatigue and response set. It was decided that a 28-item test instrument would be adequate to achieve this objective. (The Phase II instrument consisted of 24 items.) Accordingly, from the inventory of 24 $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments in English, the 22 which occur in initial position were drawn; to avoid violation of the morpheme structure constraints of English /ŋ/ and /ž/ were discarded for the purposes of the Phase I instrument. These 22 $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments were divided into three groups according to their distribution as final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments in the descriptive rule for noun plural formation. The groupings were:

1. / p, t, k, θ, f /
2. / s, š, z, č, ĵ /
3. / b, d, g, ā, v, m, n, l, r, w, y, h /

It should be emphasized here that this initial grouping was not an arbitrary one; it was motivated primarily by the intent to make Phase I as much like Phase II as possible--the instruments becoming mirror-images of each other. Since for the Phase II instrument, it would be precisely this manner of grouping of final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments which should have significance according to the linguists' descriptive rules, we anticipated this stage of the data collection by reproducing the

same groupings here in the construction of the Phase I instrument.

The $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments within each of the three groups were written on small pieces of paper and placed in three separate containers. The master list of initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments (cf. Appendix A) was constructed by randomly drawing first one segment from Container 1 (representing group 1 above), then one from Container 2 (representing group 2 above), and, finally, two segments from Container 3 (representing group 3). It should be noted that the choice of one, one, and two segments each, respectively, reflects the size of the three groups of $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments. This drawing procedure was continued, discarding each segment upon its being drawn, until all segments were drawn and entered onto the list; the results appear in Appendix A.

Three $\left[\begin{array}{l} +voc \\ -cons \end{array} \right]$ segments--/i, a, u/ representing the sounds in English "bit," "pot" and "book," respectively--were chosen and randomly paired with three final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments. The former were chosen on the basis of their representing the three primary distinctions in the hierarchy of the set of English $\left[\begin{array}{l} +voc \\ -cons \end{array} \right]$ distinctive features as used by Jakobson and Halle (1956, pp. 37-40) where /a/ is referred to as the most "optimal" vowel. "Optimal" refers to amount of effect for a given effort. The first contrast to be added is that of lower and higher concentration of energy (compact/diffuse), followed by that of tonality (gravity) giving us the basic "vocalic triangle." (Jakobson and Halle, 1956, p. 40).

The latter, the final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments, were chosen on the

basis of two principal criteria:

1. Feature specification. /p/ is called the "optimal" consonant because in terms of energy output, it offers the closest approach to silence (Jakobson and Halle, 1956, p. 37); /s/ the second segment chosen, differs from /p/ in both [grave] and [continuant] dimensions; /n/, the third segment chosen, added the dimension of nasality.
2. The differing cues these three consonants--/p, s, n/--are expected to provide for the formation of noun plurals in English when they occur in final position, according to the linguistic descriptions, i.e. /s, ðz, z/, respectively.

The random pairing of the vowels and final consonants resulted in:

$$\begin{aligned} V_1C_1 &= /-as/ \\ V_2C_2 &= /-ip/ \\ V_3C_3 &= /-un/ \end{aligned}$$

The following design (which is often referred to in statistics as a Latin Square design--cf. English and English, 1958, p. 288) was then used to pair the Master List of initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments with the three VC pairs:

Pairings	Version I	Version II	Version III
V_1C_1	I [⊗]	II	III
V_2C_2	II	III	I
V_3C_3	III	I	II

[⊗]The Roman numerals refer to the consonant groupings as per the Master List in Appendix A.

The results of the application of this design are shown in Items 1-22 of Versions I, II and III of the Phase I instrument (cf. Appendix B).

It should be mentioned here that after the 22 items were constructed, an examination was made to determine which, if any, were English or Spanish words, and thus, not meeting the criterion--non-sense syllable. When an occurrence of such a "word" was found, the most minimal change possible--i.e. that lowest in the hierarchy of distinctive features--was made in the vowel. For example /i/ → /e/, /u/ → /o/. We attempted to protect as much as possible the constancy of the final VC combination, thus controlling all variables and limiting our examination to the influence, if any, of the initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segment, our independent variable.

It will be noted in Appendix B that each of the three versions of the Phase I instrument contains 28 items--i.e. six more than the original 22 we constructed in the original design. Our reasons for including six additional items were basically two:

(1) To make the Phase I instrument at least as long as the Phase II instrument so as to provide a test of Ss' fatigue, response set, and the like.

(2) The additional six items were selected from within each Version of the Phase I instrument, two each from each of the three groupings as per the Master List and the above design. By repeating items identical to those already in the sample for a particular S, we added not only the desired length, but also a test of individual S response reliability. While these additional six items were not

included as data in our test of the influence of initial $\left. \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments, the repetition of the same items provided us with an opportunity to check the Ss' consistency of response and to detect possible random responding. In short, we provided a test of reliability.

1.2 Illustrations

An artist was contacted and we discussed with him the nature of our research and the sort of illustrations which would be appropriate. Specifically, he was asked to prepare 35 simple sketches in bright colors which would "depict" nonsense syllables, i.e. for which there would be no immediate name attachment present in the Subjects' repertoire. It is interesting to note that while we discussed these preparations with him, his 2 1/2 year-old son was nearby. On a magazine cover there was an illustration of three pieces of sculpture resembling (to the writer) evil gods of the Aztecs, but for which no particular name came to mind. The little boy looked at the cover and declared, "This is a /piy/pap/." We said, "But look, there are three of them, not just one." The child replied, "One, four, three /piy/papsiz/." This little incident provided the father of the boy (the artist) with insight into the exact nature of our research, and of his contribution, and gave us assurance that if a 2 1/2 year-old can perform the task without any prior instructions, we should have little difficulty with the youngest Ss in our sample, the six-year-old first-graders. (Berko's success in communicating the desired task to her Ss lent further support to this notion.)

Each of the 35 completed illustrations was reproduced on a

piece of thick paper, one reproduction near the top of the page and two identical copies of it side by side just below the middle of the page (cf. Appendix D). Colored slides of each illustration were made in order to provide insurance against destruction or loss of the artist's originals during the testing period. These illustrations (encased in plastic covers and inserted in three-ring binders) served for Phase I as well as Phase II.

For each presentation of the illustrations to accompany both the Phase I and Phase II instruments, all 35 illustrations were re-ordered so as to insure randomization of the order of both illustrations and nonsense syllables (the order of nonsense syllables having already been randomized for each S as discussed below). This further randomization procedure eliminated the possibility of a constant order of illustrations conditioning any particular response. The arguments presented for the randomization of the nonsense syllables themselves in an attempt to preclude response set conditioned by a constant serial order are equally appropriate here (cf. Chapter I). The text was provided orally by the experimenter, no written text appearing on the illustration. We thus restricted the Ss' linguistic stimuli to auditory ones, and eliminated any possible "interference" caused by conflicting visual and auditory stimuli (e.g. /man/ as opposed to man). It will be recalled that Berko's texts were affixed to her illustrations. Our study differed from hers in several significant ways (cf. Chapter I), two of which bear heavily on our decision to limit stimuli to auditory ones: (1) the attempt to control all relevant

variables so that our data provided clear information about the dependent variable; (2) the in-depth examination of only one linguistic parameter--noun plurals. Berko's failure to apply strict controls and her examination of several different linguistic parameters using only 28 items, made it relatively easy to select nonsense syllables appropriate both visually and auditorially, although, as previously discussed, the results became nearly impossible to interpret.

Further, as indicated earlier, any illustration(s) proving to be inappropriate during Phase I--too distracting, confusing, etc.--would have been discarded, thus reducing the total inventory of illustrations from which random pairings would have been made.

1.3 Phase I Subjects

Demographic information was gathered for approximately twenty-six Ss (half native speakers of English and half native speakers of Spanish--hereafter referred to as NES and NSS, respectively) in the first, second and third grades, respectively. Those falling within the SES (socio-economic status) range predetermined as our target range (based on general considerations of occupation of fathers as discussed in Natalicio, 1967), were selected. Data relative to the general aptitude of the S population were then examined. Our interest here was within-group control; we eliminated any potential Ss who deviated significantly from the group norms (e.g. Appendices I and J). Using first the SES range and then the aptitude range as selection criteria, we ultimately chose 18 Ss for each grade, nine NES and nine NSS, for a total of 54 Ss. Had our attempt to get 18 Ss for each

grade from a pool of 26 original possibilities fallen short, we would obviously have continued our search for Ss meeting the criteria of SES and aptitude, until we had had the desired nine Ss per cell:

	1st	2nd	3rd
NES	9	9	9
NSS	9	9	9

To this Subject sample, we then administered the Phase I instrument. Obviously, these same Ss were not used later as part of the sample for Phase II of the study.

1.4 Procedure for Phase I Implementation

After the selection of Ss was completed, the instrument was presented individually to each S.

In preparation, a set of twenty-two 3 x 5 cards was made for each of the twenty-two items in each version of the Phase I instrument (cf. Appendix F). These items were those read into the text (cf. Appendix E) which accompanied the presentation of each illustration to the Ss. To each S, Version 1, 2 or 3 was randomly assigned:

	1st			2nd			3rd		
NES	3	3	3	3	3	3	3	3	3
NSS	3	3	3	3	3	3	3	3	3
Test Version	1	2	3	1	2	3	1	2	3

The twenty-two cards forming the basic list for that particular version were shuffled (and thus randomized) and entered onto a response sheet for each S (cf. Appendix G). Thus, for each S, we had a

randomized list of the first twenty-two items of one of the three versions of the Phase I instrument. The final six items (the items to be repeated) for each version of the Phase I instrument were selected separately for each version--e.g. for Version I, items 2, 15, 10, 21, 7 and 16 were repeated as items 23-28 (cf. Appendix B). Since randomization of the nonsense syllables had already been completed for each S's version of the Phase I instrument, the repeated items varied according to the initial randomization procedure. That is, the items repeated for within-Subject reliability purposes for Ss being administered the same Version of the Phase I instrument were not necessarily the same. In fact, the probability of their being the same was extremely low.

When the first S arrived for testing we pulled out the list which had been previously prepared for him. We also re-ordered the 35 illustration cards regularly so that each S had not only a randomized list of nonsense syllables, but a random order of illustrations as well (cf. Section 1.2).

The instrument thus prepared, the experimenter provided the S with instructions (cf. Appendix C) accompanied by an example, using the nonsense syllable /w ə g/, which was not part of the test instrument, and accompanied by whichever illustration happened to be first in the page ordering. The S was then presented with the second illustration and the experimenter read the text using another nonsense syllable, /mef/, which was not part of the sample either, as a trial to check the S's understanding of the task he was being asked to

perform. If the experimenter at this point judged the S to be ready, he began the administration of the Phase I instrument. On the other hand, if the experimenter sensed some confusion or misunderstanding, he provided still another trial(s), e.g. /gič/, before beginning the actual administration.

The experimenter began with Item 1 of the randomized list prepared for this particular S, and, displaying the illustration which was next in the shuffled order, repeated the text to the S using Item 1 as the nonsense syllable. The text was not visible to the S. As mentioned above, the visual stimulus consisted solely of the illustration. The linguistic stimulus was solely auditory. There were, in addition to the considerations discussed in Section 1.2 of this Chapter, two overriding circumstances affecting our decision not to include a written text on the illustrations: (1) We were interested in oral production and in perception of oral cues; (2) Many nonsense syllables either (a) necessitated symbols unfamiliar to the Ss--e.g. /ā, θ/; or, (b) allowed for stimulus "interference"--auditory and visual stimuli in contradiction--e.g. /pat/ vs. "pat."

The experimenter continued through the S's list, stopping after items 7, 14, and 21 to relieve possible monotony and avoid a possible response set. At these junctures, a question was posed; unlike those questions in the actual Phase I instrument--i.e. those requesting a plural form--these questions requested other kinds of information, but not unrelated to the materials so as to avoid bringing about total distraction. The S was asked which of the already

displayed illustrations he liked best (after Item 7); if he liked any of the illustrations occurring in Items 8-14 better than his favorite from the first group (after Item 14); and, finally, which one he thought the prettiest and which the ugliest (after Item 21).

As the experimenter proceeded through the specific list of items for the S in question, he transcribed the S's responses on the data sheet (cf. Appendix G), and as a further verification of the experimenter's cues and his transcription as well as of the S's responses, the entire interview was recorded on tape for later consultation.

Analysis and discussion of Phase I results are the subject of Chapter III.

2.0 Phase II

After Phase I testing and verification of the results had been completed, we were ready to begin the Phase II data collection.

2.1 The Instrument

The instrument for our test consisted of 24 nonsense syllables prepared as described below. The presentation of each nonsense syllable was accompanied by an illustration as described above for Phase I.

2.2 Preparation of Phase II Data Collection Instrument

The twenty-four $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments which may occur in final position in English (thus complying with the morpheme structure constraints of the language in question) were divided into three groups based on the noun plural form they elicit according to the descriptive rule provided by the linguist, i.e. /s, ðz, z/, respectively:

1. /p, t, k, θ, f/
2. /s, z, š, ž, č, ě/
3. /b, d, g, ə, v, m, n, ŋ, l, r, w, y, h/

Each $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segment was written on a piece of paper and placed in a container representing one of the three groups. Each group was thoroughly mixed in its respective container, and the selection process was begun. One segment was drawn from Group 1 and placed as Entry 1 on List I; a segment was drawn from Group 2 and placed as Entry 2 on List I; two segments were drawn from Group 3 and entered as Items 3 and 4 on List I; returning to Group 1, one segment was drawn and entered as Item 5 on List I and so on through Item 8. As each segment was drawn, it was removed from the inventory so no repetition was possible. Lists II and III were selected continuing the same process described for List I until the eighth item on List III was entered, thus exhausting the total inventory of segments. As mentioned above regarding the Phase I instrument construction, the selection of one segment at a time from Groups 1 and 2 and two segments per drawing from Group 3, reflected the relative size of the groups in question.

The same three vowels--/i, a, u/--used in Phase I were chosen for the Phase II instrument, the rationale being the same as discussed in the Phase I instrument construction section (Section 1.1) of this Chapter. The three initial consonants chosen for use in the data collection instrument were /b/, /s/ and /n/. At this point in the study, the particular initial consonant chosen for use in the data collection instrument was not of great concern since we would by this time have

either verified the hypothesis tested in Phase I--i.e. initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments do not influence the choice of plural suffix response on the part of Ss --or, had verification been impossible, the matter of initial segments would have been pursued until sufficient data were obtained to shed some light on the question. It should be re-emphasized here that if acceptance of the Phase I hypothesis had been impossible, the results obtained from the Phase II data collection as outlined here would be meaningless; if initial segment influence had remained a possibility after the first Phase, we could not have simply disregarded this possibility and continued with our original plan, for we would have been unable to say anything meaningful about our data. Since it was possible to accept the hypothesis of the lack of influence of the initial segment on pluralization, our choice of initial consonant for the nonsense syllables of the Phase II instrument was motivated not by the possible influence on plural response of one or another initial consonant, for that was already ruled out, but rather by considerations of monotony, possible response set, distinctiveness and the resulting relative ease of perception and production for both Spanish and English native speakers. It was conceivable, of course, to use the same initial consonant throughout the whole of the Phase II data collection. In terms of both experimenter and S interest, however, it seemed more reasonable to provide some variety. Further, those consonants which (a) require seemingly less effort in production, (b) are easily discriminated (markedly differing features), (c) are among the first acquired by native speakers of English (Jakobson and

Halle, 1956) and (d) do not differ markedly in initial position in English and Spanish, were favored. Accordingly, /b/, /s/ and /n/ were chosen over such other possibilities as /θ/, /j/ or /š/ in terms of the four criteria set forth above:

/b/ is

+cons
-voc
+vce
-nas
+grv
-cnt

/s/ differs in its being

+cons
-voc
-vce
+cnt
-grv
-nas

/n/ differs from /b/ in being

+voc
+cnt
-grv
+nas

and from /s/ in being

+voc
+nas
+vce

The random pairing of initial

[+cons]
[-voc]

 segment and the following vowel resulted in:

$C_1V_1 = /su-/$
 $C_2V_2 = /ni-/$
 $C_3V_3 = /ba-/$

The design used to construct the Phase II instrument was the same one as used for Phase I: three versions of the test resulted from pairing the three groups of final

[+cons]
[-voc]

 segments (I, II, III in Appendix A-2) with the three randomly paired CV combinations. Thus:

Pairings	Version I	Version II	Version III
C ₁ V ₁	I	III	II
C ₂ V ₂	II	I	III
C ₃ V ₃	III	II	I

As discussed above regarding Phase I, any combinations of the above which resulted in meaningful items were altered; in this case, however, it was by a minimal change in the initial consonant--i.e. one feature--rather than in the vowel as had been the case in Phase I instrument construction, because we had already rejected the influence of initial consonant choice anyway. So, for example, /b/ → /p/ ~ /d/; /n/ → /l/ ~ /m/; /s/ → /z/ ~ /t/, depending on which minimal change provided us with a non-meaningful trigram. ("Non-meaningful trigram" refers here simply to "no existing English or Spanish word.")

2.3 Illustrations

The illustrations used in conjunction with Phase II are the same ones used in Phase I. Their preparation and format is fully described in Section 1.2 of this Chapter, and a sample is provided in Appendix D.

2.4 Subjects

The Ss for the data collection of Phase II included twenty-four adults, all college graduates, 12 of whom were native speakers of English, and 12 native Spanish speakers for whom English was a second language acquired upon entering school at approximately age 6. They

served as the criterion sample. "College graduate" was selected as a criterion for the adult sample in order (1) to provide a certain homogeneity of Ss and (2) to approach the accepted "standard" forms for pluralization, operationally defined as those used by college graduates. Our rationale for insisting on an equal number of native and non-native speakers of English among the adult sample was to insure that there existed no significant differences between these two populations in their responses to our Phase II instrument. The separation of the adult sample into NES and NSS and the within-language category comparison possibility are considered relevant in light of studies which reveal, ". . . a persistent occurrence of [s] or [z] in final position (in English) in place of [z]" (Sawyer, 1957, p. 185), among college students whose native language is Spanish.

The experimental sample for this study included 144 Ss, 36 each in the first, second, third and tenth grades, half of whom (on each grade level) were native speakers of English, and the other half, native speakers of Spanish. As mentioned above (cf. Phase I Subjects), Ss were selected from a larger pool of possible Ss on the basis of their falling within certain predetermined ranges of socio-economic status and aptitude (cf. Appendices I and J).

We chose to examine students in the first, second, third, and tenth grades in order to project "apparent time" as discussed extensively by Labov (1966). That is, we assumed that, controlling variables such as aptitude and socio-economic status, age, etc., we could, by testing several different age levels, approximate a longitudinal

study of, say, the group of first graders as they progressed through the educational levels.

In summary, our design was:

		GRADES				ADULTS	
		1	2	3	10	Native English Speakers	Native Spanish Speakers
G R O U P S	Native English Speakers	18	18	18	18	12	12
	Native Spanish Speakers	18	18	18	18		
	EXPERIMENTAL SAMPLE					CRITERION SAMPLE	

2.5 Procedure

One of the three previously determined versions of the test instrument was randomly assigned to each S so that within each grade, each of the three versions was administered 12 times, to six NES and to six NSS Ss (cf. Appendix H). For example:

		Grade I		
		Version I	Version II	Version III
NES		6	6	6
NSS		6	6	6

The result, as can be easily seen, is that we had an equal number per cell. It should be mentioned here that the same assignment procedure was applied to the adult sample, resulting in four Ss in each cell.

3 x 5 cards containing one item each for each test version were prepared in advance (cf. Appendix F). The order of the cards (and thus items) for a specific version of the data collection instrument was randomized for each S by shuffling the cards and entering the

nonsense syllables onto the Subject Response Sheet (cf. Appendix G) prior to administration of the test. The illustration cards were re-ordered at the time of testing each S assuring randomization of not only the order of the nonsense syllables, but also the ordering of illustrations (cf. Section 1.4).

The experimenter gave instructions to the S (cf. Appendix C) and provided each S with an example of what he was expected to do, the experimenter providing both the text (cf. Appendix E) and, if necessary, the expected responses. The experimenter then provided the S with a trial item to ascertain the S's readiness to perform the task in terms of his understanding of what was being asked of him. Two trials were provided when the S manifested apparent confusion even after the example and the first trial. The example and trial items for Phase II as well as the procedures for preparing the Ss for the task were derived from the discussion above (cf. Section 1.4) and experience gained from administration of the Phase I instrument.

It will be recalled that at certain points in Phase I, requests of a different nature were made of the Ss (cf. Section 1.4). Similarly, in Phase II, the questions--"Which of the illustrations you have seen do you like best?" after Item 8; and, "Which of all you have now seen do you think is the prettiest?" after Item 16--were asked of the Ss. The rationale for the inclusion of such questions is discussed in Section 1.4 above.

As in Phase I, the text was read by the experimenter, and was not affixed to the illustrations. The rationale for this decision was described fully in the discussion of Phase I procedures above (Section 1.4).

The administration of the Phase II instrument began with the adult sample, using the procedures just described. Their responses were to serve as the baseline or criterion of "correctness" on the basis of which we were then able to evaluate the responses of the experimental sample. As mentioned earlier, any item which elicited considerable disagreement of responses on the part of the adult, or criterion, sample, was to be discarded as unreliable. If this disagreement had indicated a marked cleavage between the NES and the NSS adults, however, we would have had to evaluate the student responses separately--i.e. NSS students in terms of NSS adults and NES students in terms of NES adults.

After the adult sample had been tested, the Phase II data collection for the experimental sample was carried out according to the procedures already elaborated upon above (cf. Phase I procedures). It should be emphasized here that the experimental sample responses were compared for "correctness" only with the responses of the criterion sample. There was no a priori assumption of an absolute norm of "correctness" for the pluralization of the nonsense syllables in our instrument.

3.0 Additional Testing in Phase II: A Phonological Discrimination Test

A further test which was necessary for all Ss to provide us with greater explanatory power is that of determining the difference between the ability to distinguish between two contrasting final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments (a purely phonological question) and the ability to attach appropriate plural suffixes (a grammatical question).

For the first grade native speaker of English, for example, it is possible that a final /θ/ (or any /θ/ for that matter) is not discriminated from an /s/. This being the case, it would be a mistake to conclude that /θ/ forms part of this particular S's rule for sibilant group plural formation; final /θ/ is simply not a part of the S's repertoire, and thus, does not occur at all in his rules for attaching plural suffixes to nouns.

For the native speaker of Spanish, the problem is a similar one. Since it is the case that there are phonological differences between Spanish and English and the morpheme structure constraints in Spanish do not correspond in a one-to-one relationship to those in English, data dealing exclusively with plurals would tend to make results difficult to interpret.

To attempt elimination of this possible area of ambiguity in the interpretation of our data, we included in the design of both the Phase I and Phase II instruments two responses for each nonsense syllable on the part of each S. The first response was a repetition of the nonsense syllable in the singular, in answer to the interviewer's question, "What is it?" (cf. Appendix E). This response was transcribed on the Subject Response Sheet in column A (cf. Appendix G) as well as recorded on tape. The S's second response--his formation of the plural--was transcribed in column B on the response sheet and recorded immediately after his production of the singular form, thus permitting a close examination of both responses in proximity for all items and all Ss.

So, for example, if we found that a particular S gave as a plural of /puθ/, /pusiz/, the "right-wrong" plural dimension would be first marked "wrong" for the purposes of assessing total "correct" plural count. Further analysis leading toward an explanatory level, using this S's singular repetition which would be, say, /pus/, would indicate a lack of /θ/ in his repertoire, and the resulting impossibility of this particular phoneme being part of a rule for plural formation. Or, suppose a S provides a plural response /bips/ for the experimenter's form /bib/. While again, in terms of raw score plural count, the response would be judged "wrong," further examination of this S's singular form repetitions would provide information as to the possible nature of the "error." Thus, for example, if we were to find a consistent devoicing of final voiced consonants (a neutralization of the [voice] dimension) for /b, d, g/, this S's plural responses could be more easily interpreted in light of the limitations in his repertoire of segments. /b, d, g/ are not included in the rule of pluralization simply because they are not within the S's repertoire for the linguistic environment in question. It should be noted that the rule for pluralization itself probably does not change; only the number of segments to which it applies is affected. On the other hand, we might find that another S gives us the same plural form /bips/ for the experimenter's singular stimulus /bib/. Upon examining the S's singular repetitions, however, we find that he does seem to discriminate between voiced and voiceless consonants in final position--i.e. he does not neutralize them. We find, on the other hand, that he does not

distinguish between one pair of them--English /s/ and /z/; the item with final /z/ in his test-list and other plurals where we would have expected /z/ are all realized as [s]. It is possible, then, that this lack of /s/-/z/ distinction causes regressive assimilation along the [voice] dimension of "correctly" produced morpheme-final voiced consonants; so, for example, /b/ → /p/ / — /s/, there being no /z/ in his inventory.

Carrying this procedure through the four grade levels we proposed, in an attempt to reproduce "apparent time," we did, thus, approximate a longitudinal examination of ontogenetic development of both native and non-native English speakers' formation of English plurals. Not only were we able to say whether or not a particular plural was observed to be "under control" by a S or group of Ss, but also, when it seemed that it began to be controlled. We were also able to provide certain interpretations which went beyond mere "correct" vs. "incorrect" plural formation, interpretations which should shed some light on notions of "interference" and some of the pedagogical solutions proposed to counteract such "interference."

CHAPTER III

PHASE I RESULTS AND DISCUSSION

Data were collected from Ss participating in the first phase of our study as described in the preceding Chapter in order to test the Phase I hypothesis: Initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments in a three-segment nonsense syllable do not influence the choice of noun plural suffixes attached to that nonsense syllable when said syllable is presented to Ss as a noun. These data were then tabulated and analyzed as described and discussed below.

Individual S responses to each of the stimuli are presented in Figure 1. It will be recalled that the three final -VC segment combinations were held constant, each one being paired with one-third of the randomized initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments. In the aforementioned figure, the initial $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments are listed across the top with individual Ss down the left side. These Ss are divided according to grade (1, 2, and 3) and language classification (NES and NSS). The code used for grade and language classification is: 01, 02, 03 for the three grades, and 01 for NES and 02 for NSS, respectively. The data in Figure 1 are grouped accordingly, e.g. group 0201 refers to second graders who are native speakers of English. The code 030244 as it appears in Figure 1, then, represents a third grader who is a native speaker of Spanish and whose individual S number is 44. This S's responses to the pairings of initial consonants /p, t, k, θ, f/

with one of the three -VC final segment combinations (depending on which of the three Versions of the test was presented to him--the Versions appearing just below the initial segments across the top of the figure) appear in the row following his number in Figure 1A.

The sub-total which appears at the bottom of the column representing each $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ combination indicates the number of "correct" responses recorded for a given item, the maximum being 9, three for each grade (cf. p. 52, Chapter II). Any variation from the expected response was tabulated below the sub-totaled "correct" responses according to the kind of variation provided. Thus, throughout the three grades of NSS Ss, six out of nine reacted to the singular stimulus /pas/ by repeating the singular form /pas/; such a repetition of the singular was indicated by the symbol \emptyset . Combining the sub-total of "correct" responses with the variations indicated just below them, each total would equal 9 (i.e. the maximum number of times each combination was presented in the three grades).

S	/p/			/t/		/k/		/θ/		/f/		
	1	2	3	3	2	2	3	1	3	1	2	2
Grade 1 - NES (0101)												
05	∅			Z		S		Z		S		
04	12			S		S		S		S		
06	12			Z		S		∅		S		
08		S		ts			∅	∅		∅		
11		S		ts			Z	∅		Z		
10		S		∅			Z	∅		Z		
13			Z		S		∅		S		∅	
14			Z		S		∅		S		∅	
16			Z		∅		12		S		12	

S	/p/			/t/		/k/		/θ/		/f/		
	1	2	3	3	2	2	3	1	3	1	2	2
Grade 1 - NSS (0102)												
01	∅			∅		∅		∅		∅		
02	fs			m		S		∅		S		
03	∅			S		es		∅		∅		
07		∅			∅		∅		∅		∅	
09		∅			∅		∅		∅		∅	
12		S			∅		∅		∅		Z	
15			S			S		12		S		12
17			Z			S		ts		S		∅
18			∅			∅		∅		∅		∅

Grade 2 - NES (0201)												
24	12			Z		S		Z		S		
22	12			Z		S		Z		S		
21	12			Z		S		S		S		
28		S		12			Z	∅		S		
29		S		12			Z	12		Z		
30		S		12			Z	12		Z		
35			Z		S		12		S		12	
34			Z		S		12		S		12	
36			Z		S		12		S		12	

Grade 2 - NSS (0202)												
23	∅			mz		S		mz		S		
19	∅			Z		S		S		S		
20	12			Z		S		Z		S		
26		S			∅		S		es		12	
25		S			12		S		∅		Z	
27		es			es		es		es		es	
31			S			S		es		S		12
32			Z			S		∅		S		∅
33			Z			S		12		S		12

Grade 3 - NES (0301)												
42	∅			Z		S		Z		S		
41	12			Z		S		Z		S		
40	12			Z		S		mz		S		
46		S		12			Z	12		Z		
48		S		12			Z	12		Z		
47		S		12			Z	12		Z		
54			mz		S		∅		S		∅	
53			Z		S		∅		S		∅	
52			Z		S		∅		S		12	

Grade 3 - NSS (0302)												
37	∅			Z		S		Z		S		
38	∅			Z		S		Z		S		
39	12			Z		S		Z		bz		
44		S			∅		Z	12		∅		
45		S			12		Z	12		Z		
43		S			12		Z	12		Z		
49			mz			S		12		S		12
50			Z			S		12		S		12
51			Z			S		∅		S		∅

s.t. 7 9 8 8 6 8 9 8 4 5 5 9 9 7 5

2 6 5 5 3 8 7 3 4 4 3 8 6 4 5

∅ 2 1 1 1 5 1 4 1 4
 ~ 1 1 2 3 1

6 2 1 1 5 1 1 3 3 3 4 1 2 3 4
 1 1 3 3 1 1 3 2 2 2 1 2

FIGURE 1. Tabulation of S responses in Phase I. (Columns reflect final -VC combinations: 1 = /as/; 2 = /ip/; 3 = /un/.
 s.t. = number of "correct" pluralizations
 ∅ = S repetitions of singular as plural forms ("incorrect")
 ~ = miscellaneous plural formations ("incorrect")

Figure 1A. Initial Segments /p, t, k, θ, f/.

Grade 1 - NES (0101)							Grade 1 - NSS (0102)																						
/b/		/d/		/g/		/ð/		/v/		/b/		/d/		/g/		/ð/		/v/											
2	3	1	1	2	3	1	2	3	2	3	1	3	1	2	2	3	1	1	2	3	1	2	3	2	3	1	3	1	2
S									S					S					S									S	
05	S			∅		∅			S					S					S									S	
04	S			∅		12			S					S					S									S	
06	S			∅		12			S					Z					S									S	
08		∅			S		∅			∅					∅														
11		Z			S		S			S					∅														
10		Z			S		S			S					12														
13			∅		Z		Z			∅																		S	
14			∅		Z		Z			∅																		S	
16			∅		Z		Z			∅																		∅	

Grade 2 - NES (0201)							Grade 2 - NSS (0202)																						
2	3	1	1	2	3	1	2	3	2	3	1	3	1	2	2	3	1	1	2	3	1	2	3	2	3	1	3	1	2
24	S			12		12			S					Z					S									Z	
22	S			12		12			S					Z					S									Z	
21	S			12		12			S					Z					S									Z	
28		Z			S		S			Z				12															
29		Z			S		S			Z				12															
30		Z			S		S			Z				12															
35			∅		Z		Z			12																		S	
34			12		Z		Z			12																		S	
36			∅		Z		Z			∅																		S	

Grade 3 - NES (0301)							Grade 3 - NSS (0302)																						
2	3	1	1	2	3	1	2	3	2	3	1	3	1	2	2	3	1	1	2	3	1	2	3	2	3	1	3	1	2
42	S			K		∅			S					Z					S									S	
41	S			12		12			S					Z					S									S	
40	S			12		12			S					Z					S									S	
46		Z			S		S			Z				12															
48		Z			S		S			Z				12															
47		Z			S		S			Z				12															
54			∅		mz		12			∅																		S	
53			∅		mz		Z			∅																		S	
52			12		Z		Z			12																		S	

Initial Segments /b, d, g, ð, v/															
S	2	3	1	1	2	3	1	2	3	2	3	1	3	1	2
st.	9	8	2	6	9	7	7	8	8	9	8	3	7	7	8
∅		1	7	2			2	1		1	6		2	1	
~			1	2			1						2		

Initial Segments /b, d, g, ð, v/															
S	2	3	1	1	2	3	1	2	3	2	3	1	3	1	2
7	5	4	4	6	7	2	7	5	7	3	3	6	4	8	
2	1	5	4	2	1	6	1	1	3	6	1	4	1		
3		1	1	1	1	1	3	1	3		2	1			

Figure 1B. Initial Segments /b, d, g, ð, v/.

/m/ /n/ /l/ /r/
2 3 1 3 1 2 3 / 2 1 2 3

S Grade 1 - NES (0101)

05	S	Z	Z	∅
04	S	∅	Z	∅
06	S	Z	Z	12
08	∅	∅	∅	∅
11	Z	12	∅	S
10	Z	∅	12	S
13	∅	S	S	∅
14	∅	S	S	S
16	∅	S	∅	∅

/m/ /n/ /l/ /r/
2 3 1 3 1 2 3 / 2 1 2 3

S Grade 1 - NSS (0102)

01	∅	∅	∅	∅
02	S	Z	Z	∅
03	∅	∅	∅	∅
07	∅	∅	∅	∅
09	∅	∅	∅	∅
12	S	∅	∅	S
15	∅	S	S	Z
17	∅	S	S	Z
18	∅	∅	∅	m

Grade 2 - NES (0201)

24	S	Z	Z	12
22	S	Z	Z	12
21	S	Z	Z	12
28	Z	12	12	S
29	Z	∅	12	S
30	Z	12	12	S
35	∅	S	S	Z
34	12	S	S	Z
36	∅	S	S	Z

Grade 2 - NSS (0202)

23	S	Z	Z	∅
19	∅	Z	Z	∅
20	S	Z	Z	12
26	S	∅	∅	S
25	S	∅	12	S
27	es	es	es	es
31	es	S	S	mz
32	∅	S	S	Z
33	12	∅	S	mz

Grade 3 - NES (0301)

42	S	Z	Z	∅
41	S	Z	Z	12
40	S	Z	Z	12
46	Z	12	12	S
48	Z	12	12	S
47	Z	12	12	S
54	∅	S	S	mz
53	∅	S	S	Z
52	12	S	S	Z

s.t. 9 8 2 8 6 9 9 7 8 6 8 5
∅ 1 7 1 3 2 1 3 1 2
~ 2

Grade 3 - NSS (0302)

37	S	Z	Z	∅
38	S	Z	Z	∅
39	S	∅	Z	12
44	Z	12	12	S
45	Z	12	12	S
43	Z	12	12	S
49	∅	S	S	Z
50	12	S	S	Z
51	∅	S	S	Z

6 3 2 6 3 7 7 4 8 2 6 6
3 2 6 3 5 2 2 4 1 7 2
4 1 1 1 1 3

Figure 1C. Initial Segments /m, n, l, r/.

/w/ /y/ /h/
3 1 2 2 3 1 1 2 3
Gradel-NES(0101)

05	Z	S	∅
04	S	S	12
06	Z	S	12
08	∅	∅	∅
11	∅	Z	S
10	∅	Z	S
13	S	∅	m
14	S	∅	Z
16	S	12	Z

/w/ /y/ /h/
3 1 2 2 3 1 1 2 3
Gradel-NSS(0102)

01	∅	∅	∅
02	∅	S	∅
03	S	S	∅
07	∅	∅	∅
09	∅	∅	∅
12	∅	Z	S
15	S	12	S
17	S	∅	Z
18	∅	∅	∅

Grade 2-NES(0201)

24	Z	S	12
22	Z	S	12
21	Z	S	12
28	12	Z	S
29	12	∅	S
30	12	Z	S
35	S	12	Z
34	S	12	Z
36	S	12	Z

Grade 2-NSS(0202)

23	Z	S	∅
19	Z	S	12
20	Z	S	12
26	∅	S	S
25	∅	Z	S
27	es	es	es
31	S	es	S
32	S	∅	Z
33	S	12	Z

Grade 3-NES(0301)

42	Z	S	∅
41	Z	S	12
40	Z	S	∅
46	∅	Z	S
48	12	Z	S
47	12	Z	S
54	S	∅	Z
53	S	∅	Z
52	S	12	Z

Grade 3-NSS(0302)

37	Z	S	12
38	Z	S	∅
39	Z	S	12
44	12	Z	S
45	12	Z	S
43	12	Z	S
49	S	12	Z
50	S	12	Z
51	S	∅	Z

st 8 5 9 9 7 5 6 8 8
∅ 4 1 4 3 1
~ 1 1 1

6 3 8 8 5 4 4 6 6
1 5 1 1 2 4 5 2 1
2 1 2 1 1 2

Figure 1D. Initial Segments /w, y, h/.

Grade 1 - NES (0101)

	/s/	/z/	/š/	/č/	/j/
	1 2 3	1 2 3	2 3 1	2 3 1	3 1 2
05	∅	∅	S	S	Z
04	12	12	S	S	Z
06	12	12	S	S	Z
08	S	∅	∅	∅	∅
11	S	S	Z	Z	∅
10	S	S	Z	Z	12
13	S	Z	∅	∅	S
14	∅	Z	∅	∅	∅
16	S	Z	∅	∅	∅

Grade 1 - NSS (0102)

	/s/	/z/	/š/	/č/	/j/
	1 2 3	1 2 3	2 3 1	2 3 1	3 1 2
01	∅	∅	∅	∅	∅
02	∅	∅	∅	∅	∅
03	∅	∅	S	S	∅
07	∅	∅	∅	∅	∅
09	∅	∅	∅	∅	∅
12	S	∅	∅	∅	∅
15	S	Z	∅	∅	12
17	Z	Z	∅	∅	S
18	∅	∅	∅	∅	∅

Grade 2 - NES (0201)

	/s/	/z/	/š/	/č/	/j/
	1 2 3	1 2 3	2 3 1	2 3 1	3 1 2
24	12	12	S	S	Z
22	es	12	S	S	Z
21	12	12	S	S	Z
28	S	S	Z	Z	∅
29	S	S	Z	Z	∅
30	S	S	Z	Z	∅
35	Z	Z	∅	12	S
34	Z	mz	12	∅	S
36	Z	Z	∅	12	S

Grade 2 - NSS (0202)

	/s/	/z/	/š/	/č/	/j/
	1 2 3	1 2 3	2 3 1	2 3 1	3 1 2
23	∅	∅	S	S	∅
19	12	∅	S	S	∅
20	12	12	S	S	Z
26	S	S	∅	S	ts
25	S	S	Z	ms	∅
27	es	es	es	es	es
31	ms	mz	∅	es	S
32	∅	Z	12	∅	S
33	S	Z	∅	es	S

Grade 3 - NES (0301)

	/s/	/z/	/š/	/č/	/j/
	1 2 3	1 2 3	2 3 1	2 3 1	3 1 2
42	∅	∅	S	S	Z
41	12	∅	S	S	mz
40	12	12	S	S	Z
46	S	S	Z	Z	12
48	S	S	Z	Z	12
47	S	S	Z	Z	12
54	mz	∅	∅	∅	S
53	Z	Z	∅	∅	S
52	Z	Z	12	12	S

Grade 3 - NSS (0302)

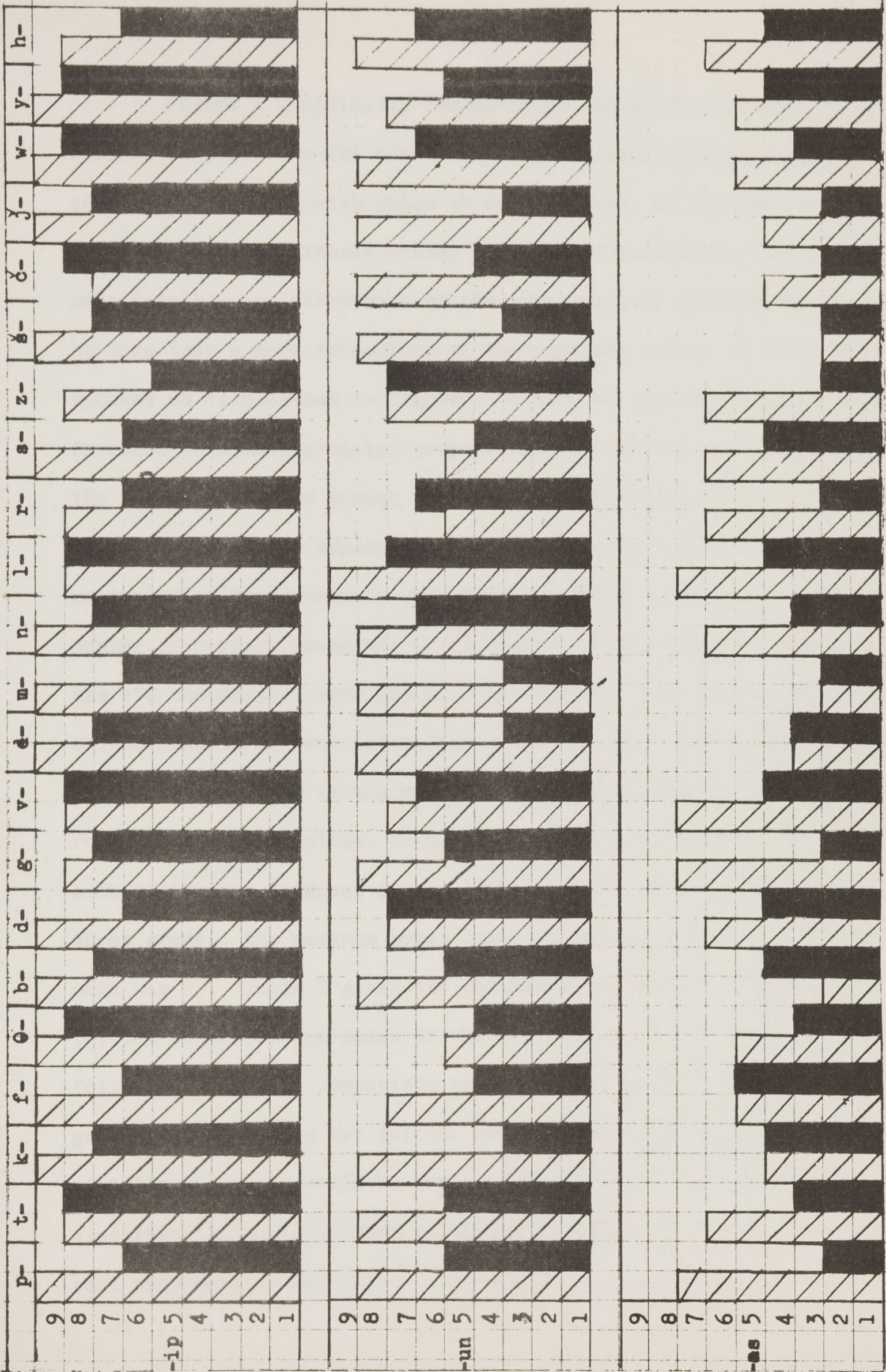
	/s/	/z/	/š/	/č/	/j/
	1 2 3	1 2 3	2 3 1	2 3 1	3 1 2
37	12	12	S	S	Z
38	∅	∅	S	S	Z
39	12	∅	S	S	Z
44	S	S	Z	Z	∅
45	S	S	Z	Z	12
43	S	S	mz	mz	12
49	Z	Z	∅	12	S
50	Z	Z	12	12	S
51	Z	Z	∅	∅	S

s.t. 6 9 5 6 8 7 9 8 2 9 8 4 8 4 7
 ∅ 2 1 3 1 1 6 1 4 5 2
 ~ 1 3 2 1 1 1

4 6 4 2 5 7 7 3 2 7 2 3 4 2 8
 5 2 2 7 3 1 2 3 7 2 2 4 5 4 1
 1 3 1 1 3 5 2 3

Figure 1E. Initial Segments /s, z, š č, j/.

The total number of correct responses to each of the initial segments combined with each of the three -VC segments (-ip, -un, -as) is illustrated in Figure 2. Again, the maximum possible is nine. Taking initial /d-/ as an example, we notice that among NES Ss, d + ip resulted in a total correct of 9, d + un = 7 total correct, and d + as = 6 total correct. For the NSS group of Ss, the totals for these same combinations are 6, 7, and 4, respectively.



NES = [hatched box] NSS = [solid black box] Initial { [+cong] [-vocal] } Comparison Across Grades by Language Group and by Final -VC.

Figure 2 graphically demonstrates the greater proportion of correct responses to the final -VC combination /-ip/, regardless of the initial segment with which it was combined, as opposed to /-un/ and /-as/; the hypothesis would, thus, stand as stated. In order to make possible the acceptance of the hypothesis on grounds which would be more than a mere inspection of the apparent number of correct responses as illustrated in Figure 2, a test of the significance of differences between correlated proportions was carried out. In Figure 2, the sum of Ss across grades was separated according to the final -VC segment combination employed. In order to undertake the statistical manipulation mentioned, it was necessary first to determine the total number of correct responses to any given initial segment regardless of the -VC combination with which it was paired. (It will be noted that this criterion of data organization differs from that used in Figure 2 where the data were tabulated according to the final -VC combinations regardless of the initial segments.) Since there were 27 total Ss in each of the two language groups (NES and NSS), nine in each of the three grades, the maximum total correct possible for each initial segment was 27. Table 1 gives the tabulation of correct responses to initial segments regardless of which of the three -VC combinations followed. Should a comparison between total correct responses across grades for any given two initial segments show the difference to be significant, there would be some evidence against the stated hypothesis; that is, a significant difference between the proportions of correct responses to any two initial segments would be interpreted as

indicative of the positive effects of one of the initial $\left. \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments on the inflection of noun plurals, independent of the final -VC combinations which followed it. However, care should be taken to avoid interpreting non-significant results obtained from the comparison of initial segments as an indication of final -VC combination effects. For information to be obtained regarding the latter, another set of statistical tests appropriate to the new question would have to be carried out. In short, a statistical test only provides information regarding the question being asked and not for other questions, however closely related.

A sufficient number of such significant differences (e.g. 11 per cent of the total number of possible comparisons) would have necessitated the rejection of the hypothesis, and further investigation of these differences would have been necessary since the assumptions underlying the remaining questions posed in Chapter II would have required re-examination.

The basic procedure for the statistical test carried out may be summarized as follows: Taking the largest range between proportions (e.g. 19 ~ 24 for NES), a within-S tabulation is made (each S's responses, whether correct or incorrect, are entered into the appropriate cells for both members of the pair of initial segments under consideration):

		/b-/ Wrong		Right		
		(a)	7	(b)	17	24
/p-/ Right	Wrong	(c)	1	(d)	2	3
	Right	8	19	27		

With initial /b-/ (19/27 correct) opposed to initial /p-/ (24/27 correct), the number of instances where the same S provided a correct response to initial /p-/ and incorrect to initial /b-/ is recorded in cell (a); when the same S responded correctly to both /p-/ and /b-/, he was included in cell (b); a single S who responded incorrectly to both /p-/ and /b-/ was recorded in cell (c); and, finally, a S who responded incorrectly to /p-/ and correctly to /b-/ was recorded in (d). Correct or incorrect response, to recapitulate, refers to the individual S's plural response to the stimulus item containing the initial segment in question (the -VC combination paired with said initial segment notwithstanding) and presented to him as a noun. The assumption here was that if the hypothesis had to be rejected, the difference in initial segments had to be significant regardless of the

final -VC with which they were paired; thus, we had, necessarily, to focus our attention on the initial segment regardless of the -VC combination which followed it. The necessary calculation to determine whether there exist significant differences between correlated proportions is the statistic known as \tilde{z} -Test (Downie and Heath, 1959, p. 139), given by the formula:

$$\tilde{z} = \sqrt{\frac{(a - d)^2}{a + d}}$$

It should be noted that we are using the totals from cells (a) and (d) only--i.e. only those cells which evidence a within-S difference between correct and incorrect responses to trigrams having either initial /p-/ or /b-/. For the /p-/ vs. /b-/ difference, for example, the calculations are as follows:

$$\tilde{z} = \sqrt{\frac{(7 - 2)^2}{7 + 2}} = \sqrt{\frac{25}{9}} = \sqrt{2.777} = 1.664$$

In order for the difference to be viewed as significant at the .05 level (the particular distribution of scores yielding \tilde{z} of this size would be only expected 5 per cent of the time), \tilde{z} must be greater than 1.96, and greater than 2.58 for significance at the .01 level (A. Bernstein, 1964, p. 110). The obtained result from the above calculation--i.e. $\tilde{z} = 1.664$ --accordingly, did not reach the significance level at .05 and we may conclude that there exists no difference (greater than what pure chance would yield) between the relative effects of the two

initial segments considered regarding noun plural inflection for the population sample in question.

Since the above test of differences between the two proportions (number of correct responses to /p-/ and to /b-/) representing the widest range among the NES group proved to be non-significant, a lesser range would not be expected to yield a significant \tilde{z} . Another test for NES Ss was run on /r-/ and /l-/, two initial segments which also represented the 19~24 range (cf. Table 1). This test resulted in a \tilde{z} of 1.88, which also fails to reach the required value for significance at the .05 level (cf. Table 2).

10 ~ 16	/s ~ w/	2.00	ns
12 ~ 18	/t ~ w/	2.00	ns
12 ~ 17	/k ~ w/	2.00	ns
13 ~ 17	/g ~ w/	2.00	ns

TABLE 2.

GROUP	RANGE	CONSONANTS	\bar{z} =	1.96 = (.05) 2.58 = (.01)
NES	19 ~ 24	/r ~ l/	1.88	n.s.
	19 ~ 24	/b ~ p/	1.66	n.s.
NSS	12 ~ 19	/s ~ l/	3.00	sg. .01
	11 ~ 19	/m ~ l/	2.828	sg. .01
	12 ~ 19	/j ~ l/	2.33	sg. .05
	11 ~ 18	/m ~ v/	2.10	sg. .05
	12 ~ 18	/s ~ v/	1.89	n.s.
	12 ~ 18	/j ~ v/	1.88	n.s.
	11 ~ 17	/m ~ d/	1.73	n.s.
	13 ~ 19	/p ~ l/	1.414	n.s.

TABLE 2. Results of \bar{z} tests on maximum ranges of response.

The same tests were run on the ranges represented by the proportion of correct responses to specific initial segments on the part of the NSS sample. As shown in Table 2, some of these tests resulted in significant \tilde{z} 's. Further tests were run to determine the extent of these significant differences which fail to support the proposed hypothesis, at least as far as the NSS group was concerned. Significant differences were found in only four cases of comparison of pairs of initial segments. Since the total number of possible pairings is equal to 231 --i.e. $n(n-1) / 2$ --the ratio of significant to non-significant \tilde{z} 's ($4/231$) is quite low and presents no significant evidence against the hypothesis (cf. p. 77). The number of differences yielding significant \tilde{z} 's would have had to have been much greater, as previously discussed, than that exhibited in four pairs out of a total of 231 before the proposition of possible positive effects of initial segments on the inflection of final segments could have been seriously considered. Thus, we would conclude from the results of the \tilde{z} -tests that there is no evidence to permit the refutation of the hypothesis, and, consequently, it stands as stated.

As will be recalled, a test for reliability of within-Subject responses was included in the Phase I instrument design to permit verification of consistency in the responses provided by any given S and to detect possible random responses on the part of Ss. Six additional items were included in the Phase I instrument, increasing the original 22-item list to 28 items. Each of the six additional items represented a repetition of one of the original 22 items of the

particular version of the instrument in question (cf. Chapter II, p. 48). These additional six items in each test version were not included in the data used for purposes of analysis; rather, they were isolated to provide information only for a test of reliability.

For each S, a comparison of each repeated item with the item in the original list of 22 which it replicated was made to determine whether the responses to the two identical stimulus items in question were themselves identical. (It should be emphasized here that the question of correct or incorrect response to a given stimulus has no relevance; the only concern is with the identity of responses to the two paired identical stimuli.) A perfect reliability score for any given S would have been six since there were six paired items in question. Since each of the three test versions was presented to 18 Ss, the maximum possible score for perfect reliability of responses to a given version of the test would have been 108 (i.e. 6 x 18). The results of the test for reliability of S responses are as follows:

Version I: 97/108 or 89.8 per cent

Version II: 98/108 or 90.7 per cent

Version III: 96/108 or 88.8 per cent

On the basis of the percentages of identical responses to the reliability test stimulus items, we were justified in ruling out the possibility of random responding and in carrying out the Phase II data collection on the evidence of S responses being reliable.

Having accepted the hypothesis proposed (cf. p. 42, Chapter II), it is now possible to consider differences in inflection in terms

of the final segment. This is the case since the data (cf. Figure 2) may be viewed as uncontaminated by possible initial segment effects, and we can be confident that whatever differences are found through the use of appropriate statistics can be accounted for in terms of final segment effects. With this in mind, we may feel justified in taking all of these data and asking a second question. We may now group the initial segments according to the final -VC combinations with which they occurred in the testing situation.

Having the data for NSS and NES Ss grouped now according to grade level (1, 2, and 3) and according to the -VC combinations (-ip, -un, and -as), we first calculated the means, variances and standard deviations for each of the nine cells representing each language group. These results appear in Table 3. It should be noted that the means, variances and standard deviations expressed in this table represent proportions of items correct for each of the nine Ss included in each cell.

NES	-ip	-un	-as
GRADE 1	.9841	.6666	.3095
GRADE 2	1.0000	.9405	.8551
GRADE 3	1.0000	.8571	.6031
NSS			
GRADE 1	.4722	.2619	.0853
GRADE 2	.8591	.4881	.3433
GRADE 3	.9861	.8293	.6666

Table 3A. Means - Phase I.

NES	-ip	-un	-as
GRADE 1	.0759	.1120	.1384
GRADE 2	0	.0051	.0182
GRADE 3	0	.0753	.2062
NSS			
GRADE 1	.1945	.1096	.0487
GRADE 2	.1072	.1307	.1682
GRADE 3	.0017	.0465	.1378

Table 3B. Variances - Phase I.

NES	-ip	-un	-as
GRADE 1	.2755	.3347	.3720
GRADE 2	0	.0714	.0324
GRADE 3	0	.2744	.1435
NSS			
GRADE 1	.1392	.3311	.2206
GRADE 2	.3275	.3619	.4100
GRADE 3	.0412	.2156	.3713

Table 3C. Standard Deviations - Phase I.

TABLE 3. Means, Variances and Standard Deviations - Phase I.

In order to perform the analysis of variance (Winer, 1962, p. 307)--which permits an examination of differences between grade means, between the three -VC combination means, and their interaction, if any--it was deemed appropriate to transform the proportions used for the calculations represented in Table 3 into arcsines (Winer, 1962, p. 221). The rationale for such a transformation is given by Winer (pp. 218-221). These procedures were carried out, and the results of the analyses appear in Tables 4 and 5. It will be noted that the design used for the NES Ss differs from that used for the NSS sample in that the former was a 3 x 2 design while the latter was a 3 x 3. The rationale behind this decision was the near-perfect performance of the NES Ss in providing a plural response to the /-ip/ stimulus, thus rendering the inclusion of this variable unnecessary and impossible.

SOURCE	df	MS	F
<u>Between Ss</u>	26		
grades	2	5.88	5.25 (p < .05)
<u>Ss within grades</u>	24	1.12	

<u>Within Ss</u>	27		
syllable	1	6.09	11.07 (p < .01)
gr. x syll.	2	.58	1.05 (n.s.)
syll.x <u>Ss</u>	24	.55	

TABLE 4. Results of Analysis of Variance for NES sample.

SOURCE	df	MS	F
<u>Between Ss</u>	26		
grades	2	19.65	6.26 (p < .01)
<u>Ss within grades</u>	24	3.14	

<u>Within Ss</u>	54		
syllable	2	10.56	16.25 (p < .01)
gr. x syll.	4	.23	.35 (n.s.)
syll.x <u>Ss</u>	48	.65	

TABLE 5. Results of Analysis of Variance for NSS sample.

It will be noted in Tables 4 and 5 that the F-ratio resulting from the between Ss calculations (5.25 and 6.26 for NES and NSS, respectively) are both significant, the former at the .05 level, the latter at the .01 level. Such a result indicates that there is a significant difference between the means of the three grade levels in terms of correct responses to the stimulus items. That is, these results permit us to reject the implied null hypothesis which would state that there is no difference between the three grade levels. In order to determine whether this difference is significant between any two particular grade levels (e.g. grades 2 and 3, or 3 and 1), a t-test of independent samples is appropriate (cf. Downie and Heath, 1959, pp. 123 ff.). Using this procedure, the difference between the means representing the two grades in question was tested for significance. In the case of the NES sample, the result of performing this test gives us a t-value of 3.3435 ($p < .01$) for the comparison of first and second grades. This result enables us to state that the second grade sample provided significantly more correct plural responses than the first-grade sample having the same characteristics (NES). Since t-test results comparing grades 1 and 3 ($t = 1.4387$), and grades 2 and 3 ($t = 1.2228$) proved to be non-significant, the differences between these means (e.g. the third grade mean greater than that for the second grade--cf. Table 3A) may be attributed to chance.

In the case of the NSS sample, comparing each of the three grades with each of the other grades using a t-test to determine the source of the significant differences revealed in the 6.26 F-ratio

value result of the analysis of variance, showed all three resulting t's to be significant. The comparison of grades 1 and 2 resulted in a t of 2.5198 which is significant at the .05 level; comparing grades 2 and 3, the resulting t was 2.4525 which is also significant at the .05 level; the comparison of grades 1 and 3 resulted in a t of 6.1165 which is significant at the .01 level. These results demonstrate a significantly better performance from grade one to grade two and from two to three. That is to say, second-grade NSS Ss in our sample provided significantly more correct plural responses than first-grade Ss having the same characteristics; the same statement can be made for third-grade Ss when compared to second-grade Ss having these characteristics.

In examining the results of the analysis of variance (Within-Ss level), we find that there is a significant difference (F) between the three -VC combinations for both NES and NSS samples, both being significant at the .01 level. As in the aforementioned example, these results (F's) indicate that the difference between the -VC combinations is significant, or, that the implied null hypothesis which would state that there is no difference between -VC combinations may be rejected. For the NES sample, we have no need to perform further statistical manipulations since only two -VC combinations (/ -un and -as/) were included in the analysis of variance design, and the difference between them has been demonstrated to be significant at the .01 level. In other words, the NES Ss in our sample performed significantly better (provided significantly more correct plural responses) on / -un/

stimuli than they did on /-as/ stimuli. For the NSS sample, however, all three -VC combinations were included in the analysis of variance design, and a further test, a t-test (difference between two means) of dependent samples, sometimes referred to as a correlated t-test, is in order (Downie and Heath, 1959, pp. 123 ff.). The results of performing these tests showed a difference ($t = 4.2395$) which is significant at the .01 level between correct responses to stimulus items having /-ip/ and /-un/ as the final -VC combinations, as well as a difference ($t = 5.5179$) significant at the .01 level between correct responses to stimulus items ending in /-ip/ and /-as/. The t (1.9480) resulting from comparing /-un/ and /-as/ stimulus item responses approached significance. For our NSS sample, then, we can say that responses to stimulus items having an /-ip/ ending were significantly more often correct than those to stimulus items ending in /-un/ and /-as/. The mean difference in correct responses to /-un/ stimulus items as opposed to /-as/ items was non-significant.

The third result of the analysis of variance, the F-ratio representing the interaction between grades and syllables, was, in both the NES and NSS samples, not significant. That is to say, our data did not reveal any significant interaction effects between grades and syllables.

Since our sample for Phase I was very restricted in size (nine Ss per cell) in order to carry out the preliminary objectives discussed in Chapter II (p. 51), an extensive discussion of the results of having reorganized the data to perform the analysis of variance and

CHAPTER IV

PHASE II RESULTS AND DISCUSSION

Having accepted the hypothesis proposed in Phase I of this study, the data for the second phase were collected for the Ss as described in Chapter II.

1.0 Adult Criterion Sample

As discussed in Chapter II, samples of twelve NES and NSS adults were tested, and the resulting data used as a "correctness" criterion in evaluating the responses of first, second, third and tenth grade Ss.

The NSS adults readily accepted the task and performed in a very uniform manner, their responses conforming to the descriptive rules for plural formation in English. Their production of both singular and plural forms was in all cases careful (in some, almost guarded) and precise. One of the differences appearing within the NSS adult sample occurred in three cases where a nonsense syllable terminating in /f/ was pluralized by a voiced /vz/ as in the case of English /liyf/ → /liyvz/ or /layf/ → /layvz/; in the other nine cases the /f/ was maintained as in English /klef/ → /klefs/. The other difference occurred in that ten NSS adults in the sample maintained final /θ/ and /ð/ when attaching the plural as in English words /miθ/ → /miθs/ and /leyð/ → /leyðz/. Two NSS adults eliminated final /θ/ and /ð/ in the pluralization of singular forms ending in these two consonants, as /miθ/ → /mis/ and /leyð/ → /leyz/.

The NES adult sample was more difficult to deal with in terms of accepting the task as explained by the experimenter. Several of them seemed suspicious of such a "simple" task and either verbalized their distrust openly (e.g. "Come on. Tell me. You really are looking for something else, aren't you?"), or provided responses to the trial items which implicitly indicated the same doubts which had been expressed openly in other cases. Thus a trial item /mif/ accompanied by one of the illustrations might be pluralized as /muwf/ or even /miflim/. It was then necessary to re-emphasize the nature of the activity, to re-emphasize the fact that they were serving as models for the children's responses, that the task was, in fact, just as simple as described, and that no value judgments regarding "creativity" or other hidden talents were being made. Once convinced of the task, the NES adults approached it with an apparently greater relaxation as evidenced by rapid responses and an urgency to "get on with it." The results of NES adult responses showed the same variation as was demonstrated by NSS adults' responses, and only the distribution of a specific variation differed. For example, the final /f/ pluralization analogous to English /liyf/ → /liyvz/ occurred in five cases among NES adults. The /miθ/ → /mis/ and /leyǎ/ → /leyz/ type plurals occurred in nine out of twelve NES adult responses, only three preserving the final /θ/ or /ǎ/ when attaching the plural suffix; this is nearly opposite to the distribution of plural responses to the same stimulus items by NSS adults.

Using the adults as the criterion sample, and having found no

substantive difference between NES and NSS adults, Table 6 lists the final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments and the plurals which were considered admissible as "correct" for the purpose of evaluating the responses of the Ss used in this investigation.

1.		
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TABLE 6. Categories of segments
derived from a list
of 24 segments
and their plurals

FINAL SEGMENT	PLURAL (S)
1. -p	+s
2. -t	+s
3. -k	+s
4. -θ	+s, → ∅s
5. -f	+s, → vZ
6. -b	+z
7. -d	+z
8. -g	+z
9. -ǰ	+z, → ∅z
10. -v	+z
11. -m	+z
12. -n	+z
13. -ŋ	+z
14. -l	+z
15. -r	+z
16. -w	+z
17. -y	+z
18. -h*	+z
19. -s	+z
20. -z	+z
21. -ʒ	+z
22. -ʒ̃	+z
23. -ʒ̄	+z
24. -j	+z

TABLE 6. Correctness Criterion of Pluralization in English Derived from a Sample of Adults. (∅ = final segment of singular is dropped; *-h = vowel lengthened and shifted toward mid-vowel position as in "blah").

2.0 Results of Overall Analysis of Data Comparing Language Groups and Grades

The most general of possible analyses of the data collected in Phase II of this study was carried out first. The underlying notion was that subsequent analyses could then be of a more specific character with the aim of attaining more information of a descriptive nature and, thus, of greater interest.

The first step was to determine the mean proportions of correct responses to each of the given final segments by the Ss in each grade and in each language group. Thus, for example, for the final segment /d/ we would have a total of eight mean proportions, four each for each of the two language groups represented. These proportions were determined by summing the total number of correct plural responses provided by the Ss included within each of the cells, and dividing by the number of Ss in each cell (18). (For a review of the design, the reader is referred to Chapter II.) These mean proportions are presented in Tables 7 and 8. The standard deviations of the sample scores for each of the final segments are displayed in Tables 9 and 10.

FINAL SEGMENT	GRADE 1	GRADE 2	GRADE 3	GRADE 10
1. -p	.8333	1.0000	1.0000	1.0000
2. -t	.8889	.9444	.9444	.9444
3. -k	.9444	.9444	1.0000	.9444
4. -θ	.2778	.1667	.3889	.8333
5. -f	.8889	1.0000	.8889	1.0000
6. -b	.9444	.9444	.9444	1.0000
7. -d	.8889	1.0000	1.0000	1.0000
8. -g	1.0000	.8889	1.0000	.9444
9. -ð	.3333	.2222	.7222	.9444
10. -v	1.0000	.9444	1.0000	1.0000
11. -m	.8889	.9444	.9444	1.0000
12. -n	.8333	.9444	1.0000	.8889
13. -ŋ	.6667	.6667	.9444	1.0000
14. -l	.8889	1.0000	.9444	1.0000
15. -r	.8889	1.0000	1.0000	1.0000
16. -w	.8333	1.0000	1.0000	1.0000
17. -y	.7778	.9444	1.0000	.8889
18. -h	.8333	.8333	1.0000	.8889
19. -s	.3889	.7222	.8889	.9444
20. -z	.2778	.5000	.8333	.7778
21. -ʒ	.3889	.8333	.9444	.8333
22. -ʒ	.2222	.5000	.7778	.8333
23. -ʒ	.3889	.7222	.8889	.8889
24. -j	.4444	.6111	.7778	.8333

TABLE 7. Phase II Means of Correct Plural Responses by Native English Speaker Sample.

FINAL SEGMENT	GRADE 1	GRADE 2	GRADE 3	GRADE 10
1. -p	.8333	.9444	1.0000	.9444
2. -t	.8333	.7778	.8333	1.0000
3. -k	.9444	.8889	.9444	.8889
4. -θ	.2778	.1667	.6667	.7222
5. -f	.6667	.8889	.9444	.9444
6. -b	.7778	.8889	1.0000	.7778
7. -d	.9444	.8889	1.0000	1.0000
8. -g	.7778	.9444	1.0000	.8889
9. -ð	.4444	.4444	.6667	.7222
10. -v	.7222	.8333	.9444	.7778
11. -m	.9444	.8333	.9444	.9444
12. -n	.8889	.8889	1.0000	.8889
13. -ŋ	.5556	.6111	.9444	.8333
14. -l	.7778	.9444	1.0000	.8889
15. -r	.8889	.8889	1.0000	1.0000
16. -w	.7778	.9444	.9444	.8889
17. -y	.8889	.9444	.9444	.8889
18. -h	.7222	.8889	.6667	.7778
19. -s	.2778	.5556	.3333	.5556
20. -z	.1667	.4444	.3333	.4444
21. -ʃ	.2222	.5556	.4444	.6667
22. -ʒ	.1111	.3889	.3889	.4444
23. -ç	.4444	.5556	.3889	.5000
24. -j	.2222	.6111	.3889	.6111

TABLE 8. Phase II Means of Correct Plural Responses by Native Spanish Speaker Sample.

FINAL SEGMENT	GRADE 1	GRADE 2	GRADE 3	GRADE 10
1. -p	.3727	0	0	0
2. -t	.3143	.2291	.2291	.2291
3. -k	.2291	.2291	0	.2291
4. -θ	.4479	.3727	.4875	.3727
5. -f	.3143	0	.3143	0
6. -b	.2291	.2291	.2291	0
7. -d	.3143	0	0	0
8. -g	0	.3143	0	.2291
9. -ð	.4714	.4157	.4479	.2291
10. -v	0	.2291	0	0
11. -m	.3143	.2291	.2291	0
12. -n	.3727	.2291	0	.3143
13. -ŋ	.4714	.4714	.2291	0
14. -l	.3143	0	.2291	0
15. -r	.3143	0	0	0
16. -w	.3727	0	0	0
17. -y	.4157	.2291	0	.3143
18. -h	.3727	.3727	0	.3143
19. -s	.4875	.4479	.3143	.2291
20. -z	.4479	.5000	.3727	.4157
21. -ʒ	.4875	.3727	.2291	.3727
22. -ʒ	.4157	.5000	.4157	.3727
23. -ʒ	.4875	.4479	.3143	.3143
24. -j	.4969	.4875	.4157	.3727

TABLE 9. Phase II Standard Deviations of Correct Plural Responses by Native English Speaker Sample.

FINAL SEGMENT	GRADE 1	GRADE 2	GRADE 3	GRADE 10
1. -p	.3727	.2291	0	.2291
2. -t	.3727	.4157	.3727	0
3. -k	.2291	.3143	.2291	.3143
4. -θ	.4479	.3727	.4714	.4479
5. -f	.4714	.3143	.2291	.2291
6. -b	.4157	.3143	0	.4157
7. -d	.2291	.3143	0	0
8. -g	.4157	.2291	0	.3143
9. -ā	.4969	.4969	.4714	.4479
10. -v	.4479	.3727	.2291	.4157
11. -m	.2291	.3727	.2291	.2291
12. -n	.3143	.3143	0	.3143
13. -ŋ	.4969	.4875	.2291	.3727
14. -l	.4157	.2291	0	.3143
15. -r	.3143	.3143	0	0
16. -w	.4157	.2291	.2291	.3143
17. -y	.3143	.2291	.2291	.3143
18. -h	.4479	.3143	.4714	.4157
19. -s	.4479	.4969	.4714	.4969
20. -z	.3727	.4969	.4714	.4969
21. -š	.4157	.4969	.4969	.4714
22. -ž	.3143	.4875	.4875	.4969
23. -š	.4969	.4969	.4875	.5000
24. -ŷ	.4157	.4875	.4875	.4875

TABLE 10. Phase II Standard Deviations of Correct Plural Responses by Native Spanish Speaker Sample.

The next step was to carry out an analysis of variance (cf. Chapter III) by grouping the 24 mean proportions (one each for each of the 24 segments examined) for each of the four grades within each of the two language groups. The purpose of this analysis was to determine whether significant differences existed between mean correct responses to all stimulus items (24) between grades as well as between language groups. The design (including main effect and cell means) used for the analysis of variance performed is given in Table 11.

The results of this analysis appear in Table 12. It will be noted that the F-ratios for both main effects are significant. (Language Group: $F = 10.0293$, with 1 d.f., $p < .01$; Grade: $F = 8.2639$ with 3 d.f., $p < .01$). No significant interaction effect was found between grades and language groups ($F = .3927$).

	GRADE 1	GRADE 2	GRADE 3	GRADE 10	
NES	$\bar{X} = .6968$	$\bar{X} = .8032$	$\bar{X} = .9097$	$\bar{X} = .9328$	$\frac{\sum \bar{X}}{n} = .8356$
NSS	$\bar{X} = .6296$	$\bar{X} = .7384$	$\bar{X} = .7808$	$\bar{X} = .7940$	$\frac{\sum \bar{X}}{n} = .7355$
	$\frac{\sum \bar{X}}{n} = .6632$	$\frac{\sum \bar{X}}{n} = .7708$	$\frac{\sum \bar{X}}{n} = .8449$	$\frac{\sum \bar{X}}{n} = .8634$	

TABLE 11. Mean proportions Used in Grade x Language Group Analysis of Variance.

SOURCE	M. S.	d.f.	F-Ratio
TOTAL	.0552	191	
BETWEEN	.2466	7	
LANGUAGE GROUPS	.4810	1	10.0293 (p < .01)
GRADES	.3963	3	8.2639 (p < .01)
LANGUAGE GROUPS/ GRADES	.0188	3	.3927 (n.s.)
WITHIN	.0479	184	

TABLE 12. Results of Analysis of Variance Comparing Mean Correct Pluralizations Across Ss and Final Segments within Grades (1, 2, 3, 10) and Language Group (NES and NSS).

These results indicate that there is, in fact, a significant difference between the means of the different levels of the two main effects (grade and language group). But, as noted in Chapter III, this general statement does not inform us as to whether a significant difference exists between the means of any two given levels of the variables under consideration. In order to obtain this type of information, we may use t-tests (cf. Chapter III) or their statistical equivalent (cf. Guilford, 1956, p. 264), the one-way analysis of variance (with 1 d.f., $F = t^2$). A series of one-way analyses of variance were performed for 16 pairs of means. It will be noted that these analyses were performed for all combinations of main effect levels of interest, i.e. grades within a single language group and language groups within given grades. The results of these analyses appear in Table 13.

<u>WITHIN LANGUAGE GROUP BETWEEN GRADES</u>			
	<u>COMPARISON</u>	<u>F - Ratio</u>	<u>p</u>
NES	Grade 1 x Grade 2	2.056	n.s.
	Grade 1 x Grade 3	11.901	<.01
	Grade 1 x Grade 10	17.252	<.001
	Grade 2 x Grade 3	3.452	n.s.
	Grade 2 x Grade 10	6.211	<.02
	Grade 3 x Grade 10	.534	n.s.
NSS	Grade 1 x Grade 2	2.200	n.s.
	Grade 1 x Grade 3	3.713	n.s.
	Grade 1 x Grade 10	5.861	<.02
	Grade 2 x Grade 3	.357	n.s.
	Grade 2 x Grade 10	.914	n.s.
	Grade 3 x Grade 10	.047	n.s.
<u>WITHIN GRADES BETWEEN LANGUAGE GROUPS</u>			
GRADE 1	NES x NSS	.712	n.s.
GRADE 2	NES x NSS	.919	n.s.
GRADE 3	NES x NSS	4.692	<.05
GRADE 10	NES x NSS	12.732	<.001

TABLE 13. Results of Series of One-Way Analyses of Variance within Language Groups between Grades and within Grades between Language Groups.

As might be expected, the largest F-ratio resulting from the analyses was that between first and tenth grades among native speakers of English. That is to say, the difference between mean proportions between these two grades in the NES sample was of such magnitude so as to preclude its being viewed as the result of chance effects. This is followed in terms of level of significance by grades 1 and 3 in the NES group, 2 and 10 in the NES group and 1 and 10 in the NSS group. These results are not surprising inasmuch as one would expect, for variables such as the ones studied, to find a greater difference between grades 1 and 10 in a given population sample than between grades 1 and 2. It will be noted that in no case have we encountered a significant difference between two grades one interval apart (e.g. 1 and 2). In the within-language group between grade comparisons (e.g. NSS 1 x NSS 2), one comparison between two grades one interval apart approached significance, namely NES grades two and three ($F = 3.452$ with 1 d.f., $p < .07$).

These general results confirm what might have been expected from an inspection of the cell means in Table 11. However, it should be noted that had the examination of the data been limited to such a cursory analysis of absolute differences between mean values of particular combinations, one would have been led to quite erroneous conclusions. This is the case because the character of the distribution of scores upon which any given two means was based would not have been taken into account. One example will suffice: while the absolute difference between the means of NSS 10th grade and NES 10th grade is

.1388, and the difference between the two means was found to be highly significant ($p < .001$), the absolute difference between the means of NSS grades 1 and 3 is .1512, and this difference was found not to be statistically significant.

In comparing the differences between language groups within any single grade, the largest F-ratio, which is highly significant ($p < .001$), is that between NES and NSS groups in grade 10. The second in magnitude, also significant ($p < .05$), is that between these two language groups in grade 3. The differences between grades 1 and 2 were not significant. In other words, the significant differences between the two language groups are most obvious in the two highest grades sampled, namely, grades 3 and 10, and not in grades 1 and 2. Native English speakers apparently continue to progress as regards formation of English plurals through the third grade, and show no apparent loss in what they have mastered when tested in the tenth grade. Native Spanish speakers, our data would suggest, while experiencing gains, comparable to those of native speakers of English, in their ability to form plurals in the first and second grades, fail to maintain their progress, and by the third, and particularly by the tenth grade, their level of performance regarding plural formation is significantly inferior to that of their NES counterparts.

These results generally tend to support a notion discussed in Chapter I regarding a possible "cumulative deficit" which may build up during the educational process whereby initial "disadvantages" which may not be, in themselves, insurmountable or extremely significant,

will, if not appropriately approached, result in an increase in the deficit on a cumulative basis. As was previously noted, there is no significant difference in the performance of the two groups (NES and NSS) by the end of the first and second grades. NSS Ss' performance is significantly inferior to that of NES Ss by the end of the third grade, however, and by the tenth grade, the performance differential is even greater.

3.0 Discussion of Individual Final Segment Mean Proportion Results

3.1 General Examination of NES Results

First of all attention is called to the fact that the total number of Ss in all cases was 18, so that a mean proportion of .9444 indicates one S's error, a mean proportion of .8889 indicates two Ss' errors, and .8333, three Ss'. Since there is always a possibility of random error in any task of this kind, we shall consider those final segments showing a mean proportion of correct plural responses of .8333 or better as being under control by the Ss; i.e. in our discussion the expressions "under control" and "controlled" refer to that proportion range (.8333 - 1.000) and mean only that.

An examination of the mean proportions of correct plural responses to the final segments in English indicates that for the NES sample, the plurals to final segments /p, t, k, f, b, d, g, v, m, n, l, r, w, h/ are apparently under control by the end of the first grade. Examining Table 7 and Figure 3 for these same segments, it will be observed that through apparent time, these segments either remain at

the same level or show only minor fluctuations of no significance (e.g. /g/ which had a mean of 1.000 in the first grade, was at the same level in the third grade, has a mean of .8889 in the second grade and of .9444 in the tenth grade). The slight downward variations in Figure 3 and Tables 7 and 8 reflect the influence of only one or two Ss, and thus should not be viewed as indicating a significant trend. We can state, then, that the NES Ss apparently know how to pluralize the aforementioned segments by the end of the first grade. We cannot, on the basis of this study, make any statement as regards when they were acquired--i.e. during pre-school or the first-grade period. For discussions of this earlier period, the reader is referred to either Berko's study (1958) or Anisfeld and Tucker (1967).

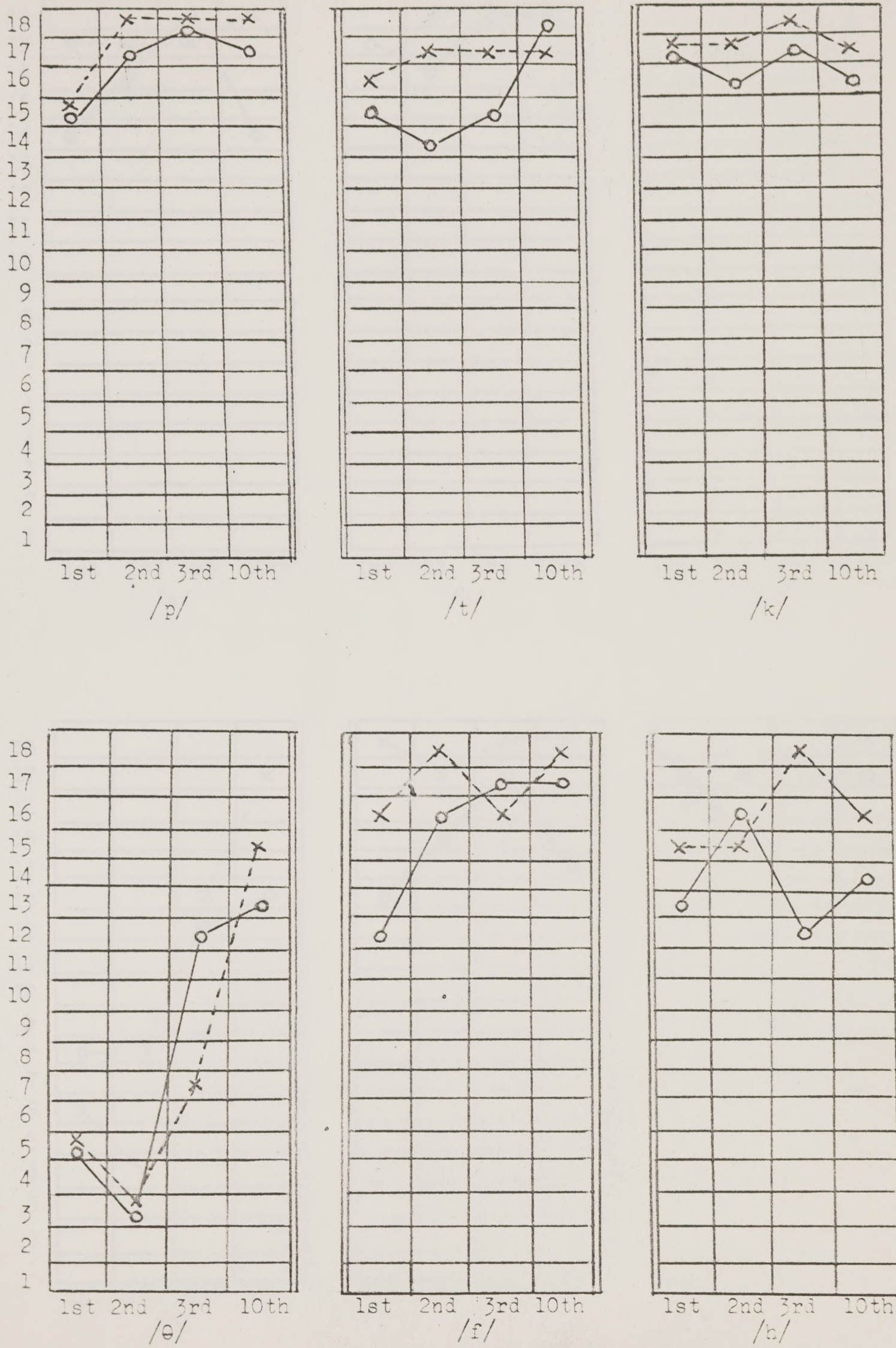


FIGURE 3a. Number of Correct Plural Responses to Individual Final Segments. ("x" = NES; "o" = NSS).

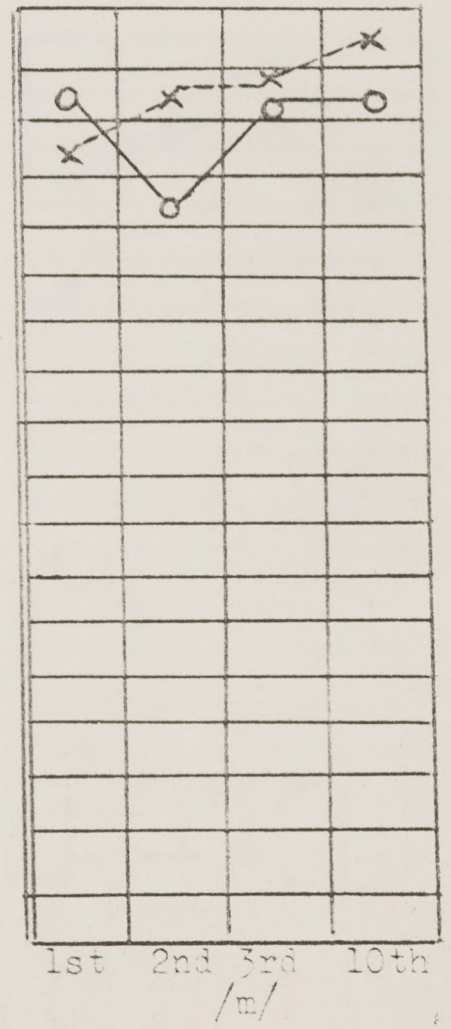
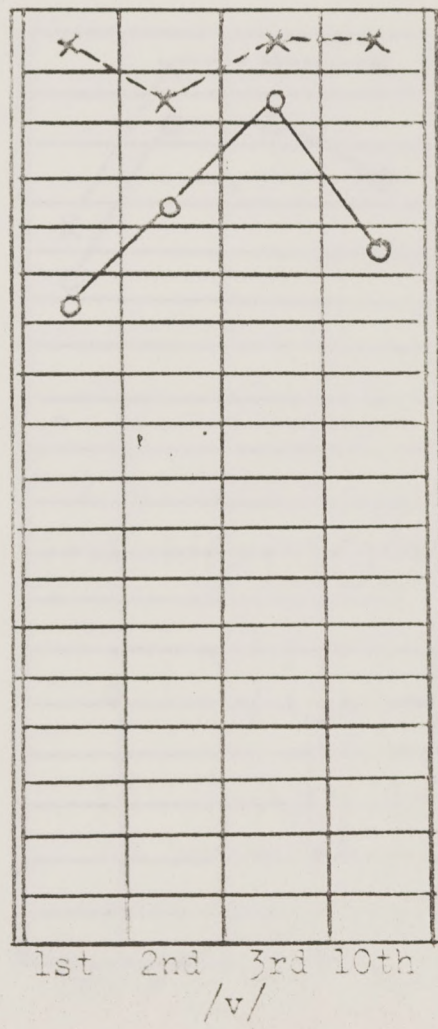
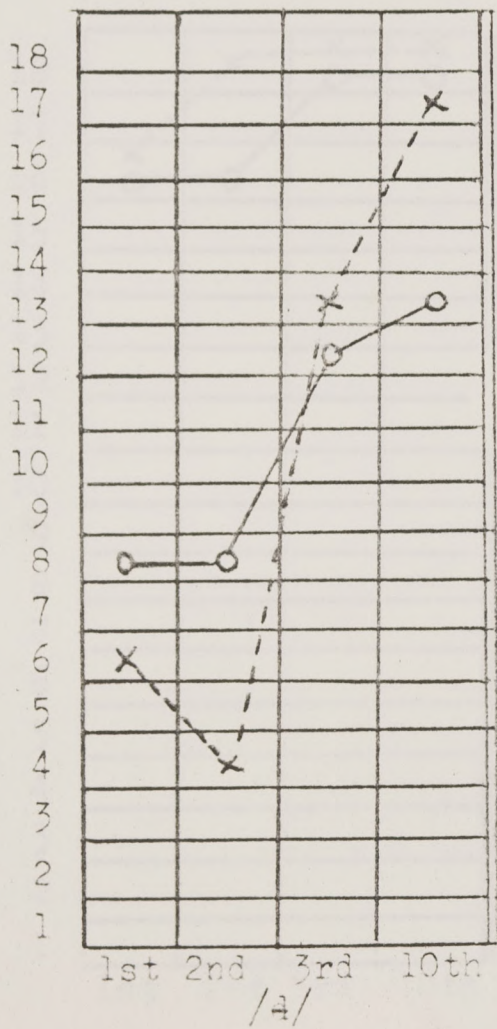
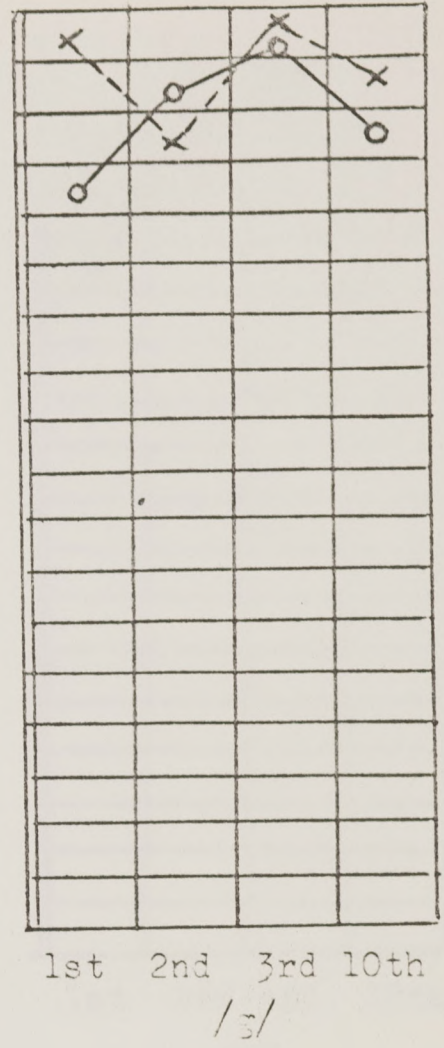
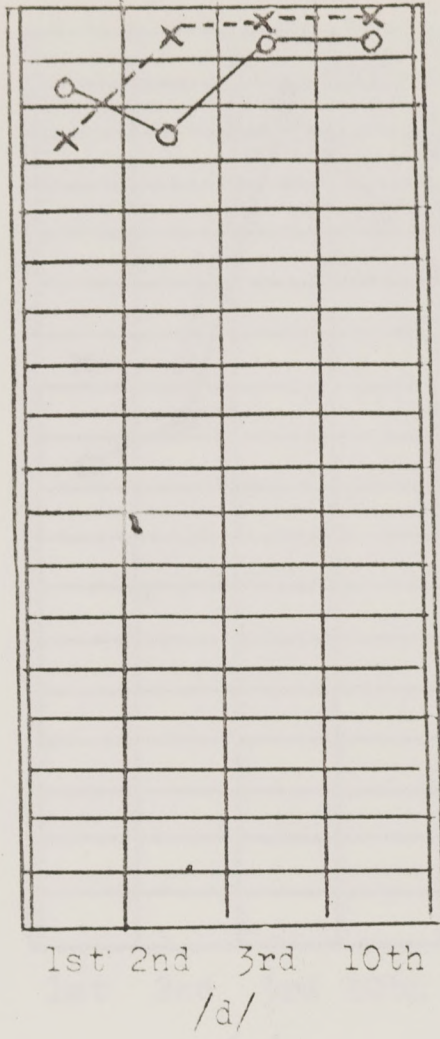
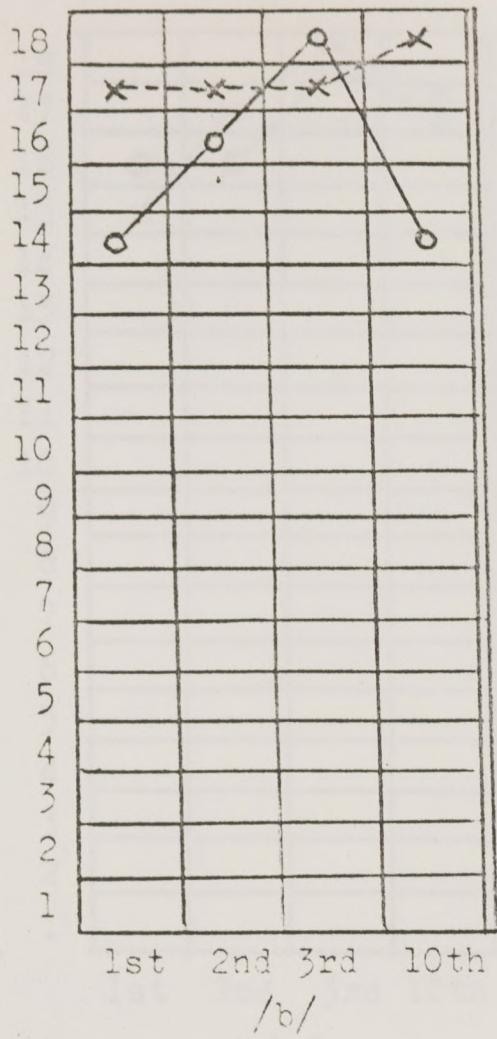


FIGURE 3b. Number of Correct Plural Responses to Individual Final Segments. ("x" = NES; "o" = NSS).

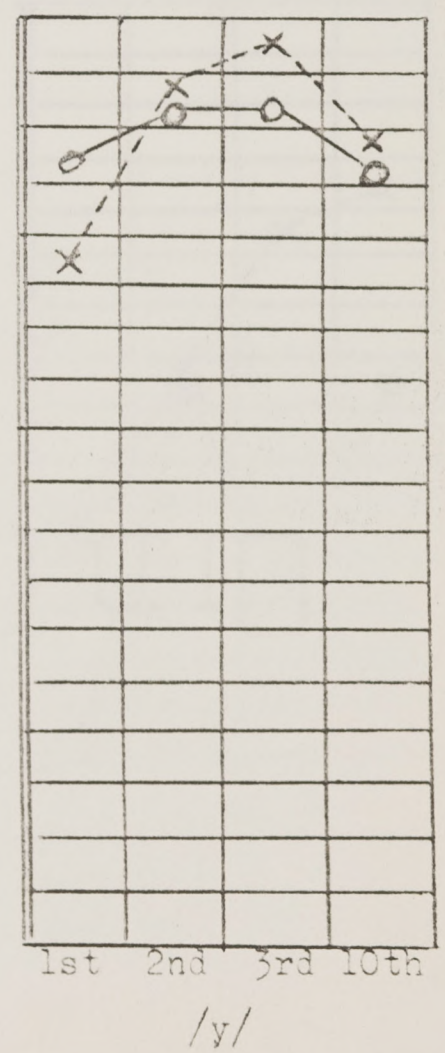
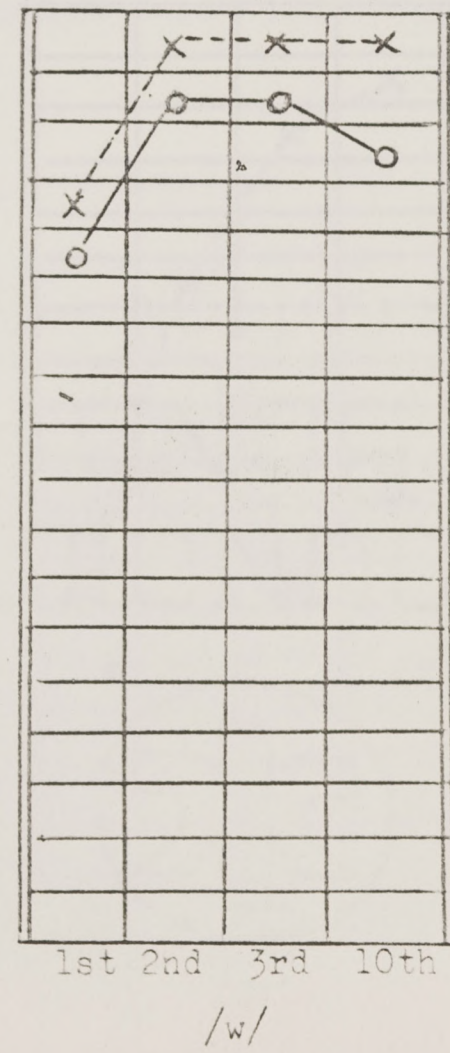
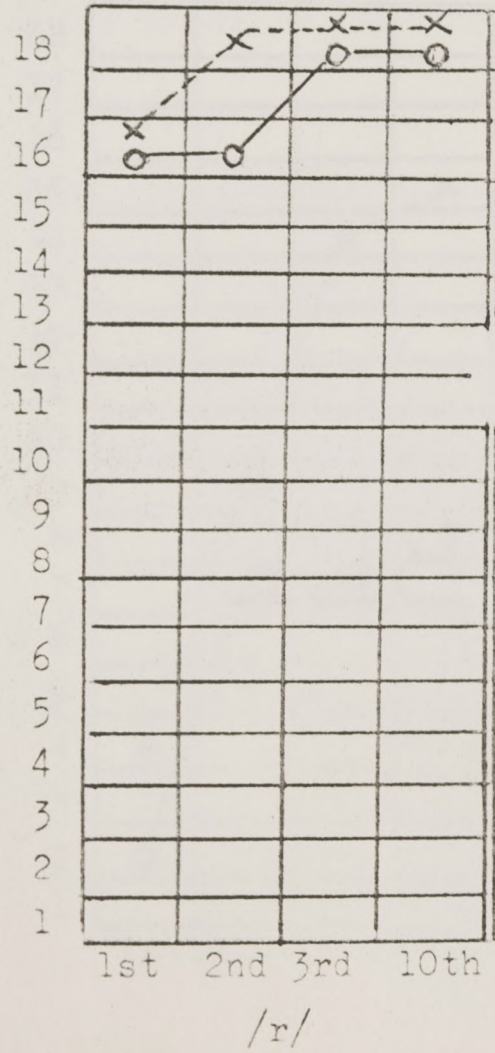
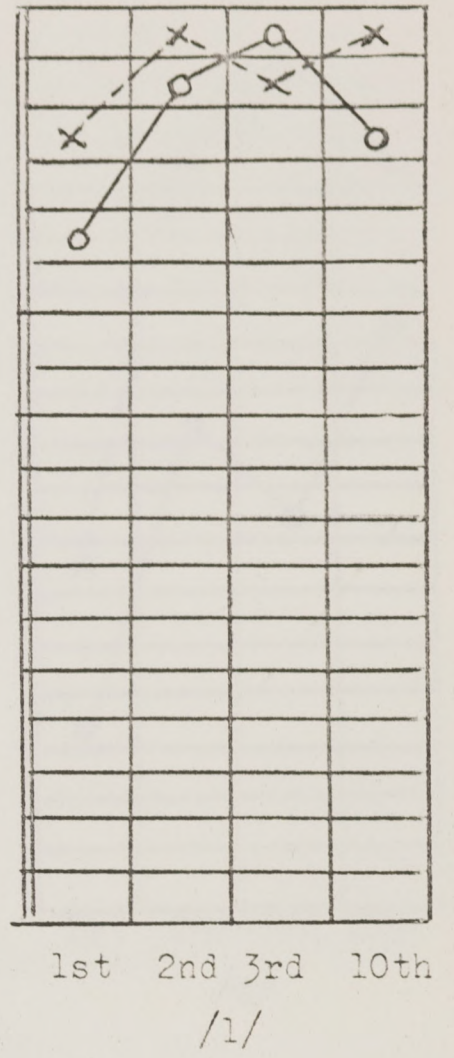
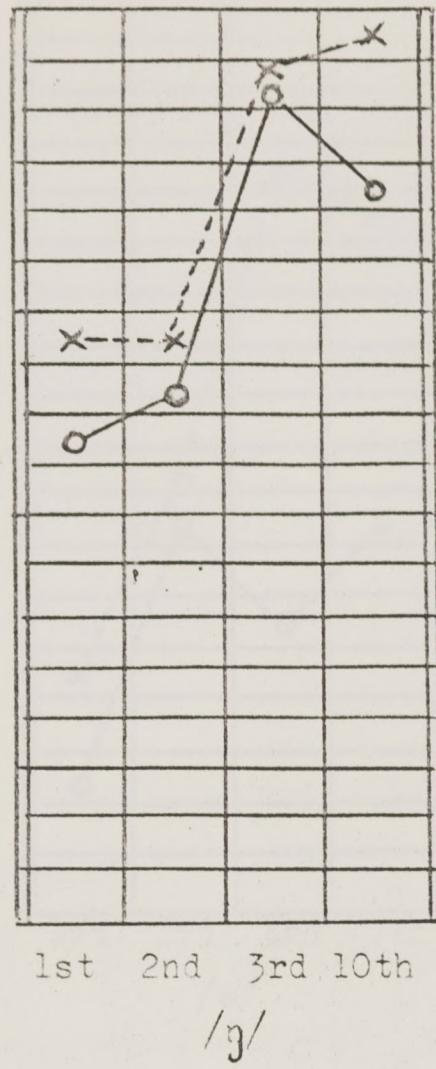
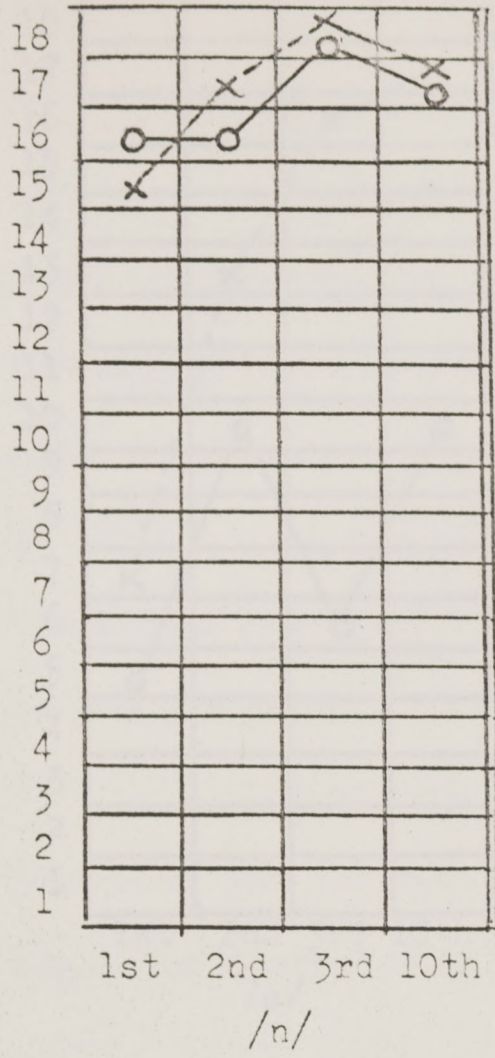


FIGURE 3b cont. Number of Correct Plural Responses to Individual Final Segments. ("x" = NES; "o" = NSS).

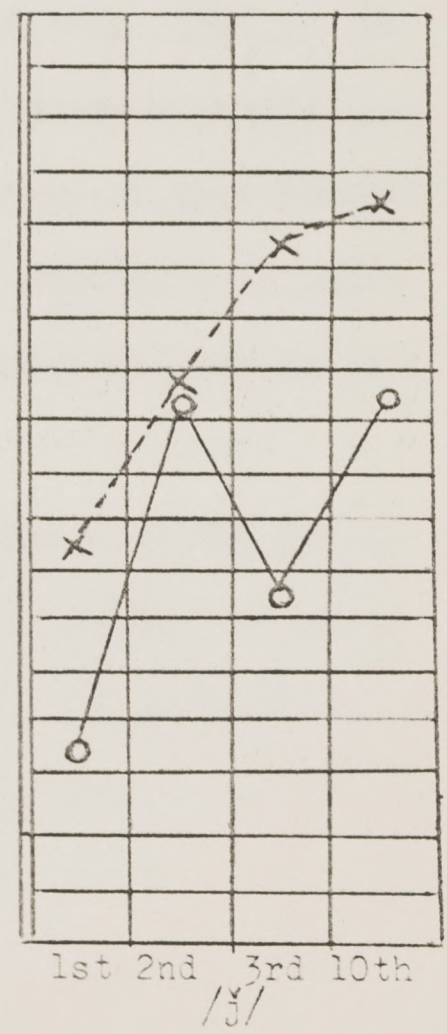
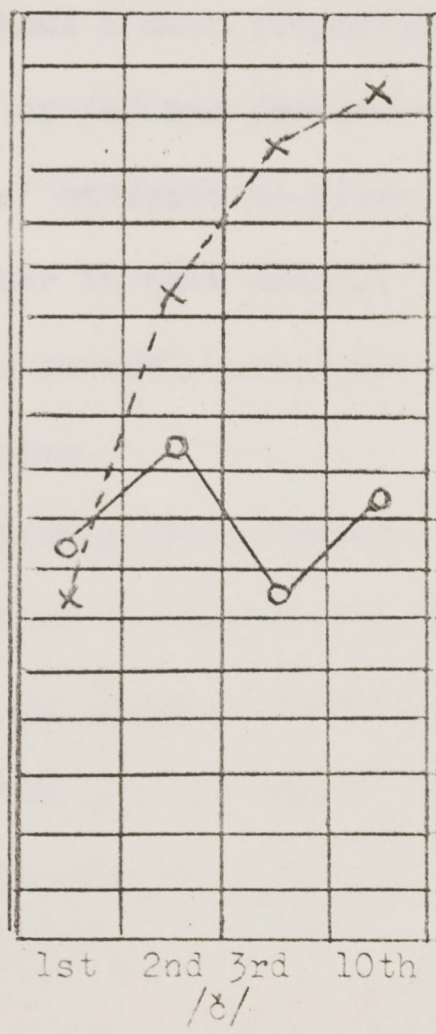
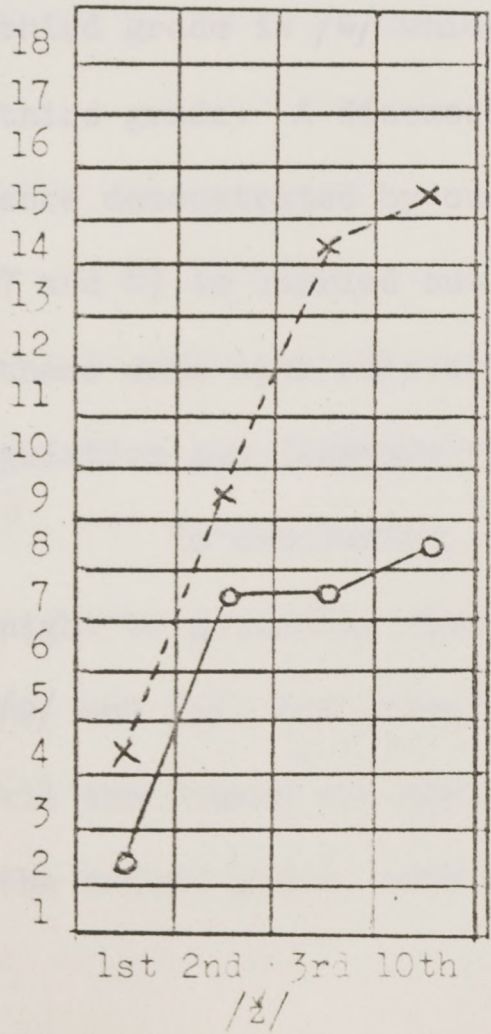
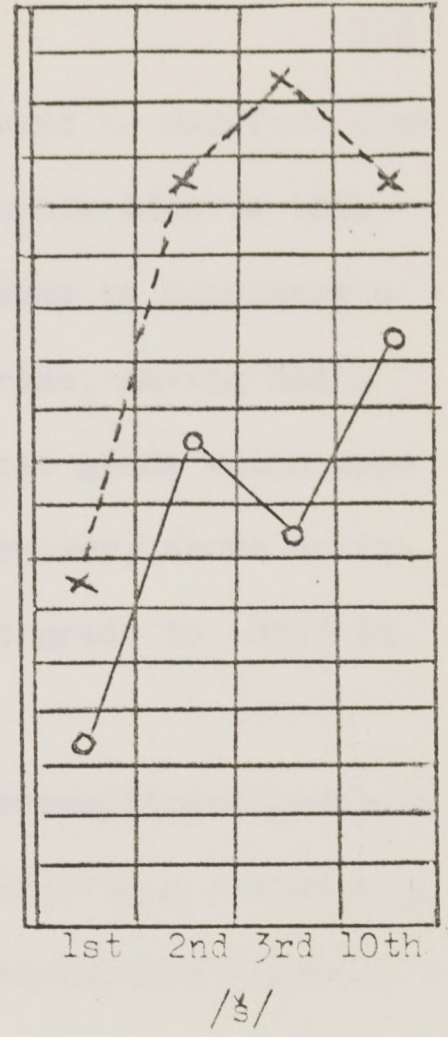
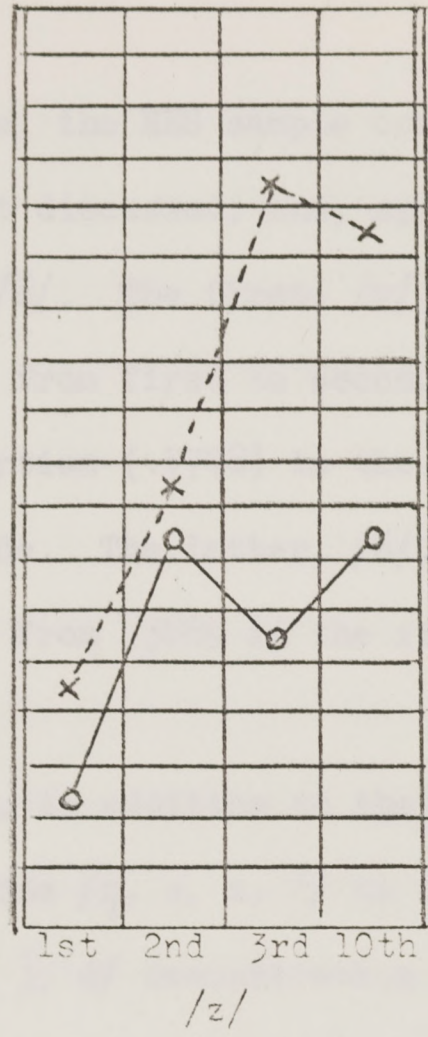
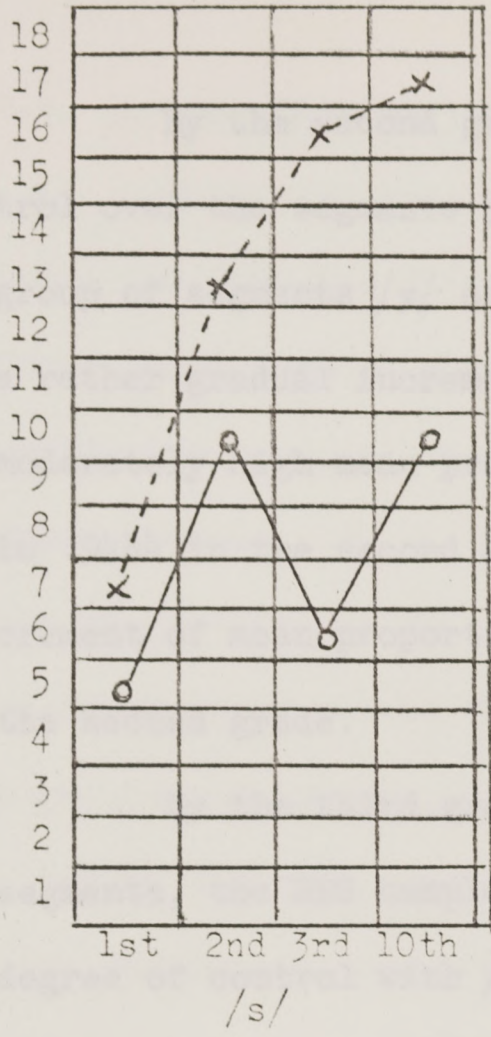


FIGURE 3c. Number of Correct Plural Responses to Individual Final Segments. ("x" = NES; "o" = NSS).

By the second grade, the NES sample continues to manifest control over the segments just discussed, and, apparently adds to this group of segments /y/ and /š/. The first, /y/, seems to demonstrate a rather gradual increment from first to second grade, having had a moderately high mean proportion (.7778) in the first grade which goes to .9444 in the second grade. The latter, /š/, however, shows an increment of mean proportion from .3889 in the first grade to .8333 in the second grade.

By the third grade, in addition to the aforementioned group of segments, the NES sample adds /ŋ, s, z, č/ as evidencing a rather high degree of control with /ž, ě, ě/ demonstrating a borderline control, .7778, .7778, .7222, respectively (Table 7). The only final segment which is clearly not controlled by the NES group by the end of the third grade is /θ/ which shows a mean proportion of only .3889 in the third grade. A discussion of /ǎ/ and /θ/ and the rather poor performance demonstrated by our Ss' attempts at pluralization of them (Tables 7 and 8) is carried out later in this Chapter (cf. Section 4.1) since these data seem relevant to several questions of interest both to linguistics and language teaching.

In conclusion, regarding pluralization progress of NES Ss, it might be generally stated that in addition to the individual segments /θ/ and /ǎ/, the group of sibilants is usually the last to be mastered. All the others are well under the NES sample Ss' control by the end of the second grade, most by the end of the first grade.

3.2 General Examination of NSS Results

Examining the NSS sample in the same manner as the NES sample above, we find the following general trends (cf. Table 8 and Figure 3). Those final segments which may be said to be controlled by the NSS sample for purposes of pluralization of nouns by the end of the first grade include: /p, t, k, d, m, n, r, y/, fewer, and manifesting a slightly different distribution from those in the NES group. It will be remembered that in the NES sample, /y/ was not one of the final segments considered to be under control by the end of the first grade, although its mean proportion, .7778, approached the arbitrary criterion for control set. This is the only case where the NSS sample contains a segment not contained in the NES sample, while the opposite, i.e. those controlled by the NES first-grade group and not by the NSS group of the same grade include /f, b, g, v, l, w, h/.

By the end of the second grade, and in addition to those segments already mentioned as being under control by the end of the first grade for our NSS sample, the segments /f, b, g, v, l, w, h/ may be included for the NSS children. It is of interest to point out that the group of final segments added by the end of the second grade in the NSS sample exactly coincides with those mentioned in the previous paragraph as being the ones controlled by the NES first-grade sample and not by the NSS first-grade group. It will also be noted that there are no great increases between first and second grade mean proportions, the gains in the second grade being, rather, quite small. It will be remembered that in the case of the NES sample, /š/ went

from .3889 in the first grade to .8333 in the second grade and from then on maintained this high level. No such rapid increment was evidenced in the NSS data for these two grades.

In the third grade for the NSS sample, we may add to those segments already mentioned in connection with the first and second grades, only the segment /ŋ/. It is interesting to note first that this same segment was brought under control by the NES sample at the same time (end of the third grade) unlike the majority of the other consonants in general, and the other nasals, in particular. It will also be noted that none of the sibilant group of final segments has yet been brought under control by the NSS sample for purposes of pluralization, the mean proportion for the group as a whole, /s, z, š, ž, č, ě/, being only .3796, or, only slightly better than the mean proportion of .3518 registered for the NES sample in the first grade for this same group of final segments. Thus, while the increment for the NSS children in our sample from first grade to third with regards to this particular segment group was from .2407 to .3796, their third grade performance with this segment group is roughly equivalent to that demonstrated by the NES group at the end of the first grade. This group of sibilants will be discussed in greater detail in Section 3.3 of this Chapter.

Of interest in the data for the third grade of the NSS group is that final /θ/ and /ð/ both demonstrate a mean proportion of correct responses of .6667, while the third-grade NES mean proportion for the first, /θ/, is .3889, and for the second, /ð/, is .7222. The

NSS group's better performance on /θ/ than that exhibited by the NES group is of interest and will be discussed in Section 4.1. The great increment exhibited from grade 2 to grade 3 for the segment /θ/ (i.e. .1667 to .6667) is also a point to be discussed in this section.

What is perhaps most extraordinary about the data from the NSS sample is their considerably inferior performance in the tenth grade when compared with the NES group. It might be expected that by approximately age 15 and the second year in high school, the foundations of language have been established (cf. Lenneberg, 1967, p. 377), and the NES sample tends to bear this out as regards plural formation. Whatever control was gained over final segments for the purposes of pluralization, with the exception of /θ/, was gained during the first three grades of school; tenth grade performance among the NES sample indicated control of all 24 final segments. With the NSS group, on the other hand, the sibilant group discussed with relation to the third grade where a mean proportion of .3796 was revealed shows little increment by the tenth grade (i.e. the tenth grade mean proportion is .5370). The only two final segments from the entire group which show even a slight margin of control, i.e. better than .50, are /š/ and /ǰ/, the mean proportions of which are .6667 and .6111, respectively.

The generally less successful performance by the NSS sample might be explained in many different ways. The fact that most of the NSS Ss probably continued to use Spanish in their homes throughout the school experience, thus, failing to receive continuous practice in English, might be an important factor. Using English only in the

school setting might tend to produce just the sort of "restricted code" discussed by Bernstein. Further, the use of English in the home and/or the neighborhood might, in fact, reinforce just those "errors" which are evidenced by the data. For, if within the peer group or the family group the "errors" discussed are condoned, albeit implicitly, and are used by other members of the group, these errors are then positively reinforced. This latter aspect would be very similar to the possible explanation for the greater substitution of final /θ/ and /ð/ by the NES sample, i.e. continued practice in the home without correction tends to maintain the "error" (cf. Section 4.1).

It thus appears that those final segments included in the sibilant group, when not controlled by the end of the third grade, do not improve appreciably after that time. Our data tend to indicate that those plurals controlled by the end of the third grade do, in fact, remain under control; those plurals not controlled by Ss by the end of the third grade apparently remain so at least up to the limit of our sample (i.e. tenth grade).

3.3 Comments on the Pluralization of /s, z, š, ž, č, ĵ/

Our finding indicating the generally poor performance level of all Ss on all of the sibilant-final segments (cf. Table 14) seems to corroborate the findings of Berko (1958) and Anisfeld and Tucker (1967). The Ss included in our sample, however, were presented a greater variety of sibilant-final nonsense syllables than were the Ss in those studies.

RANK	NATIVE ENGLISH SPEAKERS		NATIVE SPANISH SPEAKERS	
	FINAL SEGMENT	MEAN ACROSS GRADES	FINAL SEGMENT	MEAN ACROSS GRADES
1.	-v	.9861	-d	.9583
2.	-r	.9722	-r	.9445
3.	-d	.9722	-p	.9305
4.	-p	.9583	-n	.9167
5.	-k	.9583	-y	.9167
6.	-b	.9583	-k	.9166
7.	-g	.9583	-m	.9166
8.	-l	.9583	-g	.9028
9.	-w	.9583	-l	.9028
10.	-f	.9445	-w	.8888
11.	-m	.9444	-b	.8611
12.	-t	.9305	-t	.8611
13.	-n	.9166	-f	.8611
14.	-y	.9028	-v	.8194
15.	-h	.8888	-h	.7639
16.	-ŋ	.8445	-ŋ	.7361
17.	-š	.7499	-ā	.5694
18.	-s	.7361	-š	.4722
19.	-č	.7222	-č	.4722°
20.	-j	.6666	-θ	.4584
21.	-z	.5972	-j	.4584
22.	-ž	.5833	-s	.4306
23.	-ā	.5555	-z	.3472
24.	-θ	.4167	-ž	.3333

TABLE 14. Rank Order of Final Segments Using Mean Proportion of Correct Responses Across Grade Levels.

The children making up our first grade sample were near the end of that grade (April of a school year beginning in September), and they had had no previous school experience (e.g. kindergarten) as was determined by an examination of their school records. Berko does not provide us with information as to exactly when in the first grade her sample was taken, but we know that the age range of her first-grade Ss is 5.6 - 7 years. Our first-grade sample falls within the same age range.

In our study, the mean proportion of correct plural responses to singular nonsense syllables ending in any of the segments which require the /iz/ form of the plural, i.e. /s, z, š, ž, č, ě/ for the NSS first-graders was .2407 and for the NES first-graders was .3518. Berko found no significant difference between pre-schoolers and first-graders in their ability to pluralize those sibilant-final segments included in her study, i.e. /s, č, ž, z/. The mean proportion of correct plural inflections for these four sibilant-final segments for Berko's first-graders was .3650. The mean proportion of correct pluralizations of these same final segments for our NES first-grade Ss is .3194, this result being, thus, in agreement with that of Berko's. This finding is of interest when we consider that the mean proportion reported by Berko is based on 61 cases while ours is based on a smaller sample of 18 Ss. The size of the sample notwithstanding, the Ss provide the correct inflections to the final segments under consideration, on the average, only 1/3 of the time in both studies.

An examination of individual Ss in our first-grade NES sample

to determine patterns of response to the group of sibilants /s, z, š, ž, č, ě/ demonstrated that those who generally were correct in one, say, /s/, tended to be consistently correct in all; and, those who failed in one, consistently failed throughout the sibilant group. Randomly correct responses were not evident in these data.

Berko (1958) asserts that "however poorly children may do on extensions of the rule for forming the plural of glass, they do have this item in their vocabulary and can produce it appropriately . . .," and she further states, ". . . evidently they have at least one actual English model for this contingent plural" (p. 365). That her Ss (and ours) did not generalize from this item is clearly seen in the data. What is less clear is Berko's assertion that the child does actually "have at least one actual English model" which demonstrates this plural [cf. also Huttenlocher (1964) in this regard]. The example used, glasses, seems quite unconvincing as a demonstration of the child's internalized English model. What we are suggesting here is that the vocabulary item glasses may be for the child a quite separate entity from the vocabulary item glass. That the child may have these two separate lexical items in his "vocabulary" (Berko, 1958, p. 367) is quite possible, but it seems unclear as to just how Berko might purport to establish any singular-plural relationship between the two lexical items. In other words, the child may have been told many times to "Go get Daddy's glasses," and to "Be careful with the glass," when he is drinking something, but it does not necessarily follow, even assuming that he has some "notion of plurality" as evidenced by

his saying /weg → wegz/, that the one would in any way be necessarily linked to the other by the child. An analogous example might best clarify our discussion. If a child were given the word "Miss" and asked what two of them would be called, and the child replied /misiz/, would it be correct to assume that "Misses" is what was produced (which would demonstrate "at least one actual English model for this contingent plural") or might it be "Mrs.," i.e. a different lexical item? In light of this ambiguity, it is at least difficult to accept any notion of the child having any such model for contingent plural based on this ambiguous item glasses.

As an aside, it should be recalled that the samples of these two studies can only be considered comparable to the extent that they fall within the same age range. The reader is cautioned against the fact that any statements of corroboration of other investigators' findings herein made are intended as only suggestive of possible trends and couched in the writer's full recognition that generalizations to population parameters from just a few studies, comparable only in the most general sense, would not only be erroneous, but inadmissible. This becomes immediately obvious if it is recalled that the Ss of this study differ from Berko's, definitely in terms of geographical location, and probably in terms of socio-economic status, pre-school experience and aptitude (all controlled variables in this study).

In our study the notion of apparent time has been carried further as compared to its use in the studies of Anisfeld and Berko previously cited. While Berko tells us that first grade Ss give correct

plurals for the sibilant group only 36.5 per cent of the time, ours provides this same information (with the added dimension of complete coverage of the segment-group and thereby, the possibility for making more general statements regarding this group), but goes on to ask still another question. If a mean proportion of only .3518 is demonstrated by our NES Ss in the first grade in response to the sibilant-final group of segments, when can this particular group of segments be said to have been brought under control as far as pluralization is concerned? We thus examined, by means of apparent time, the second-grade group, the third-grade group, and, finally, the tenth-grade group. As it will be recalled, the answer to this question within the constraints of the population sample represented was previously discussed.

4.0 Singular Repetitions--The Reliability of Stimulus Items for Plural Formation

After viewing the data with regard to the overall "correct-incorrect" mean proportions for each of the 24 final segments, an analysis of the Ss' singular repetitions for the given final segments was carried out to determine the "nature" of the plural provided in response to Experimenter-given stimuli--i.e. what did the S, in fact, pluralize? The rationale for this analysis involved the question of the difference between the "incorrect" pluralization of a given nonsense syllable stimulus ending with a given segment as opposed to the pluralization of a different stimulus (e.g. the incorrect repetition of the singular by the S before giving his plural response). It will

be recalled that in Chapter II we discussed the necessity of having the Ss provide the E with a repetition of the singular form of the nonsense syllable as they perceived it. In analyzing results in a study of this kind, there can be no assumption whatever that the stimulus provided by E is the same one perceived by S. Miller and Nicely (1961) provide extensive data on the perceptual confusions which result between different consonants under controlled conditions of noise. It should be noted that "noise" here would be interpreted in its broadest sense, not being specified as to number of decibels of actual noise as in the Miller and Nicely study, but including as well any extraneous factors which might interfere with the perception of particular segments. Thus, we might include "accented" speech where a good deal of filtering must necessarily occur before communication is achieved, or the occurrence of unfamiliar phonemes which are in an analogous way filtered to an existing set of features corresponding to the repertoire of the "receiving" individual. Presumably, such confusions (or accommodations) would be greater between two segments having very similar features, and Miller and Nicely's data tend to bear this out. So, for example, among the most "confused" consonants are /θ/ and /f/ (pp. 156-164).

That noise is not the only important variable in segment confusion seems quite clear. Chomsky (1964) pointed out:

It is by no means obvious that a child of six has mastered this phonological system in full--he may not yet have been presented with all of the evidence that determines the general structure of the English sound pattern (p. 7).

If this is the case, a child who does not have a given segment in his repertoire might be expected to substitute for that segment one which is already within his repertoire and which is quite similar to the segment in question in terms of features. The child may very well "perceive" the segment already present in his repertoire, regardless of whether this is actually the stimulus provided by the E. So, for example, the E might provide a stimulus item ending with /θ/, say /meθ/. A S, if not given an opportunity to repeat the singular, might give as the plural of /meθ/, /mefs/. This plural is, according to the standards set up by the criterion sample, incorrect, and was counted as such in determining the mean proportions for each of the final segments in Tables 7 and 8. Presumably, this was the extent of Berko's count of right vs. wrong responses (1958).

A further step is necessary, however, in analyzing data such as these. If, by permitting the Ss to provide a singular repetition for each stimulus item presented to him, we find that certain consistent final segment substitutions are made by Ss, such findings will certainly have an effect on the mean proportion of correct plurals provided when such information on the singular is not taken into account. In other words, if we count as wrong all those plural responses which do not agree with the criterion established, as we, in fact, did for all the analyses previously discussed, we are arbitrarily adding together two quite distinct kinds of "error"--the lack of a particular segment in a given S's repertoire (or, of course, possible random perceptual confusion) as opposed to the incorrect pluralization of a noun

terminating in a segment which is a part of the S's repertoire as evidenced by his having produced it in the singular.

An examination of the data within the constraints just described was carried out. The singular repetitions provided by the Ss, it will be remembered, were recorded as were the plural responses.

Table 15 shows those final segments for which substitutions were made in the singular repetitions.

TABLE 15. Comparison of Final Segments in Singular and Plural Responses.

SEG- MENT	BE- CAME	NATIVE ENGLISH SPEAKERS					NATIVE SPANISH SPEAKERS					TOTAL
		1st	2nd	3rd	10th	NES sub-	1st	2nd	3rd	10th	NSS sub-	
1.-t	-k						2				2	2
2.-θ	-f	10	13	10	2	35	7	10	3	2	22	57
	-t	1				1						1
3.-f	-θ						1				1	1
4.-b	-p	1	1			2						2
5.-d	-ð	1				1						1
6.-ð	-d	4				4	1		1		2	6
	-v	2	8	4		14	1	6	2	2	11	25
	-z	2	1			3	1				1	4
	-b		1			1						1
	-l							1			1	1
7.-v	-θ		1			1				1	1	2
	-f							2			2	2
	-d						1				1	1
8.-n	-m	1	1		1	3	1	1			2	5
	-ŋ						1				1	1
9.-ŋ	-n	2	6			8	2	3		1	6	14
	-m	4		1		5	3		1		4	9
10.-z	-s									1	1	1
11.-ʃ	-s						1				1	1
	-ʃ	1				1		2	1	2	5	6
12.-ʒ	-j	3	1			4	4	2	5	3	14	18
	-z		1			1	1				1	2
	-s							1		1	2	2
13.-ʒ	-ts	1				1						1
	-ʒ							1		1	2	2
14.-j	-ʒ							2	1	1	4	4
TOTALS		33	34	15	3	85	27	31	13	15	87	172

TABLE 15. Comparison of Final Consonant Substitution in Repetition of Singular Form of Nonsense Syllable between NES and NSS Sample Groups.

It will be noted that the occurrence of these substitutions is given according to language group and within each such group in terms of the four grades tested. It will be seen from a general overview that from 24 total final segments 14 were, in at least one case, replaced by another segment in the singular repetition. Of these 14 final segments, some of the replacements are of limited significance, representing only one occurrence (e.g. f → θ) from a total of 144 possible instances. On the other hand, however, certain other segments were rather consistently replaced in the singular repetitions. /θ/, for example, was substituted for 58 times out of a possible 144, /ä/ 37 times, /ŋ/ 23 times and /ž/ 22 times. It will also be noted that the total number of substitutions for the two language groups, NES and NSS, are 85 and 87, respectively, for all practical purposes the same. What differs, however, is the distribution of substitutions both in terms of grades and segments replaced. In the NES group, for example, the substitutions in grades one and two are high (33 and 34, respectively), even higher than the totals for these two grades in the NSS sample; by the third grade, the NES total has been cut in half (15) as has that of the NSS sample (13). The principal difference across grades lies in the tenth grade where among the NES sample, only three occurrences of segment substitution are found out of a possible total of 432 (24 segments x 18 ss); for the NSS sample, this total remains at approximately the third-grade level for the same group, or, 15. So, while the NES sample phases out its final segment substitution to a virtually complete degree (i.e. 3/432), the NSS sample tends to con-

tinue to provide some consistent substitution patterns even in the tenth grade.

As is obvious, the proportion of substitutions per grade is extremely low when all stimulus items are considered jointly, even in the cases of greatest substitution (e.g. NES second grade). This tends to indicate that environmental conditions during the interviews were of such a nature as to minimize random perceptual errors and to maximize the probability of occurrence of systematic errors of perception (cf. Miller and Nicely, 1961). It should be emphasized that the only evidence we have for the fact that perception of stimulus items was quite accurate is the singular repetitions provided by the Ss. That they were perceived accurately is demonstrated by their having been produced accurately. The accuracy within a given grade is also a reflection of the relatively few segments for which substitutions were made, and the concentration of substitutions among these few segments. So, for example, no substitution whatever occurred for final /p, k, g, m, l, r, w, y, h, s/ and only token cases for /t, f, b, d, z/. So, the proportion of substitutions for given grades across segments (columns in Table 15) is relatively small, while that for given segments across grades (rows) is relatively high. The highest proportion for a given grade is 34/432 (NES second grade); the highest proportion for a given segment is 58/144 (/θ/).

An examination of a different kind, taking into consideration the final segment substitutions just discussed, was then carried out. By subtracting the total number of substitutions revealed in the

singular repetitions of each segment by the Ss in each sub-group (e.g. NES, grade 2) from the original total for each sub-group (18), we prepared a table of mean proportions of correct plural responses given to correct singular repetitions. In other words, only the plural responses of those Ss who gave correct repetition of the singular were used in calculating this new set of proportions for each segment for each sub-group. The number of Ss upon which the entries in Table 16 are based is indicated in the column labeled "n" following each grade; referring back to Table 15, this "n" represents the difference between the number of substitutions recorded therein and the total possible for any cell, or, 18. The blank cells in Table 16 indicate that no substitutions were made for that segment at those particular levels, the proportions, thus, remaining the same as those recorded in Tables 7 and 8.

TABLE 16. Mean Proportion of Correct Plural Responses for Each Cell in Language Study Using the 24 Singular Segments as the "Stimuli" (n = number of Ss providing the singular repetition with the first segment indicated).

FINAL SEG- MENT	NATIVE ENGLISH SPEAKERS								NATIVE SPANISH SPEAKERS							
	GRADE 1	n	GRADE 2	n	GRADE 3	n	GRADE 10	n	GRADE 1	n	GRADE 2	n	GRADE 3	n	GRADE 10	n
-p																
-t									.9375	16						
-k																
-θ	.7143	7	.6001	5	.8750	8	.9375	16	.4546	11	.3751	8	.8000	15	.8125	16
-f									.7059	17						
-b	1.0000	17	1.0000	17												
-d	.9412	17														
-g																
-ð	.5999	10	.5000	8	.9285	14			.5333	15	.7272	11	.8000	15	.8125	16
-v			1.0000	17					.7647	17	.9374	16			.8236	17
-m																
-n	.8823	17	1.0000	17			.9412	17	1.0000	15	.9412	17				
-ŋ	1.0000	12	1.0000	12	1.0000	17			.7693	13	.7333	15	1.0000	17	.8823	17
-l																
-r																
-w																
-y																
-h																
-s																
-z															.4705	17
-š	.4118	17							.2353	17	.6251	16	.4705	17	.7500	16
-ž	.2666	15	.5625	16					.1538	13	.4667	15	.5385	13	.5714	14
-č	.4118	17									.5883	17			.5288	17
-j											.6875	16	.4118	17	.6470	17

TABLE 16. Mean Proportion of Correct Plural Responses for Each Grade and Language Group Using the Ss' Singular Repetitions as the "Stimuli" (n = number of Ss providing the singular repetition with the final segment indicated).

For example, for the NES first-grade sample, only 7 Ss repeated the nonsense syllable terminating in /θ/; the others (11) substituted some other segment for /θ/ (cf. Table 15). In our original table of mean proportions, Table 7, we note that the total for this group was a very low .2778. This proportion was based, however, on all 18 Ss making up that sub-sample, irrespective of the "correctness-incorrectness" of their singular repetition. When we removed the 11 Ss who, in fact, changed the stimulus to accommodate it to their own repertoires, and considered only those 7 Ss who actually maintained the stimulus provided by the E intact, we find for the latter, a proportion of .7143 correct pluralizations of the stimulus item. While the proportion represented in Table 7 indicates an extremely poor performance on the part of the NES first-graders due to its being uncorrected for "incorrect" singular repetitions, the second proportion (.7143) reflects not only a better performance, albeit for a smaller number of Ss, but one more compatible with those found for the set of segments to which /θ/ belongs for purposes of pluralization; i.e. /p, t, k, f/. The great disparity between the proportions for this set as reflected in Table 7 would have been difficult to account for were it not for the information provided in Tables 15 and 16.

Figure 4 shows the adjustment of the mean proportions when error brought on by the replacement of the final segment of the singular is removed from the sample proportion. The "x" for each segment indicates the number of correct responses as reflected in Tables 7 and 8 and Figure 3.

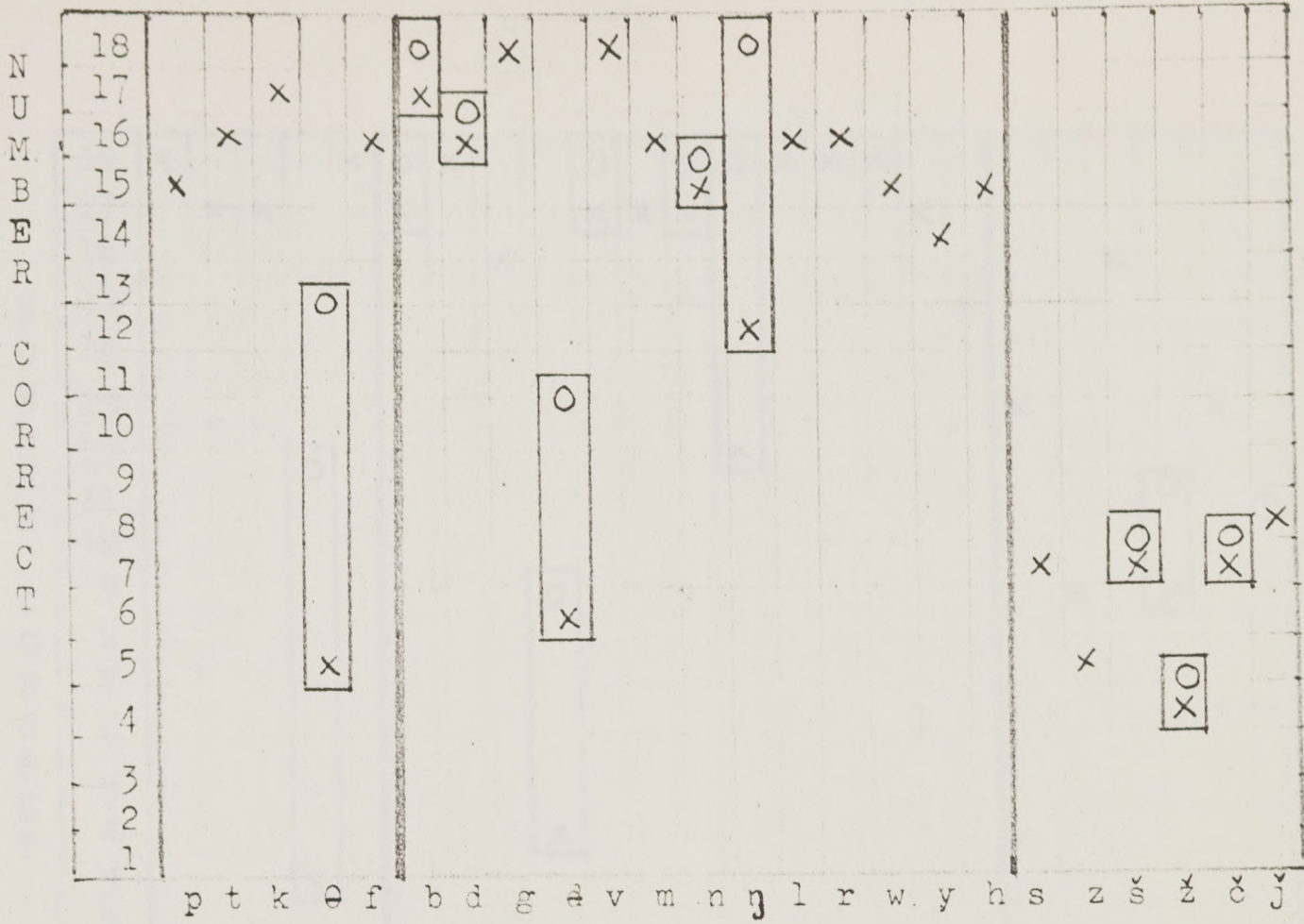


FIGURE 4a. NES - GRADE 1

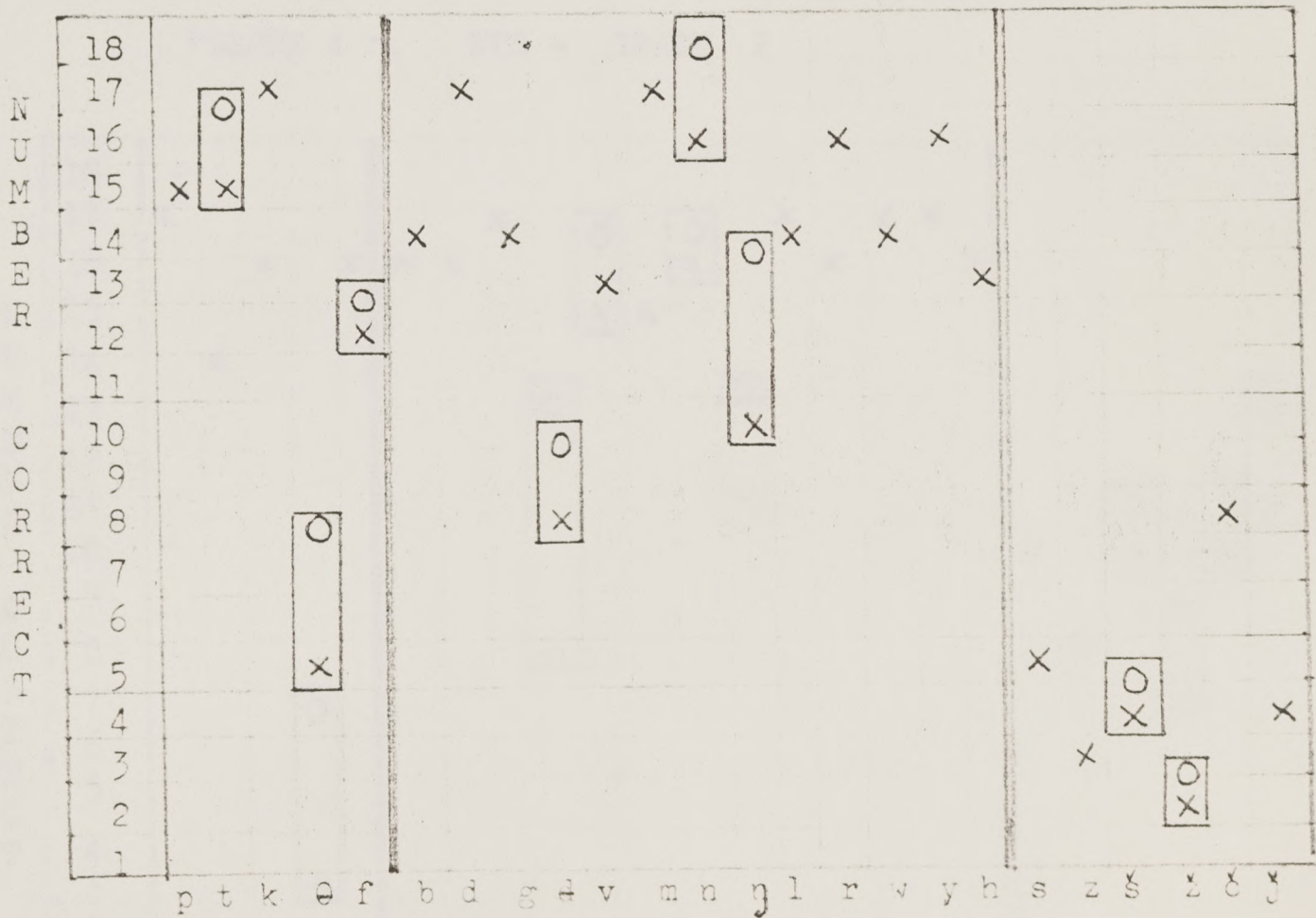


FIGURE 4b. NSS - GRADE 1

FIGURE 4. Mean Proportion of Correct Plurals Viewed as a Binary "Right-Wrong" Situation ("x") as Opposed to Adjusted Means to Allow for Errors in Singular Repetitions ("o"); Figure Divided into Grades and Language Groups.

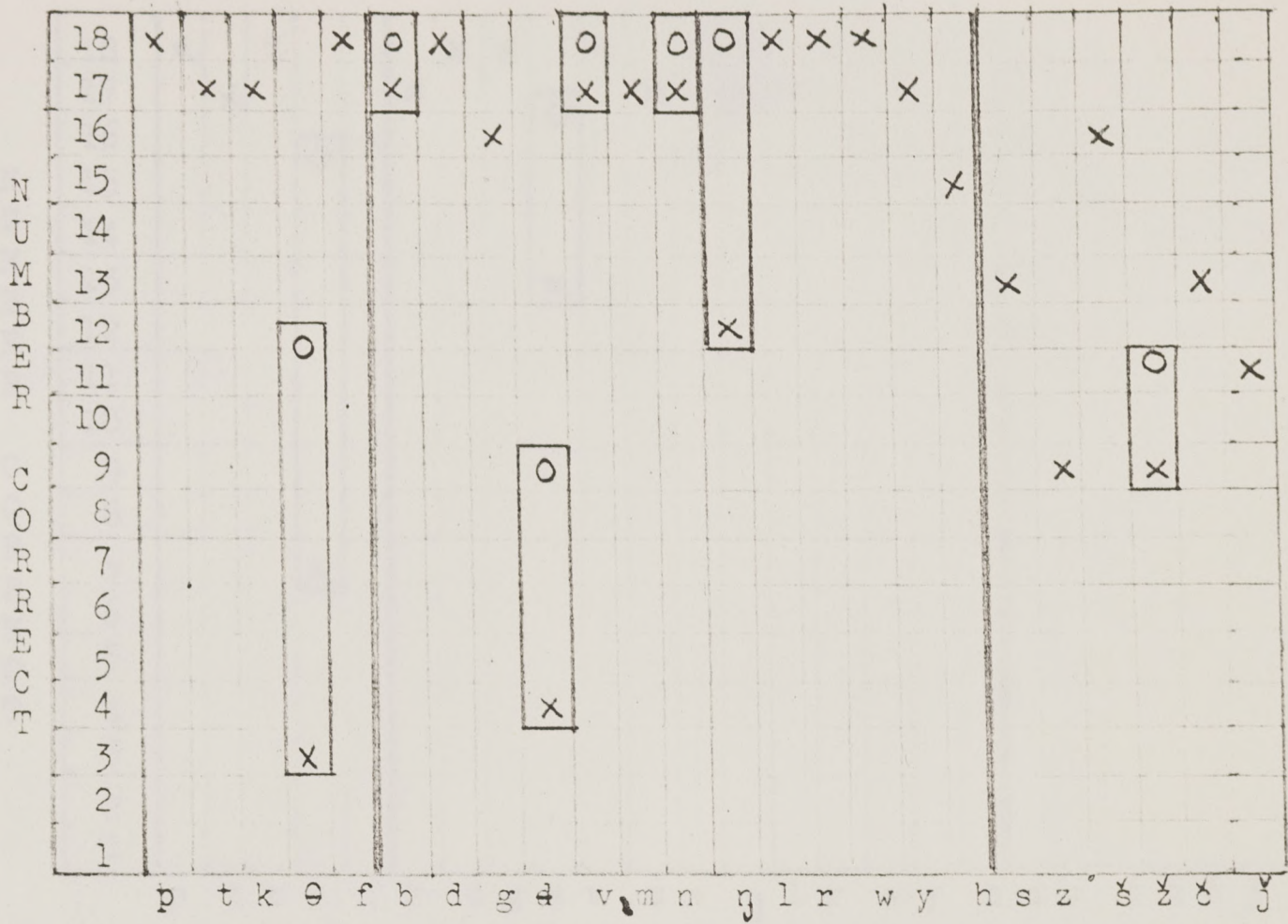


FIGURE 4 c. NES - GRADE 2

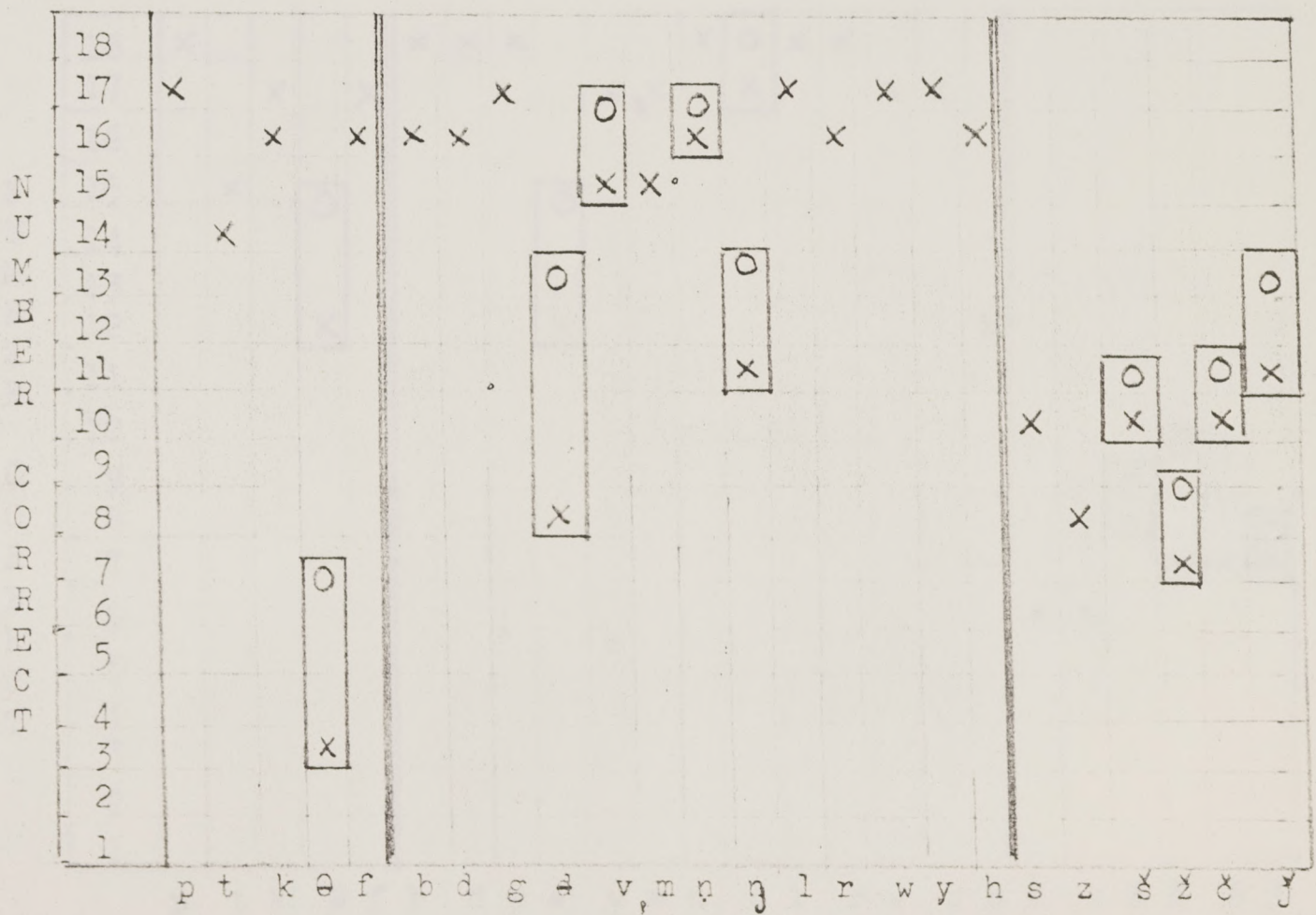


FIGURE 4 d. NSS - GRADE 2

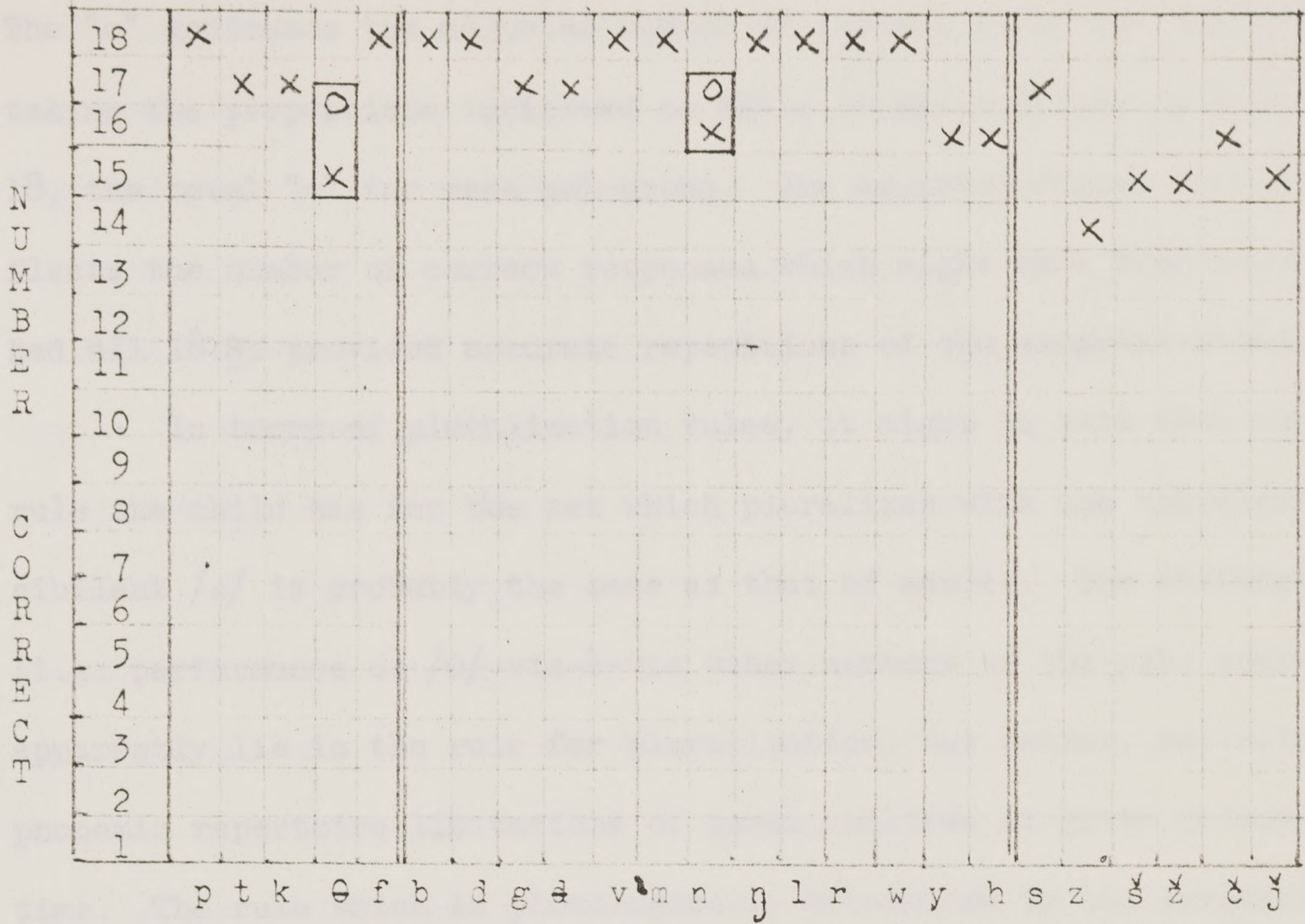


FIGURE 4 g. NES - GRADE 10

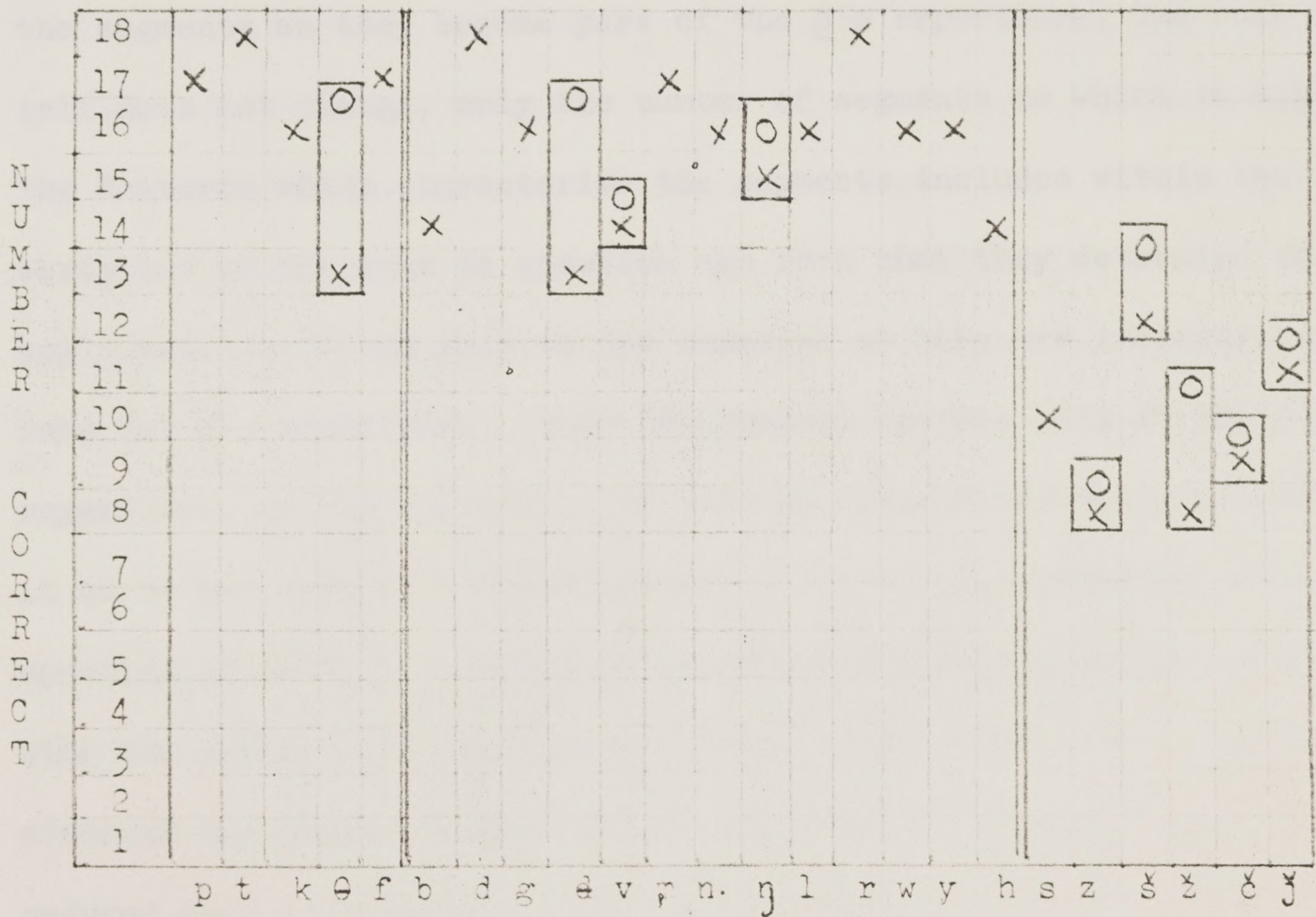


FIGURE 4 h. NSS - GRADE 10

The "o" indicates the adjusted number of correct responses derived by taking the proportions indicated in Table 16 and multiplying them by 18, the total "n" for each sub-group. The adjusted figure thus reflects the number of correct responses which might have been expected had all 18 Ss provided accurate repetitions of the singular stimuli.

In terms of pluralization rules, it might be said that the rule the child has for the set which pluralizes with the voiceless sibilant /s/ is probably the same as that of adults. The difference (i.e. performance on /θ/ vis-à-vis other members of the set) does not apparently lie in the rule for pluralization, but rather, reflects the phonemic repertoire limitations of given children at given points in time. The rule which is phonologically determined by the presence or absence of [voice] in the final segment of the singular is extended to the segments as they become part of the S's repertoire; the rule itself does not change, only the number of segments to which it applies. The features which characterize the segments included within the description of the rule in question are such that they determine the applicability of the rule to new segments as they are incorporated into the S's repertoire. Once the segment becomes part of the S's repertoire, he has virtually the same success at correctly pluralizing it as he has with all other members of the set in question. An inspection of Table 16 reveals a proportion for /θ/ much more in keeping with the proportions revealed for other members of its set in Table 7, although the number of Ss actually included in the proportion has been reduced to 7 to eliminate those Ss for whom /θ/ is still not part of

their repertoires. For the NES group, the data in Table 16 and Figure 4 reflect the necessary compensation for segments not yet within the repertoire of a S. For the NSS group, much the same might be said except for the fact that such dramatic differences in some proportions as revealed by the NES data is not evident. Allowing for the compensation of singular substitutions (and it is to be noted that they are considerably fewer for the NSS group for this particular segment (/θ/), there is some general improvement in the proportions for the segments found in Table 16 as compared with those in Table 8. Still, in the NSS first-grade group, we see that while 11 Ss correctly repeated the singular stimulus item, only .4546, or about half, were able to pluralize the correctly produced singular form. That is to say, while the NES group demonstrated a considerably greater number of errors in singular production, once the segment could be said to be a part of the S's repertoire as evidenced by an accurate repetition of the singular, the mean proportion of correct plurals increased to a level more like that of other members of the set. For the NSS group, however, such was not the case inasmuch as the ability to repeat the singular form of the item accurately did not guarantee success in pluralizing that final segment. For the NES group, then, the pluralization rules accommodated newly acquired phonemes, and upon the inclusion of the latter in a S's repertoire, they were rather readily incorporated into the already existing rule for pluralization of nouns. In the case of the NSS sample, on the other hand, the rules for pluralization did not reveal themselves to be so stable, since in the analyses based on the

existence of a given phoneme in the Ss' repertoires, the performance on plurals was not markedly better for segments /θ/ and /ð/ (cf. Figure 4).

It will be noted that for the NES and NSS groups, the performance on pluralization of nouns (nonsense syllables) with final /s, z, š, ž, č, ě/ did not appreciably change when the question of singular final segment substitution was taken into consideration. The mean proportions in Table 16 do not differ in any marked way from those for this particular group of segments in Tables 7 and 8. This could be interpreted as an indication that success in pluralizing is not solely a function of the existence or non-existence of a particular segment in a S's repertoire, but rather that it is the rule for pluralization itself which is crucial in determining success in the pluralization task. That is to say, in the case of /θ/ and /ð/ for the NES sample, for example, the evidence points to the fact that the rule of pluralization is not a sufficient condition, albeit a necessary one, in accounting for results along the "correct-incorrect" dimension in a study such as Berko's. What seems to be crucial is the existence of the aforementioned segments in the S's repertoire; once they become part of the repertoire, they are pluralized along with the other members of the same set. In the case of /s, z, š, ž, č, ě/, however, it is the rule of pluralization which is of prime importance; the mean proportions reported in Tables 7, 8 and 16 would tend to support this conclusion. So, for the NES sample, the data seem to corroborate the findings of Berko and Anisfeld in that, of the three possible plural

endings in English, the third, /ɪz/, is the last to be demonstrated by the Ss.

When dealing with English plurals in general for a non-native population sample (NSS), especially at the first grade level, however, the picture is somewhat different inasmuch as the instability of all rules is evidenced by there being a generally lower mean proportion revealed in Table 8 and little recovery evidenced by this group in Table 16 and Figure 3. An examination of the kinds of errors made in pluralization should shed further light on this discussion (cf. Section 5.0).

4.1 /θ/ and /ð/

From the data herein recorded (Table 15), it seems clear that the NES sample (1) substituted the /θ/ and /ð/ sounds in singular repetitions consistently more often than did the NSS sample, and (2) that in the rank ordering of segments according to their overall means of correct plural responses (Table 14), these same two phonemes for the NES sample consistently fall at the bottom of the distribution as opposed to the NSS sample where they generally precede the sibilant group /s, z, š, ž, č, ě/. [It is, of course, obvious that (2) would follow from (1).]

Many explanations could be offered as to the "why" of this phenomenon as exhibited by these data. It could be stated, for example, that the NES sample continues to implement substitution forms used in the home (e.g. /wiθ → wif/) during the first years of school, and it is not until much later that these two segments are differen-

tiated. Although rather infrequent in final position among nouns, these two segments are extremely frequent in the English language in general. The word "the," for example, which contains the segment /ð/ occurs in the stream of speech once in every eleven words (Zipf, 1935, pp. 44-48); added to this are such commonly used words as "these, those, this, that, them, they, with, thing" and so forth. It might thus be suggested that because of the considerable amount of practice the NES child gains in the home setting using other segments in place of these particular segments of high frequency in the language (cf. Weir, 1962, p. 51) (presuming that the environment does not condition him to do otherwise), the job of extinguishing this behavior from the child's repertoire may be considerably more difficult than bringing about a new behavior on the part of the NSS child whose vocal apparatus is already able to produce the sounds in question, the job being one of calling the sounds forth at the appropriate moments. Accordingly, the NSS group might have fewer problems with these two segments since one of the allophones of the /d/ in Spanish is realized as [ð], depending on the dialect, sometimes in final, usually in medial (between vowels) and occasionally in initial position.

In this regard, it is worth noting that special attention is given to the "th sound" by teachers who see it (or who have been trained to see it) as a problem for NSS children attempting to learn English, and who, thus, emphasize exercises of "putting the tongue between the teeth," and the like. A re-examination of the adults' responses will serve to remind us that in the case of the NSS adults,

the plural forms of nonsense syllables ending in /θ/ or /ð/ were consistently provided with the inclusion of the final segment of the singular (e.g. /meðz/); the NES adults, on the other hand, more often than not dropped the singular final /θ/ or /ð/ when pluralizing a nonsense syllable ending with either of these two segments. It seemed clear to the experimenter that the NSS adults were exerting great effort to produce a clear and unmistakable /θ/ or /ð/, while the NES adults did not demonstrate this same degree of concern.

As a final point, it might be argued that there is an over-emphasis on teaching the "th sound" to non-native English speakers, NSS in particular (cf. for example, E. B. Carr, "Teaching the th sounds of English," 1967). For the NSS at least, the emphasis on these two sounds may be out of proportion, and efforts to bring about greater control of the sibilant group of segments, for example, may as a result suffer in terms of time allocated to particular tasks. By the same token, these data seem to indicate quite strongly that less than sufficient time is spent in training the two sounds in question (/θ/ and /ð/) among native speakers of English, if the goal is, in fact, to insure mastery by the child of the total repertoire of English sounds during his first years of school.

5.0 Errors in Pluralization--Their Description

The above discussion concerned errors of final segment substitution and their implications for the examination of data on plural formation. This section deals with the types of errors observed in

the actual formation of the plural with nonsense syllables representing English nouns.

Table 17 presents information on the kinds of plural errors made by Ss according to grade and language group. Only those errors occurring more than twice are included since the variety of token-odd plurals possible is virtually limitless (as evidenced by the "originality" demonstrated by some of the adults in the trial items). Since such examples of novelty provide little general information related to the pluralization of English nouns by native speakers of Spanish and native speakers of English, we have limited the entries in Table 17 to those errors which might be considered as having a broader base among Ss in that their occurrence was not limited to one particular S. It should be noted that Table 17 contains not only errors made in pluralizing stimulus items provided by the E and correctly repeated by the Ss, but also any errors occurring after substitution of the final segment of a stimulus item was made; that is, using the replacement as the singular stimulus (when this differed from the E's stimulus), only the Ss' pluralization of their stimuli is what is recorded in Table 17.

TABLE 17. Pluralization of Stimulus Items by Grade and Language Group. (The table content is illegible due to fading.)

		NES				NSS			
		1st	2nd	3rd	10th	1st	2nd	3rd	10th
p	+ ∅	2 + 1				2	1		
t	+ ∅	2							
	+es						1	1	1
	+siz				1		1		1
	+iz			1		1			
k	+ ∅	1			1	1 + 1	1		1
θ	+ ∅	1	+ 1			5		2	
	+iz	1	1		1		2		3 + 1
	→ ∅fs		1			1	2	1	
	→ ∅dz							1	1
f	+ ∅					3 + 2	1 + 1		
	+iz	1		2		1 + 1	1 + 1	1	
	+siz	1							1
b	+ ∅					3	1		
	+ziz					1			1
	→ ∅ps						1		3
d	+ ∅	1				1 + 1	2		
g	+ ∅		1			3	1		
	+iz				1	1			
a	+ ∅	3	1			2			
	+iz		2	1		2	2	2	1
	→ ∅vz		1			2	1		1
	→ ∅θs					1			1
v	+ ∅					2		1	
	→ ∅fs					2			1
	+iz						1		2
m	+ ∅	1				1		1	1
	→ ∅nz	1	1 + 1	1					
	+iz						3		
n	+ ∅	2 + 1	1		1		1		1
ŋ	+ ∅					3 + 1	1		1
l	+ ∅	2				3	1		
	+es					1			2
r	+ ∅	2				1	1		

TABLE 17. Tabulation of "Errors" in Pluralization. (∅ = Repetition of Singular Stimulus; Number Preceding "+" = Responses to E Stimulus; Number Following "+" = Responses to Subject-Altered Stimulus).

w	$\left\{ \begin{array}{l} + \emptyset \\ \rightarrow \emptyset vz \end{array} \right.$	2				2 1	1		1
y	$+ \emptyset$	3				1	1	1	2
h	$\left\{ \begin{array}{l} + \emptyset \\ + dz \\ + vz \\ + s \end{array} \right.$	3	1		1	2 1	1	1	2 1
s	$\left\{ \begin{array}{l} + \emptyset \\ \rightarrow \emptyset z \end{array} \right.$	9	5	2	2	12 + 1	8	10 1	7
z	$+ \emptyset$	10 + 2	9 + 1	3	4	14 + 2	10	12	8
s ^y	$\left\{ \begin{array}{l} + \emptyset \\ \rightarrow \emptyset z \\ \rightarrow \emptyset s \end{array} \right.$	7 1	2 1	1	2	10	6 + 2	6 1 2	2 2
z ^y	$\left\{ \begin{array}{l} + \emptyset \\ \rightarrow \emptyset z \\ \rightarrow \emptyset s \end{array} \right.$	10	4 1 1	3 1	1	8 1 1	7 1	4 2 1	3 2
c ^y	$\left\{ \begin{array}{l} + \emptyset \\ \rightarrow \emptyset z \\ \rightarrow \emptyset s \\ \rightarrow \emptyset ts \end{array} \right.$	8 + 1 1	3 1 1	2	2	9 1	6 + 3 1	6 + 1 3 1 1	3 + 1 4
J ^y	$\left\{ \begin{array}{l} + \emptyset \\ \rightarrow \emptyset z \\ \rightarrow \emptyset s \\ \rightarrow \emptyset z \\ \rightarrow \emptyset s + z \end{array} \right.$	7 1	6 + 1	3	2	12 + 2 1	5 + 2	8 + 3 1 3	2 + 1 4 1

TABLE 17. cont.

The most obvious observation which can be made regarding the kinds of errors made in plural formation by the Ss in our sample was that a mere repetition of the singular preceded by a numeral was, by far, the most common error occurring in conjunction with nearly all final segments in both language sample groups, and principally in the first two grades. This repetition of the singular form is a particularly prevalent error in the pluralization of the set of segments described as appearing latest in the order of control over pluralization, namely /s, z, š, ž, č, ě/. This is particularly the case in the NSS group where the repetition of the singular is almost the rule rather than the exception, even in the tenth grade (cf. Table 17).

It has been suggested by Ervin and Miller (in Anisfeld and Tucker, 1967) and Weir (1962) that the numeral preceding a noun may be considered by the child learning English (native speaker population only) as sufficient to indicate that "more than one" is involved, the inflection of the noun being a luxurious redundancy. For the NES children in our sample in the first two grades, there was a strong tendency to repeat the singular forms of those nonsense syllables ending in /s, z, š, ž, č, ě/, or, those "nouns" for which the S had no established rule of pluralization. While the NES child may already successfully inflect the other two plurals, /s/ and /z/, in English, he does not yet inflect the /iz/ plural successfully. Whether or not the numeral is, for the child, a satisfactory substitute for inflection in the case of sibilants is open to question. Younger children as described by Leopold (1961) show a tendency not to inflect nouns

initially, relying instead on numerals. Adding these observations to the information previously described regarding the set of sibilants as coming last in terms of when correct pluralization actually begins to occur regularly, we might speculate that the child uses the numeral-only system until such time as the plural for a given group of segments is controlled, at which time he uses both numeral and inflection. Since the sibilant group is the last, he continues using his initial singular-plural system (one based on the occurrence of a numeral preceding the noun) until the sibilant plural is finally established. If this is the case, then, the pluralization rule first used by the child is different from that used by adult speakers; the child's rule initially involves only a preceding numeral.

Added to this possibility, and perhaps confounding it, is the fact that the set of sibilants includes those segments which indicate inflected pluralization of nouns of the two types already exhibited as being under control by the Ss. The child may, it might be suggested, associate sibilant with plural, and those words terminating in segments of this set simply "sound all right" as plurals when preceded by numerals. This may actually delay the correct inflection of the sibilant set of final segments, since apparently there is no inherent articulatory difficulty in producing a CVC combination of the composition sibilant + vowel + sibilant as evidenced in words such as "sister" which is normally part of the child's early lexicon. Interestingly enough, however, the NSS sample in Phase I of this study demonstrated an occasional apparent difficulty in producing such a CVC combination,

a difficulty not encountered when either of the two consonants were non-sibilants. Although it was demonstrated in Phase I that the initial segment did not influence the pluralization of a nonsense syllable, the observation of this apparent articulatory problem area was made (cf. also in this regard, Brown, 1969).

An observation made by Anisfeld and Tucker (1967) provides further information regarding the sibilant-final group of segments. They point out that there are only rare occurrences of nouns in English which end in -Cz; the examples provided are "lens" and "adze" (p. 19). Further, segments such as /ž/ have a very low frequency in the language in general. It would seem as if there were constraints inherent to the language which, for purposes of conditioning a particular plural response, tend to provide ambiguous information to the child. Since the sibilant endings "sound like" other inflected plurals, and the frequency of occurrence of nouns ending with many of the sibilants is low, especially in the instance mentioned above--cases of nouns ending in -Cz--the information upon which the child can base any rule about the formation of the plural of sibilants is far from clear-cut (cf. /z/ + \emptyset in Table 17).

The NSS sample in our data seemed to follow the NES improved performance order quite consistently. It will be remembered that those final segments brought under control in the second grade by NSS children were precisely those which the NES group had brought under control by the end of the first grade and which had not been so controlled by the NSS group at the time. The use of numerals, or, the

lack of any inflection appearing on the plural of a simulated noun, is evidenced quite clearly in the data for the NSS group as well, and they tend to follow the NES pattern also in this regard.

5.1 Transfer

The results discussed above seem to cast some doubts on the notion of "transfer" proposed by Stockwell and Bowen (1965). By juxtaposing phonemic inventories, examining the various allophones of the phonemes in each of the two languages in question and the distribution of these allophones, and determining the frequency of each phonemic contrast ("functional load"), the authors propose to "discover the differences between the languages, . . . establish a hierarchy of difficulty among these differences, . . . provide a basis for deciding how much drill is needed on each point . . . [and] what the optimum order of presentation will be" (p. 8). Taking the Stockwell and Bowen (1965) contrastive study as an example, the following hypotheses might be derived:

1. Given that in Spanish there are only six $\left. \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments which may occur in final position, a native speaker of Spanish, who is in the process of acquiring English as a second language, might simply use his Spanish noun plural ending, /es/, when confronted with an English noun which happens to conform to the morpheme structure constraints of Spanish in terms of its ending in /d, l, r, n, s, y/. In the case of final vowels, the NSS would be expected to use his Spanish plural ending /s/, which follows final vowels. In Stockwell and

Bowen's terminology, this would be a case of "negative transfer"; the native Spanish speaker simply makes use of already internalized rules appropriate to Spanish, which, for the second language, do not apply.

2. Given that morpheme structure constraints in English permit a greater number of $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments to occur in final position than is the case in Spanish, a native Spanish speaker would restrict his use of the /es/ plural inflection to those final segments in English which also happen to occur in Spanish. In this case, the NSS would be maintaining intact the environment which is applied descriptively to his internalized rule for Spanish pluralization. There would be no prediction as regards the pluralization of those English words ending in $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments which do not occur in final position in Spanish; the native Spanish speaker might simply repeat the singular form when a plural is required, having no adequate plural form in his repertoire.

3. Given (2), the native Spanish speaker, when confronted with an English noun ending in a $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segment other than /d, l, r, n, s, y/ would, in forming the plural of said noun, generalize his internalized rule for Spanish pluralization to include all $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ final segments occurring in English and add /es/ to them.

4. Given that in Spanish there is a tendency toward devoicing final consonants (e.g. -d → -t), a native speaker of Spanish, when confronted with the pluralization of an English noun ending in a voiced consonant, would first devoice the final consonant before attaching a plural suffix, thus eliminating the possibility of the

[+voice] plural suffix ever occurring after a consonant (e.g. /bed/ = [bet] + /s/ → [bets]). [There also remains, of course, the possibility of adding /-es/ as described in (2) above.]

5. Given that in Spanish there is no contrast between /s/ and /z/, [z] occurring only in the environment /— [+cons
+voice] in some dialects, and given that in English such a contrast does exist, the native speaker of Spanish would, in forming English noun plurals, add /s/, since [z] does not occur in word-final position in Spanish (e.g. /bed/ = [bed] + /s/ → [bets]). It should be noted that here the devoicing of the final segment is the result of the speaker's having devoiced the plural suffix to coincide with the phonological constraints of Spanish. Regressive assimilation might then be invoked to account for the devoicing of the final segment of the noun singular form. As is obvious, this is an alternate "explanation" to that provided in (4) above, where the "negative transfer" was interpreted as occurring in the devoicing of the final segment of the noun singular, the form of the plural thus being the phonological consequence. The predictions are the same; it is on the level of attempted conceptualization of the nature of the "interference" that a differentiation becomes necessary.

6. Since an examination of the phonemic inventories of Spanish and English reveals that the Spanish plural /es/ is perceptually very "close" to the English plural /ɪz/ [in light of (5) above, and, further the fact that in Spanish there is no distinction between the English /e/ and /ɪ/], the NSS might be expected to acquire first those

plurals which for a native English speaker are the last to be controlled according to results described by Berko (1958) and Anisfeld and Tucker (1967)--namely the /ɪz/ plural for /s, z, š, ž, č, ě/--thus, reversing the order of acquisition commonly observed in native speakers of English.

7. Given (6) above, a generalization of the /es/ plural ending to all final $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments might be effected as described in (3) above. Again, the predictions are identical, i.e. /es/ to be added to all $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments; it is in the area of attempted explanation that a differentiation is made.

8. Given (7) above, the period of generalization of the /es/ ending might be expected to be followed by a period of hypercorrection in which the use of the /es/ ending is discontinued completely, even in those cases where it is perceptually "close to correct"--e.g. with final /s, z, š, ž, č, ě/. Such hypercorrection is analogous to the native English speaking child's hypercorrection of "went" → "goed" at the time of his bringing under control the productive rule for the past tense. This hypercorrection normally would be expected to level off after the rules for pluralization become more stable.

In examining the data from this study, we find very little evidence to support the predictions outlined above on the basis of the Stockwell and Bowen (1965) analysis. There was some phonological exchange or substitution (cf. Table 15 of final segment substitutions in singular repetitions) which could have been predicted on the basis of juxtaposing the two phonemic inventories. There was, however, much

less evidence for what would be termed phonological "interference" than might have been expected from the predictions made by contrastive examinations of the two languages in question. Undoubtedly, the fact that the Ss were in a controlled situation, repeating stimulus items and providing plurals for those items, may have had a considerable influence on the reduction of consonant substitutions as opposed, for example, to what might occur during a conversation on the playground. This is, of course, an empirical question. Nonetheless, the fact remains that when presented with a singular stimulus item to repeat, the NSS group did as well as did the NES group (87 and 85 substitutions respectively). There was some evidence in support of the predictions of contrastive analysis in that the distribution of the consonant substitutions for the two population samples showed different patterns (cf. Table 15). Still, the number of cases demonstrating what would have been predicted was quite small, and seems to lend support to Brière's call for caution in the use of juxtaposed charts as predictors of learning difficulties.

With regard to the pluralization of nouns, the data seem to indicate that the NSS group does not engage in any of the predicted patterns of linguistic behavior discussed above. That is, the NSS speaker in our sample tended to use the numeral plus the singular form of the nonsense syllable rather than attempt to incorporate some portion of his pluralization strategies for Spanish to the English situation. The NSS group did not use their /es/ ending [cf. (1), (2), (3), (7) above] for either the limited number of consonants occurring in

final position in Spanish, or, by generalization, to all English final $\left. \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ segments; such instances of "negative transfer" were simply not observed in this study. There were a few cases of devoicing of final segments in the singular [cf. (4) and (5) above], but far fewer than what might have been expected; this was also the case in the plurals. As previously discussed, the testing situation may have brought forth a greater emphasis on the individual nonsense syllables, thereby reducing the tendency to devoice final segments. It should be noted that English speakers also often devoice final segments in running speech. This devoicing was not observed as a prevalent tendency in either sample (cf. Table 15). The Spanish speakers in our sample did not produce the plurals for the sibilant final segments earlier [cf. (6), (7) and (8) above] than other plurals. The clearest evidence in our study was that both groups tended to rely on the numeral plus singular repetition until such time as they were able to provide a plural inflection for a given set of segments. The NSS group followed the NES group in this pattern of pluralization quite closely; the differences which might have been expected from contrastive analyses failed to materialize in this study.

On the basis of the data collected in this study, the only kind of "transfer" which could still be invoked to salvage the notion would have to be "zero" transfer, which, as discussed in Chapter I, really amounts to a statement of our inability to predict either negative or positive transfer. "Zero transfer," as far as can be determined from a careful reading of the Stockwell and Bowen discussion,

simply means that whatever happens that cannot be labeled either positive or negative will be labeled zero, for no matter what happens, zero transfer can be invoked as the explanation.

Since our data failed to provide any support for predictions derived from the contrastive analysis of Spanish and English in terms of such notions as "interference" and different types of "transfer," we find little justification for their continued use, at least as regards plural formation in English. Lest the reader find this statement too strong, we should hasten to add that an explanatory scheme, however cogent, does not acquire the status of unquestionable fact simply as a result of its repeated use. It is the responsibility of those who created the problem (i.e. interference and transfer) to provide the necessary empirical basis for it to be accepted as a general problem of linguistics, and, thus, to deserve the systematic attention of linguists in their formulations. That is to say, in the absence of considerable hard data (derived from research) which verifies the predictions of a theoretical proposal, it takes no more than one empirical study to call it into question. Perhaps the greatest danger in a field where facts are so scarce and assumptions abound is the relative ease with which explanatory devices are accepted and through their continued use tend to take on the appearance of unquestionable truths. However, we are reminded that the acquisition of new knowledge has seldom been due to revelation, but more often than not the result of systematically testing given aspects of the system of explanation in vogue for the phenomena in question. Viewed in this light the process

of acquiring new knowledge owes its outcomes to the existence of a system of explanation, and much of the credit must go to those who proposed the system, even if it is completely rejected in the end.

In the context of this discussion, one final point should be made. The notion of basing a second-language teaching methodology on a contrastive analysis of the two languages was the result of having labeled "interference" what was observed in the speech of the second language user, i.e. "interference" per se cannot be observed. Whereas the term can be operationalized in terms of predictions based on a comparative examination of two linguistic systems, it cannot be assigned causal responsibility for the observations to which it refers. Further, to state that the observations can be explained in terms of comparative analysis, the latter being the operational definition of the label used to refer to the observations, is nothing short of perfect circularity.

6.0 General Conclusions

The data collected for this study, the aim of which was to examine pluralization in English among native and non-native speakers of the language, viewed in light of certain proposals for both first and second language acquisition discussed in Chapter I permits some general conclusions over and above the discussion of specific findings already carried out.

The first and probably clearest conclusion is that the careful examination under controlled conditions of what might initially appear

to be a very restricted area of language, shows it to be a good deal more complex than the available research data might have led us to expect. The data which resulted from the use of controlled variables permitted a more sober look at previously accepted "givens," and the need for further systematic studies amenable to replication, i.e. clearly specified experimental design and sampling procedures, seems imperative.

It should be obvious that the mere juxtaposition of charts is not sufficient to explain nor to predict learning difficulties. Further, it should be evident that very little can be learned from proposals such as LAD inasmuch as they do not permit the derivation of testable hypotheses. That in interpreting our data we could invoke some rule-governing or organizing capacity as far as pluralization is concerned (e.g. the incorporation of /θ/ into the /s/-plural set) does not mean that the use of these adjectives is called for by the data. That language is not a chaotic affair and can be referred to as organized and a rule-governed phenomenon does not offend our common sense. But, to invoke a vital principle or capacity reminiscent of Aristotle, and to place it inside the "black box" (LAD), endowing it with all the necessary characteristics dictated by common sense to account for observations is at least one step removed from fair play. On the other hand, the more careful statements by Lenneberg, who starts from empirical foundations, regarding specific periods of language development, albeit not the source of any hypotheses for this study, might be said to find some support in our findings in that after the third grade

there is little increment in terms of correct responses; that is, tenth graders do not demonstrate a markedly better performance on any of the segments or groups of segments considered.

Regarding language teaching, these results which refer only to plural formation in English are sufficient to cast serious doubt on certain common practices implemented in the early grades (cf. Section 4.1). By the same token, the findings of a study with as restricted a focus as this one would certainly not serve as justification for the introduction of any particular instructional innovations. With respect to performance differentials in the two language groups studied, the data rather clearly indicate that the NSS students do not attain the NES proficiency in the formation of plurals, the generality of this finding being, of course, limited to the sampling constraints of this investigation. The nature of our data does not permit any general conclusion as to underlying causes for the less than optimal performance of the NSS Ss, and consequently we have no prescriptions for the remediation of this state of affairs. It can only be speculated (cf. pp. 119-120) that this situation is the result of a multiplicity of factors which will need to be isolated and carefully studied in certainly more than just a few studies specifically designed for that purpose.

Lastly, it seems quite clear that the only conviction which linguists should share at this time is that much of what has been accepted as common knowledge or as given, is in dire need of reconsideration and careful re-examination. The development of all-

encompassing theories based upon sporadic observations and questionable data may prove to be a challenging intellectual exercise, but can hardly be expected to provide relevant information about acquisition and the ways in which acquisition might best be facilitated.

APPENDIX A. Randomized $\left\{ \begin{array}{l} [+cons] \\ [-voc] \end{array} \right\}$ Master Lists.

A-1. Phase I Randomized Initial Segments

Versions	I	II	III
1.	k	r	t
2.	s	p	z
3.	n	ʃ	m
4.	b	d	g
5.	f	v	h
6.	ç	θ	ə
7.	w	j	l
8.		y	

A-2. Phase II Randomized Final Segments

Versions	I	II	III
1.	θ	f	t
2.	j	s	ç
3.	n	h	ə
4.	b	v	g
5.	p	k	ʃ
6.	z	ž	l
7.	y	m	g
8.	r	d	w

APPENDIX B. Phase I Nonsense Syllables.

	<u>Version I</u>	<u>Version II</u>	<u>Version III</u>
1.	pas	pip	pun
2.	sas	sep	sun
3.	has	hep	hun
4.	gas	gip	gun
5.	ras	rep	run
6.	zas	zep	zun
7.	das	dep	dun
8.	kip	kun	kas
9.	šep	šun	šas
10.	bip	bun	bas
11.	mip	mun	mus
12.	đip	đun	đas
13.	fip	fun	fas
14.	ŷep	ŷun	ŷas
15.	yip	yun	yas
16.	nun	nas	nep
17.	θun	θas	θip
18.	wun	was	wep
19.	tun	tas	tep
20.	lun	las	lep
21.	čun	čas	čep
22.	vun	vas	vip
23.	Item 2	Item 4	Item 10
24.	Item 15	Item 12	Item 5
25.	Item 10	Item 17	Item 1
26.	Item 21	Item 19	Item 20
27.	Item 7	Item 3	Item 19
28.	Item 16	Item 9	Item 11

APPENDIX C. Instructions to Subjects

For: Grades 1, 2 and 3

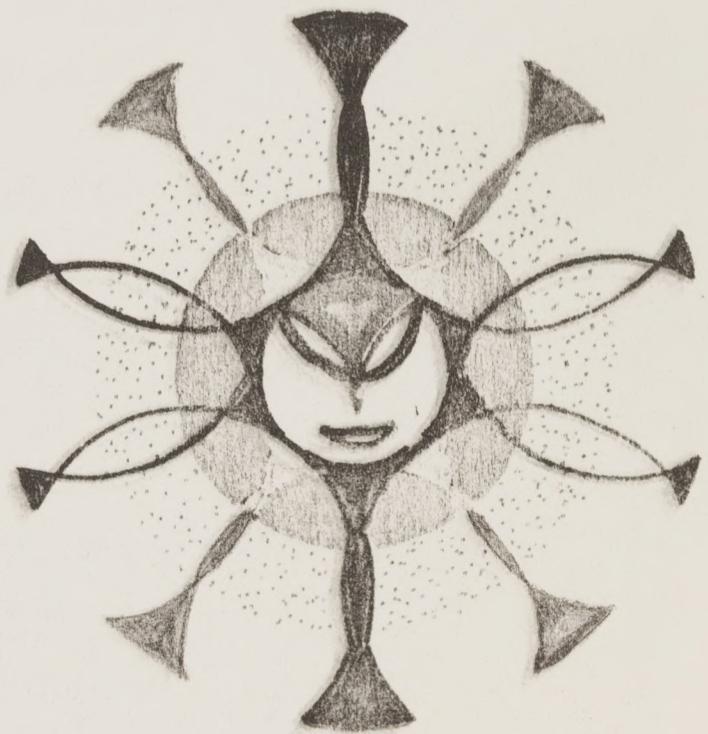
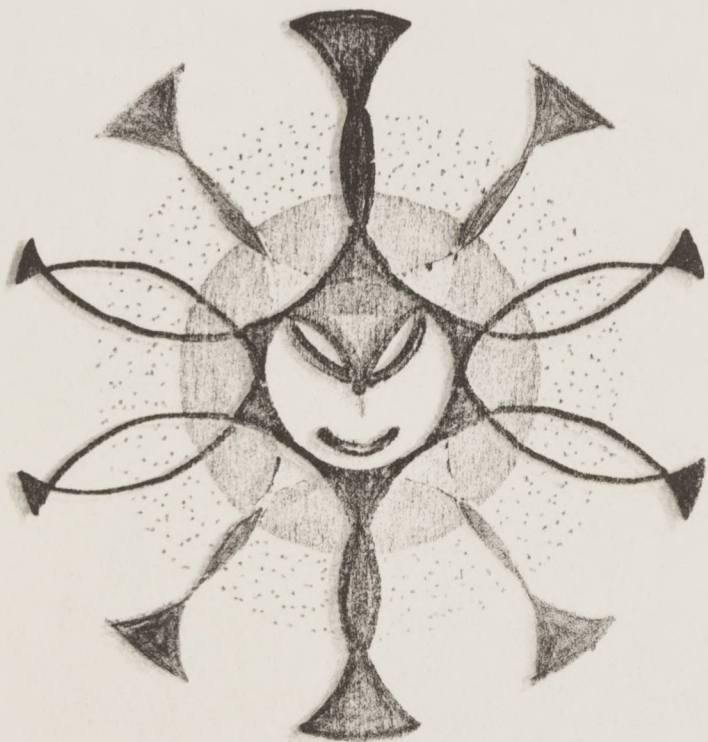
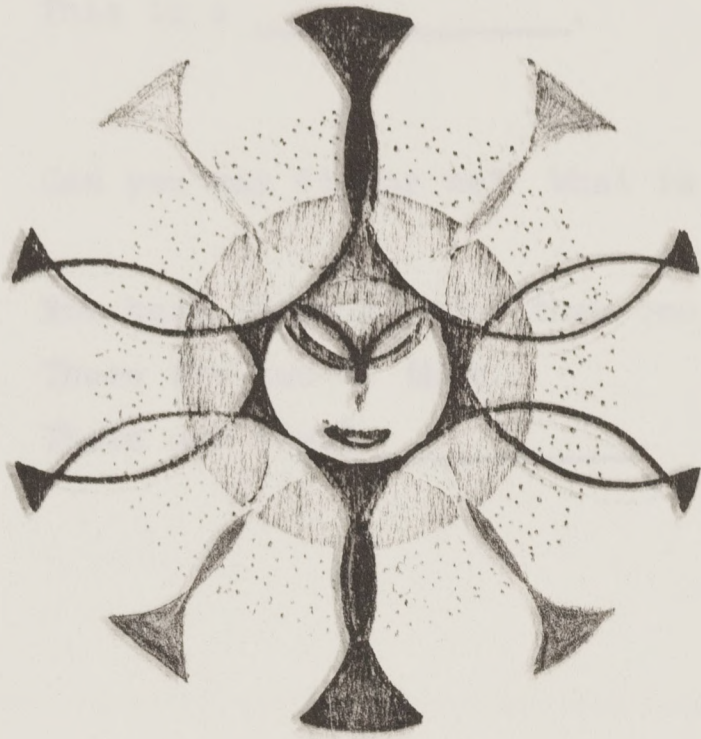
We are going to play a little game now. Would you like to play? Fine. Let's look at this picture here (demonstrating example illustration). This is a _____. Can you tell me what it is? That's right, it's a _____. Here on the bottom of the page there is not just one _____; there's another one. There are two of them. There are two _____. (Wait for a moment to see if child responds with plural. If yes, say, "That's right, there are two _____." If no, say, "There are two _____, aren't there?") Now, let's look at another picture. This is a _____. (Demonstrating trial illustration.) What is it? Here (pointing to bottom of page) there is more than one; there are two of them. There are two _____. Fine. Good. You've got the idea. Now let's look at some more pictures. (Beginning with particular S's randomized test version) This is a _____

For: Grade 10 and Adults

This is a special project which is not a test of intelligence; there is no one correct answer to any of the items. This will go very fast, and I think you will find it interesting. Here we have a picture of a _____. Could you repeat that name, please? Below here, there is more than one. There are two of them. There are two _____. OK Fine. Let's look at another one. This is a _____.

What is it? Here there is more than one. There are two of them.

There are two _____. Fine. (Example and Trial illustrations to be presented as indicated above for Grades 1, 2, 3.) (Now begin with first item on the randomized version indicated for the particular Subject.)



APPENDIX E. Text.

This is a _____.

Can you say it for me? What is it?

Now here there is more than one.

There are two of them.

There are (two) _____.

Phase I	Version 1
13. / fip /	

Phase II	Version 3
2. / bas /	

SUBJECT RESPONSE SHEET

Subject Number _____

Instrument _____

Subject Name _____

Version _____

ITEMS	REPETITION	PLURAL
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

16.

17.

18.

19.

20.

21.

22.

23.

24.

25.

26.

27.

28.

APPENDIX H. Phase II Nonsense Syllables.

	<u>Version I</u>	<u>Version II</u>	<u>Version III</u>
1.	bap	baŋ	vak
2.	bas	baθ	baš
3.	bah	daw	pab
4.	bag	baž	vam
5.	dar	bat	vay
6.	baz	bal	baf
7.	bad	vač	baĵ
8.	bađ	bav	ban
9.	mik	mip	nig
10.	niš	nis	niθ
11.	mib	rih	liw
12.	nim	lig	niž
13.	riy	mir	rit
14.	nif	niz	ril
15.	nij	nid	lič
16.	nin	niđ	niv
17.	suŋ	suk	sup
18.	suθ	suš	sus
19.	fuw	sub	fuh
20.	suž	sum	sug
21.	tut	suy	fur
22.	sul	suf	suz
23.	suč	suĵ	sud
24.	suv	sun	suđ

APPENDIX I. Inventory of Fathers' Occupations.

	GRADE 1	GRADE 2	GRADE 3	GRADE 10
1.	Lumberyard Salesman	Brewery Worker	Fireman	Maintenance Man
2.	Appliance Repairman	Painter	Store Manager	Truck Mechanic
3.	Nursery Salesman	U. S. Army	Grocery Clerk	Civil Service
4.	Telephone Lineman	U. S. Air Force	Postal Clerk	Fountain Manager
5.	Carpenter	Shoe Salesman	Department Manager	Milkman
6.	Plumber	Railroad Conductor	Brewery Worker	Truck Mechanic
7.	Electrical Repairs	Lockheed Assembly	Clerk	Pecan Sheller
8.	Civil Service	Parts Department	Secretary (mother)	Civil Service
9.	Civil Service	PBX Installation	Sales Clerk	Welder
10.	Grocery Manager	Sausage Maker	Bus Driver	Bakery Clerk
11.	Typesetter	Civil Service	Civil Service	Elevator Operator
12.	U. S. Army	U. S. Air Force	U. S. Army	Foreman
13.	Printer	Salesman	Salesman	Mechanic
14.	Printer	Civil Service	Carpenter	Civil Service
15.	Elevator Operator	Railroad Clerk	Construction Worker	Civil Service
16.	Beef Boner	Salesman	Electrician	Carpenter
17.	Printer	Appliance Repairman	TV Technician	Self-Employed (Trucker)
18.	Self-Employed (Repair)	Civil Service	U. S. Army	Domestic (mother)

I-1. Native English Speaking Subjects

APPENDIX I cont.

	GRADE 1	GRADE 2	GRADE 3	GRADE 10
1.	Civil Service	Salesman	Truck Driver	Seamstress (mother)
2.	Service Manager	Dairy Truck Driver	Service Station	Civil Service
3.	Barber	Self-Employed	Steelworker	Civil Service
4.	Civil Service	Civil Service	Truck Driver	Map Cutter
5.	Printer	Civil Service	Civil Service	Air Force--Retired
6.	Mechanic	Civil Service	Draftsman	Laborer
7.	Bookkeeper	Detective	Civil Service	Assembly Line
8.	Printer	Civil Service	Civil Service	Blueprint Clerk
9.	U. S. Army	Civil Service	Clerk	Shoe Salesman
10.	Fireman	Fireman	Printer	Mechanic
11.	Self-Employed	Civil Service	Mill Worker	Civil Service
12.	Bread Salesman	Upholsterer	Cleaner	Roofer
13.	Civil Service	Butcher	Cleaner	Salesman
14.	Salesman	Painter	Civil Service	Clerk
15.	Salesman	Civil Service	U. S. Air Force	Civil Service
16.	U. S. Air Force	Salesman	Appliance Repairman	Milkman
17.	Civil Service	Fireman	Watchman	Rug Repairman
18.	U. S. Army	Repairman	Dairy Truck Driver	Painter

I-2. Native Spanish Speaking Subjects.

APPENDIX J. Aptitude of Ss According to Language Group and Grade.

GRADE 1	NATIVE ENGLISH SPEAKERS				NATIVE SPANISH SPEAKERS			
	GRADE 2	GRADE 3	GRADE 10	GRADE 10	GRADE 1	GRADE 2	GRADE 3	GRADE 10
112	100	98	52	104	96	107	44	
110	94	110	55	114	98	100	50	
99	97	110	50	108	106	105	45	
110	102	106	44	110	110	101	41	
110	92	99	55	108	90	95	51	
104	110	101	50	100	120	99	51	
109	116	117	36	94	93	106	49	
109	109	105	46	105	101	98	51	
101	95	106	52	95	88	102	44	
107	105	116	55	99	88	100	48	
99	101	105	46	93	105	93	47	
94	100	113	45	114	96	107	50	
109	100	106	51	99	106	103	51	
109	95	93	50	99	103	99	51	
98	99	111	52	95	113	120	43	
105	100	114	51	109	90	95	48	
95	94	117	51	105	110	95	43	
88	99	108	49	104	106	117	53	
\bar{X} 104	100	108	49	104	101	102	49	

(Grades 1, 2 and 3 Scores Based on Primary Mental Abilities Test;
Grade 10 Scores on Raven Progressive Matrices.)

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