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ABSTRACT

In order to investigate the possible consequences of dialectical differences in the classroom setting relative to the low income black and white first grade child and the prospective white middle-class teacher, 25 black and 25 white university listeners yielded speech recognition scores for 48 black and 48 white five-year-old urban school-children speakers for monosyllabic words. Each child contributed one word for either a quiet, 10 decibel signal-to-noise ratio, or 0 decibel signal-to-noise ratio listening condition. Words were intensity-equated, randomized, and taped. Results showed that white listeners' speech recognition was significantly poorer for black speakers than for white speakers, while black listeners scoring white speakers equalled black listeners scoring black speakers. Overall black listener speech recognition was significantly superior to that of overall white listener speech recognition. It was concluded that since inexperienced white student teachers manifested severe speech recognition problems with black children, structured auditory training for white teachers may be fruitful. (Appendixes provide an examination of the characteristics of black English and a table of the F-tests for means.) (Author/JM)

Final Technical Report

Project No. 2A011
Grant No. OEG-1-72-0009(509)

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U. S. Department

of

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CONTENTS

ABSTRACT

Twenty-five black and 25 white undergraduate university listeners yielded speech recognition scores for 48 black and 48 white five-year old urban school-children speakers for monosyllabic words. Each child contributed one word for either a quiet, 10 dB S/N or 0 dB S/N listening condition. Words were intensity-equated, randomized and taped.

Results: White listeners' speech recognition was significantly poorer for black speakers than for white speakers while black listeners scoring white speakers equalled black listeners scoring black speakers. Overall black listener speech recognition was significantly superior to overall white listeners due to white listener problems with black speakers. Classroom noise significantly affected speech recognition. Quiet yielded best results, 10 dB S/N second, 0 dB S/N poorest; all significantly differed from each other. Black listener and black speaker speech recognition had consistently greater reduction from quiet to 10 dB S/N while white listener and white speaker scores consistently exhibited significantly greater reduction from 10 dB S/N to 0 dB S/N. Adult speech recognition for children in quiet suggests a different normative expectation for adults.

Conclusion: Inexperienced white student teachers manifested severe speech recognition problems with black children, not paralleled by black listeners for white children. Structured auditory training for white teachers may be fruitful.

TABLES

II

INTRODUCTION

A. Problem

This study investigated the possible consequences of dialectal differences in the classroom setting relative to the low income black and white first grade child and the prospective white middle-class teacher. To understand the content of the differences and the relationship to the total language spectrum as a whole, language will be reviewed in some detail.

Language involves three major components: 1) a phonological, a matrix of distinctive articulatory and acoustic features; 2) a syntactic, that deals with grammar and functional rules of sentences; 3) a semantic, dealing with dictionary or lexicon meaning and projective rules. Most spoken languages have group variations from the mainstream patterns called "dialect". The dialect is the speech of a community where members are in constant internal communication (Shuy, 1967). Thus, a dialect is not a different language but a variation from the mainstream of any or all of three components to a varying degree (Menyuk, 1971). While there are similarities among dialects to make them mutually understandable, sociolinguists specifically question the mutual understanding between black "dialect" and standard English.

Dialect variations of standard American English have racial and socio-economic implications. Both low socio-economic black and white dialect patterns differ from standard middle-class English, and from each other as well (Baratz, 1970). The distinctions depend on regional locale, historical derivations, environmental circumstances, speaker and listener roles, status, purpose and topic, social barriers, loyalty, self-identification, age, education, experience, etc. As a result, dialect differences prevail among socio-economic groups and geographic areas despite the influences of TV, movies, travel, education, etc. While these variations reflect ethnic and cultural differences, not pathological deficits (Baratz, 1968; Labov, 1969; and Stewart, 1968), they nevertheless affect the cognitive development and educational performance modeled after the middle-class culture (Baratz, 1969A). Thus, the low socio-economic black ghetto child often deals with two languages, resulting in "linguistic interference" (Baratz, 1970). This bilingual educational difference in vocabulary and sentence structure can lead to different patterns of semantic conceptualization (Labov, 1968, 1969, and Bernstein, 1962). The language difference also involves the white teacher and the student-teacher interaction, particularly in the initial contacts.

The black dialect-standard English differences can be so marked that some linguists suggest the designation "Black Language" or "Black English" as opposed to "Black dialect," "substandard English," or "nonstandard English" (Dillard, 1972; Fasold, 1970; Williams, 1971). The variety of English spoken by many, possibly most black Americans, is generic in nature, and differs from the English spoken by white Americans (Baratz, 1967, 1968, 1970; Stewart, 1964, 1968, 1969; Labov, 1966, 1968; and Dillard, 1972). Black dialect has been sustained as the primary or mother tongue, while standard English has been relegated to a second language substrata. There is evidence that the black nonstandard syntax is a complex creole-pidgin derivative (Malstrom, 1969; Stewart, 1964, 1969; and Dillard, 1972; Baratz and Baratz, 1969, Labov, 1969) and prevails as a separate system with persistent and systematic differences to standard English.

It is not within the scope of this study to attempt to resolve this controversy of whether black language is a dialect of standard American English or a different language. What is germane to this investigation are the differences between the two language systems and the extent to which these differences affect mutual black-white intelligibility of speech. The focus of this study is on the speaker's phonological output and how it specifically relates to the speech recognition* (intelligibility, discrimination) of the listener. Thus, the speech (phonological) aspect of black dialect warrants careful, experimentally controlled attention. When the "divergent" (Goodman, 1969) phonological features of black language are confounded with divergent black syntactic structure, the result may significantly reduce communication between blacks and whites. While most linguistic research on black dialect has almost exclusively focused on the semantic and syntactic components, little attention has been directed to semantic changes due to phonological differences (Menyuk, 1971) and their effects on the total communication process. Indeed, phonology is complementary to auditory perception and when this basic perceptual aspect is diminished, total conceptualization is lessened, particularly in conjunction with syntactic and semantic differences. Surprisingly, there is a dearth of published research on the speech recognition (intelligibility) of the middle-class white teacher for the

* The term, "speech recognition", is being used in this investigation in lieu of speech intelligibility and other terms often used at the suggestion of field readers of the original proposal.

low income ghetto black child. Furthermore, phonological dialect differences are more prevalent in children, suggesting an "age-grading" ontogeny (Stewart, 1964). This investigation will examine the phonological implications for auditory perception as it relates to the first-grade classroom environment.

B. Background

1. Phonology of Black English

A detailed description of black English and its phonological rules are outlined in Appendix A. Some of the more commonly used features will be briefly summarized below for the reader.

There are consistent consonant cluster reduction variations in the articulation of the th, r, l, b, d, and g phonemes, and nasalization of specific vowels. The above features are not random or unsystematic but follow rule-governed patterns. The consonant cluster reduction rule explains omission of a final phoneme of a consonant cluster, (band and last pronounced ban' and las'). The th phoneme differs from standard English production relative to the surrounding phonemic environment. For instance, voiced d is often substituted for the voiced th in the initial position, while the voiceless th becomes the voiceless t; there are similar substitutions for th in the middle and final positions.

The r and l phonemes are commonly omitted when they precede a consonant in a word or follow an o or u, producing homonyms of toe and told. Omissions of these phonemes among many blacks also occurs between vowels (arrow would be a'ow). In black English, devoicing of final b, d, and g occurs in both stressed and unstressed syllables, as compared to only in the unstressed for standard English (pig and bid become pik and bit). There is a black dialect rule of nasalization involving nasalizing of vowels that precede a nasal sound while the nasal sound per se is not pronounced (words such as run and rung become homonyms in black English).

2. Intelligibility Between Black and White Listeners and Speakers

Phonological differences will produce differences in performance and cause a language barrier between middle-class teachers and lower-class students. Peisach (1965) investigated the ability of white and black first and fifth grade children from low and middle socio-economic backgrounds to identify words omitted from contextual material (cloze procedure) spoken by their teachers and children. He found socio-economic level differences, and the differences were greater for the fifth grades. Low-income children performed as well as middle-class children in listening to lower-class children's speech but poorer when listening to middle-class children's speech. Black and white children performed equally well to black children's speech, but white children were superior to black children when replacing the deleted word in white children's speech. Peisach concluded that there was a language barrier between the middle-class teacher and lower-class child.

Eisenberg, et al. (1968) investigated the ability of black and white children of low and middle socio-economic levels to understand monosyllabic words spoken by educated and uneducated white and black speakers. Educated speakers were more intelligible than uneducated speakers, and white speakers were more intelligible than black speakers. Middle-class listeners were better listeners than lower-class listeners and black listeners were the poorest listeners.

Lower-class children had better listening scores when listening to uneducated speakers of their own race. In a second part of the same study, the investigators examined the relationship between children's listening scores and their speaking scores, and the extent to which race and socio-economic differences were factors in black and white children's ability to communicate lists of 25 monosyllabic words to black and white teachers. The teachers understood white children better than black children; middle-income children were better understood than low-income children; and females were better understood than boys.

Furthermore, there was a significant correlation between the children's listening scores and the intelligibility of their own speech to other listeners. This latter finding relates to the repetition and comprehension study of Osser, Wang and Zaid (1969) who found low-income black children had more repetition errors than white middle-income children (with errors from dialectal differences eliminated). Similarly, Baratz (1969B) examining repetition rate of black low-income and white middle-income found the black children scored better with black dialect materials and white children scored better with standard English materials.

Despite the results of these studies, Baratz (1970) contended that the extent of presumed mutual intelligibility between the black and white dialects is not yet understood. Clearly, the above supports the findings of intelligibility studies that show familiar speech material is recognized better than unfamiliar material, particularly under adverse listening conditions such as noise (Miller et al., 1951; Black, 1957; Black and Haagan, 1963). Hence a middle-income white teacher in a noisy low-income black classroom can be expected to have more trouble with the children's dialects and vice versa, resulting in a viable diminution of effective, mutual communication.

3. Speech Intelligibility

Speech intelligibility (discrimination) assessment per se evolved from the field of auditory perception. Since the output production of speech is monitored by the receptive auditory input, the total input-output language system is often treated as an inseparable feedback (servo) unit. Thus, sociological and ethnic phonological speech pattern differences can be construed, in part, as a reciprocal self-perpetuating auditory-motor process. During auditory processing, receptive speech is coded into temporal-spatial neurological patterns and subsequently transformed into motor impulses for speech output.

Speech intelligibility tests have been developed to obtain a supra-threshold measure of the auditory mechanism to utilize the speech signal efficiently at a comfortable listening level; thus, the intensity parameter is relatively less critical, at least for the "normal" ear.

A host of tests have been developed since the classic, indeed, pioneering work of Fletcher and Steinberg (1929). They developed the "articulation index" (AI) test that measured the speech intelligibility of Bell Telephone test lists relative to intensity. Another major effort is attributed to a group of researchers at the Harvard Psycho-acoustic Laboratory (PAL) (Hudgins et al. (1947) and Egan et al. 1948)) who separately developed the less redundant monosyllabic word lists to minimize the inherent predictability of linguistically redundant sentences. Most of the current "phonetically balanced" (PB) word lists emanated from this laboratory. Ostensibly, these "nonredundant" lists are comprised of items that test the listener's ability to make fine vowel-consonant distinctions. The PAL word lists were assumed to satisfy the following criteria: they were monosyllabic words, had a phonetic composition that simulated English speech (standard English), contained equal phonetic composition from list to list, and were common words with an equal-average-range of difficulty -- hence "phonetically balanced".

However, there were standardization problems with the original PB 50-word lists developed by Egan (1948). As a result, Hirsh et al. (1952) working at the Central Institute for the Deaf (CID) questioned the credibility of the phonetic balance concept and subsequently developed the currently popular CID W-22 PB word lists.

Subsequent to the W-22 word lists, other test lists have been introduced, many using a "multiple choice" procedure (Fairbanks, 1958). Some were a modification of the Fairbanks Rhyme Test called the Modified Rhyme Test (MRT)(House, et al. 1963, 1965), Black's tests (1957,1963) Sentence tests have also been reintroduced by Silverman and Hirsh (1955) and Davis and Silverman (1970).

The words used in this study are from the Word Intelligibility Picture Identification Test (WIPI) (Ross, Lerman, 1971) developed to test hearing impaired children with familiar word stimuli. As hearing impaired children typically have a language retardation, the WIPI monosyllabic words were chosen for their familiarity and thus were suited to this study.

4. Speech Interference from Noise

In the laboratory, classroom, home and office, noise interferes with speech. Nober (1974) discussed the confounding of auditory effects by the intervening variables of the source, transmitter, speakers, listener and environment. Other related factors included the type of speech material, semantic content, familiarity, spectral composition and intensity levels. Nober (1974) also contended that an encoding speaker, phonological output and personal characteristics (physical, psychological, social, ethnic) also affect a speaker's verbal charisma with listeners. Furthermore, environmental factors such as signal-to-noise ratio levels, occasion, place and purpose, acoustic reverberation and other specifications of the room are pertinent.

Perhaps the most critical, singular aspect of speech interference from noise relates to the intensity of the signal and the intensity of the noise, e.g., the "signal-to-noise ratio". Furthermore, this parameter is affected by the sensation level of the sound stimuli; the ear is more efficient and resolute at comfortable listening levels than at auditory threshold. A positive signal-to-noise (S/N) ratio denotes the signal is more intense than the noise, a negative ratio denotes the reverse, while a zero S/N designates relatively equal intensity levels.

One of the earliest quantitative measures used to predict speech interference or "masking" by noise was the articulation index (AI) developed by French and Steinberg (1947) who systematically equated relative masking efficiency to spectral bands of noise. But this procedure was cumbersome, so the speech interference level (SIL) index was developed by Beranek (1947) who used three bands, 600-1200 Hz., 1200-2400 Hz., and 2400-4800 Hz. and determined their masking effects on speech. Through the years this system has been modified to include other frequency bands. Subsequent to these pioneering studies, a deluge of research has evolved to study the complexities of the masking phenomenon.

5. Masking

Generically, masking occurs whenever one signal affects another signal. Classic studies of masking measure the shift of auditory pure tone thresholds from masking noises or speech reception thresholds from noise masking. Noise, as an auditory determinant, can raise the threshold of speech or obliterate it until the signal is unintelligible or inaudible. In some instances, noise alters the speech quality, localization and binaural interaction.

The nature of the masking noise is most pertinent. A variety of noise-making stimuli are available, depending on the objectives. In pure tone audiometry, thermal or white noise, complex noise (low fundamental plus harmonics), saw-tooth noise, and narrow band noise have been used. Currently, narrow band noise (a restricted frequency band centering around a given pure tone) is the most widely used because of its efficiency in masking pure tones. For speech audiometry, white noise (after white light, amplitudes relatively equal and randomly distributed) is quite common. Nonlaboratory generated noises also impose deleterious effects on speech intelligibility, and conversational or classroom noise are formidable examples. For the purpose of this investigation, the natural "competing-message" effect of classroom noise will be employed to simulate the first-grade classroom setting. Hence, the noise stimulus in this study was recorded at a first-grade urban classroom.

6. Speech Intelligibility Studies in Children

One population that has been neglected in speech intelligibility studies is the younger child. Nearly all intelligibility data are standardized on adult populations. Thus a "normal" listener responding to an adult speaker is expected to have an intelligibility score between 90-100%; a score of 75-89% will suggest difficulty, 60-74% a moderate discrimination loss, 50-59% poor discrimination. A score below 50% is very poor, and usually the listener is unable to follow running conventional speech. Yet in this study, it will be revealed that most of the adult listeners only "heard" in a 70-80% range (in quiet) with five year-old speakers and as low as 55% or less when noise was presented. Thus, there is a concern as to how effective the teacher is in the noisy classroom with children.

Pertinent diagnostic implications were uncovered, since many teachers give their speech defective and reading children "auditory discrimination" tests in some quiet listening condition while learning-listening occurs in the noise-filled classroom. Dr. Linda Nober (1973) (as distinguished from this author) found statistically significant increases in the auditory discrimination errors (Wepman Test) for the classroom noise environment compared to the quiet condition. This occurred for the normal as well as the reading and speech defective populations (she subsequently confirmed this trend with a hearing disability population). Thus, auditory discrimination tests in quiet cannot validly serve as an index of expected performance in the classroom with its impending noise interference constraints.

7. Classroom Acoustics

While noise levels in classrooms have been generally neglected as an area of research, some data are available. Sanders (1965) found 55 dB (Scale B) to 58 dB levels in empty kindergarten, elementary and high school classrooms (with normal surrounding activity). With the children present the levels were 69 dB (kindergarten), 59 dB (elementary) and 62 dB (high school). Paul (1967) found 63 dB (Scale C) in the elementary classes and Nober (1974) found 64 dB in the kindergarten and elementary classes. The optimal goal of 30-35 dB espoused by Neimoeller (1968) is far from being actualized.

Thus, the classroom is a very poor listening environment as the average signal-to-noise ratios were found by Sanders (1965) to range from 1 dB in kindergarten to 5 dB in elementary classes; Paul (1967) reported a 3 dB signal-to-noise ratio. Furthermore, poor classroom acoustics such as reverberation (reflection, absorption) and a moving teacher-speaker source will confound the results. This investigation provided crucial data in this regard, as the least favorable listening condition was the 0 dB S/N treatment which is near the 1-3 dB S/N of the lower-grade classroom.

C. Purpose and Scope

This investigation will evaluate speech recognition scores of black and white undergraduate University of Massachusetts students for black and white Springfield, Massachusetts, urban first-grade children relative to three listening conditions of: 1) quiet, 2) 10 dB signal-to-noise ratio, and 3) 0 dB signal-to-noise ratio. A particular focus of the study is to objectively and systematically assess the speech recognition ability of the white student adult listeners for low-income black ghetto children.

D. Significance

Speech recognition is particularly relevant to any speech-language communication process as the listener must first recognize the acoustic speech event before it can be integrated with the semantic and syntactic repository of information. If the teacher (as listener) is unable to comprehend the children in class (as speakers), then the teacher's receptive language input is deficient to some degree. The degree to which this occurs is the focus of this study.

Unfamiliar speech is indeed less intelligible than familiar speech. This investigation also will reveal that the presentation of classroom noise in the experimental design yielded a perspective that is in some ways alarming. Thus, the neophyte white student teacher who enters the low-income ghetto classroom is unfamiliar enough with the speech patterns of the students to be considered as functionally hard-of-hearing for that given situation. Perhaps, pre-graduation auditory training can help avoid the impending initial restrictive communicative barriers between the teacher and the class. While the experienced teacher eventually masters the child's phonology (much like the parent-child situation), the initial negative and, perhaps lasting, constraints may be reduced -- indeed, avoided.

E. Limitations

The conclusions of this investigation are specifically based on experimental procedures that at best can only simulate the real life situation, particularly when crucial parameters are isolated from the total communicative process. In this investigation, the semantics and syntactic component of language were ostensibly excluded as viable parameters, as the focus was on phonology.

Furthermore, the listeners and the speakers are from the Commonwealth of Massachusetts; indeed, first-grade speakers were even further restricted to the Springfield, Massachusetts, locale and to a low-income social status. Dialects acquired in different low-income areas differ from each other as well. The study only assessed the nonsophisticated, inexperienced adult prospective teacher-listener, not the experienced teacher who, like in the parent-child relationship, may perform differently, especially with the assistance of classroom structure.

The ramifications are even more restricted because the speakers represented low-income white and black dialect which can differ from middle-income white and black dialects as well as differing from each other. Furthermore, dialect differences between socio-economic groups vary in different geographic locales.

Clearly, any projections for the general population and the regular classroom setting should consider these limitations.

III

METHODS

A. General Plan

The general plan was to obtain spontaneous picture-evoked monosyllabic words from first-grade urban lower socioeconomic children representing the Springfield, Massachusetts, white and black communities. All words were recorded on site in a quiet room (e.g., less than 50 dBA ambient) and subsequently transferred to a master tape in the laboratory for coding, randomization, noise accompaniment and intensity level equating. Several words (usually four) were recorded by each child in the event inadvertent problems such as noises and extraneous interferences occurred during recording.

Picture identification pictures of the Word Intelligibility Picture Identification Test by Ross and Lerman (1971) were used to elicit the monosyllabic words spoken by the 48 children. These words were employed to assess speech recognition (discrimination). The pictures were particularly well suited for this age population since they were clearly illustrated, and represented words within the expressive vocabulary of the children; indeed, all children identified the objects with ease. No two children were shown identical pictures. The words were recorded on an Ampex 602 tape recorder through an Electro voice unidirectional microphone (Model 666) held approximately six inches from the child's lips.

The final prepared tapes for the 50 listeners were played through the stereo-speaker system of the Grason Stadler 1701 audiometer into a 1204 IAC test chamber. All 50 listeners scored all 48 speakers by writing their answers on a score sheet that identified each of the speakers through a coded number system. The results were later decoded for statistical analyses. The listeners, seated in a sound-field received the speech signals at about 62 dB SPL, binaurally in three listening conditions, (1) no classroom noise present (quiet), (2) the speech and noise at 62 dB (0 dB S/N), and (3) the speech at 62 dB with the noise at 52 dB (10 dB S/N). The free field speech and noise levels were periodically measured with the General Radio sound field meter, Model 1526B.

B. Speakers

The speakers were 48 children, 24 black and 24 white, ranging in age from 54 months to 80 months with a mean age of 75 months. The mean age for black children was 70 months and for the white speakers, 72 months. Black speakers included 8 females (mean age 67 months) and 16 males (mean age 72 months). White speakers included 13 females (mean age of 76 months) and 11 males (mean age 73 months). While most of the children were in first grade, a few were at the end of the kindergarten year preparing for first grade.

All speakers were residents of Springfield, Massachusetts, and lived within the same local urban neighborhood. Most black children were enrolled in the Springfield Head-Start Program. Most white children attended a nearby center. Both centers were under the auspices of the City of Springfield. Children in the Head-Start Program and the day-care center were classified as members of low socio-economic families. All children were screened and determined to have normal hearing.

C. Listeners

The listeners comprised 25 black and 25 white undergraduate students enrolled at the University of Massachusetts. All had normal hearing sensitivity bilaterally, as determined by a screening test at 25 dB ISO for frequencies 500, 1000, 2000 and 4000 Hz. Listeners were not aware of the objectives or nature of the study to avoid any confounding procedural artifacts.

D. Preparation of the Tapes

All recorded words were printed out on a Bruer and Kjar level recorder, Model 2305. The mean of the three highest amplitudes for each word was designated as the representative intensity level for that given word. Ultimately, some words were amplified or attenuated in intensity relative to the overall group mean of 62 dB SPL. Thus, there was homogeneity for the intensity parameter so intensity was not considered a viable variable in the speech recognition values. Finally, the words were separated, randomly scrambled and retaped on the Ampex 602 recorder; a 1000 Hz reference tone for intensity level replication was added. A final tape was prepared of the 48 speakers who were identified by a code on the tape. For the statistical analysis, the dichotomized correct-incorrect scores were arranged into their appropriate groups and listening condition cells.

The classroom noise was recorded on tape from first-grade classrooms in an urban school. The quiet listening condition or treatment designated that no external classroom noise was added but rather that the word, amplified or attenuated in intensity as needed (if at all) was presented in a "quiet" sound field. The 0 dB signal-to-noise ratio

(S/N) signified that the prerecorded classroom noise was presented as 62 dB SPL with the 62 dB word signal (with $\pm$ 5 dB fluctuation). The noise was added on a second channel of the tape. The 10 dB S/N ratio listening condition designated that the word signal was presented at 62 dB SPL and the classroom noise at 52 dB SPL with $\pm$ 5 dB variations. These listening treatments were arranged and presented in random order on the final tapes.

E. Statistical Analyses

The data were analyzed as a three factor, two-between subjects, one-within subjects, analysis of variance design. The two groups of listeners were 25 black and 25 white university students who judged or scored black and white speakers' words under the quiet, 10 dB S/N or 0 dB S/N listening conditions. Thus, each listener received a speech recognition (intelligibility) score based on the percentage of children he understood for each condition and race variable. All listeners judged eight speakers for six treatment combinations, e.g., black and white re quiet, 10 dB S/N and 0 dB S/N with different speakers at each combination. Thus, there were eight white speakers (8 words) for the quiet listening condition and eight black speakers for the quiet listening condition; there were another eight white speakers for the 10 dB and eight black for 0 dB S/N listening treatments. But each speaker was scored by all 50 listeners; said another way, all listeners responded to the same 8 x 6 cell arrangement of speakers. In many instances these cells were collapsed into larger units when the variables were pooled.

This design differed slightly from the projected original that planned to obtain three words from each speaker or one word for each of the three listening conditions. But inadvertent technical problems in precisely eliciting and equating matched subject word intensity levels made it more advisable, from the perspective of experimental control, to use separate subjects (words) for each condition. In effect, this smaller N-per-cell design placed more stress for larger or more consistent speaker and listener differences for statistically significant results; but, indeed, the statistical differences occurred in spite of the reduced N-per-cell. In addition to the analysis of variance, 41 individual mean contrasts were done, when appropriate (see Appendix B).

IV

RESULTS

A. Overall Main Effects of Speech Recognition Dependent Variable

The dependent variable, speech recognition, was tested for statistical significance by a three factor analysis of variance design, e.g., two between S, one within S (Table 1). Results showed the main effects of listening conditions (LC), speakers (S), and listeners (L) were statistically significant (e.g., listening conditions at $p < .001$, speakers at $p < .001$, and listeners at $p < .025$). Three significant interactions occurred for listening conditions x speakers ($p < .001$), listening conditions x listeners ($p < .001$) and speakers x listeners ($p < .025$).

Overall speech recognition scores (Table 2) relative to the three listening treatments decreased from the 77.39% quiet (Q) value to 51.00% at the 10 dB signal-to-noise (S/N) ratio to 21.09%*, at the zero signal-to-noise ratio. Thus, the best speech recognition scores occurred in the quiet listening condition as expected; the 10 dB S/N ratio gave the next best score and the 0 dB S/N ratio yielded the poorest scores. These results were expected since the greatest ambiguity occurs in the 0 dB S/N condition. All significant effects were tested with F-test for mean contrasts. The F-tests between the means of 77.39 (Q) vs. 51.00 (10 dB S/N) was significant at the .001 level (Appendix B1), the F-test

*All the data in this study are reported in percentages throughout and hereafter percentage signs will be omitted for reader convenience.

Table 1

Analysis of Variance of Speech Recognition Relative to Listening Conditions, Speakers and Listeners

Source	SS.	DF	MS	F	P
Listening Condition (LC)	15.8691	2	7.9346	583.4264	.001
Speakers (S)	0.2198	1	0.2198	12.4886	.001
Listeners (L)	0.0794	1	0.0794	6.1076	.025
I (L)	0.6248	48	0.0130		
LC x S	0.4329	2	0.2165	17.8925	.001
LC x L	0.4851	2	0.2425	17.8308	.001
SL	0.1030	1	0.1030	5.8522	.025
LC x I (L)	1.3054	96	0.0136		
SI (L)	0.8438	48	0.0176		
LCSL	0.0865	2	0.0432	3.5702	.050
LCSI (L)	1.1571	96	0.0121		

Table 2

Mean Speech Recognition Scores for the Listening Conditions

Quiet (Q)	77.39%
10 dB S/N	51.00%
0 dB S/N	21.09%

between 51.00 (10 dB S/N) vs. 21.09 (0 dB S/N) was significant at the .001 level (Appendix B2) and 77.39 vs. 21.09 was significant at the .001 level (Appendix B3). Hence, all three noise levels yielded statistically significant differences from each other, with listener and speaker parameters pooled. This result was in keeping with the wealth of information pertaining to noise and its effects on intelligibility (speech recognition).

Overall speaker scores (Table 3), 47.12 for the black speakers and 52.53 for the white speakers (with black and white listener parameters pooled), were a significant $p<.001$ (Table 1), a difference of 5.41. Overall listener scores (Table 3), 51.45 for the black listeners and 48.20 for the white listeners (with black and white speakers pooled), were a significant ($p<.001$), 3.25 better than their white counterparts. Hence, the white speakers were more intelligible (with listener groups pooled) but black listeners scored better than white listeners.

This too was expected as black speakers were significantly more intelligible to black listeners than to white listeners, but black listeners scored equally well for white and black speakers. In Table 4, the 1.71 difference between the black speaker 50.60 and the white speaker 52.31 was not significant (Appendix B4). On the other hand, white listener speech recognition scores were 43.64 for the black speakers (e.g., white listener-black speaker) vs. 52.76 for the white speakers (e.g., white listener-white speaker). This 9.12 difference was significant at the .001 level of confidence (Appendix B5). When the black speakers-black listeners 50.60 score was compared to the white speaker-black listener 43.64 score, the difference was significant at the .001 level of confidence (Appendix B6). Likewise the white speaker-black listener

Table 3

Speaker and Listener Speech Recognition Scores Relative to Listening Conditions

		Black	White
A. Speakers			
Quiet		80.04%	74.74%
10 dB S/N		45.26%	56.74%
0 dB S/N		16.06%	26.12%
	Overall	47.12%	52.53%
B. Listeners			
Quiet		81.26%	73.52%
10 dB S/N		46.98%	55.02%
0 dB S/N		26.12%	16.06%
	Overall	51.45%	48.20%

Table 4

Speech Recognition Scores for the Speaker and Listener Parameters with Listening Condition Pooled

	Listeners	
Speakers	Black	White
Black	50.60%	43.64%
White	52.31%	52.76%

52.31 vs. the white speaker-white listener 52.76 value was not significantly different. Thus, black listeners performed similarly with black and white speakers, but white listeners' scores were significantly better for the white speakers than for the black speakers.

This statistic was one of the most critical findings of the study and supported the original projected contentions of the proposal. The educational ramifications are imposing with more critical intelligibility discrepancies when classroom noise is present. The need for a pre-graduation teacher auditory training program is quite evident and warranted from these findings for the white teacher who plans to teach in the urban schools.

A closer examination of the data yields compelling information. In Table 3B, the black listener scores diminished 34.28 from quiet (81.26) to the 10 dB S/N (46.98) value, but less than half that magnitude (e.g., 20.86 from 10 dB S/N to 0 dB S/N value, 26.12). The total range listener loss was 55.14 from quiet to 0 dB S/N. Once again, the white listeners manifested their most severe loss of intelligibility between the 10 dB and the 0 dB S/N listening treatment. Hence, while the loss between quiet (73.52) to 10 dB S/N (55.02) was only 18.50 (compared to the black listener loss of 34.28), the white listener drop from 10 dB S/N to 0 dB S/N (16.06) was 38.96, the latter was more than twice the white magnitude shift between quiet and 10 dB S/N. The full-range white loss was 57.46 compared to the black 55.14. Thus, in magnitude, the loss of speech recognition for the black speaker and the black listener between quiet and 10 dB S/N was relatively comparable to the loss of speech recognition of the white speakers and white listeners between 10 dB and 0 dB S/N ratio.

B. Quiet and Noise Listening Conditions

1. Listener First-Order Interactions

The listener first-order interaction scores were 81.26, 46.98 and 26.12 for the black listeners and 73.52, 55.02 and 16.06 for the white listeners, respectively, at the quiet, 10 dB S/N and 0 dB S/N noise treatments. Black listener means 81.26 vs. 46.98 significantly differed at the .001 level (Appendix B14), 81.26 vs. 26.12 at the .001 level (Appendix B15), and 46.98 vs. 26.12 at the .001 level (Appendix B16). These mean differences were in keeping with the listener main effects (Table 1). White listener means 73.52 vs. 55.02 significantly differed at the .001 level (Appendix B17) 73.52 vs. 16.06 differed at the .001 level (Appendix B18) and 55.02 vs. 16.06 differed at the .001 level (Appendix B19). Thus, white speaker mean differences were in keeping with the main effects relative to noise (Table 1).

2. Speaker First-Order Interactions

As reported above, the overallspeech recognition scores relative to noise (Table 2) were 77.39, 51.00 and 21.09 for the quiet, 10 dB S/N and 0 dB S/N ratios, respectively; all were also significantly different from each other as determined by *F*-tests. These shifts are considerable. In Table 2, the overall loss of speech recognition from quiet (77.39) to 10 dB S/N (51.00) was 26.39, and 29.91 from 10 dB S/N (51.00) to 0 dB S/N (21.09), yielding a total range loss of 56.30. The original design projected an even more stringent 10 dB S/N ratio listening treatment. As early results yielded almost no responses, this condition was a meaningful parameter; yet it is a condition that can occur in the noisy classroom. Hence, in the classroom setting, with typical noise levels, the adult listener (races pooled here) only recognized about half of the words articulated by the first graders in the study. Indeed, context and syntax will alter the total communication pattern; but this is an exploration all its own, involving other dimensions.

The same trend occurred for both the black and white speakers (Table 3) in the first-order interactions, e.g., 80.04, 45.26 and 16.06 for the black speakers, and 74.74, 56.74 and 26.12 for the white speakers, respectively, in the quiet, 10 dB S/N and 0 dB S/N ratio listening conditions. Black speaker means 80.04 vs. 45.26 were significantly different at the .001 level (Appendix B8), means 80.04 vs. 16.06 were significantly different at the .001 level (Appendix B9), and means 45.26 vs. 16.06 (Appendix B10) were significant at the .001 level. These means were in keeping with the main noise effects relative to race (Table 1). The white speaker means of 74.74 vs. 56.74 were significantly different at the .001 level (Appendix B11), 74.74 vs. 26.12 at the .001 level (Appendix B12), and 56.74 vs. 26.12 at the .001 level (Appendix B13). Thus, the black and the white speaker means relative to noise were in keeping with the main effects (Table 1). In Table 3A, the black speakers score dropped 34.78 from 80.04 (quiet) to 45.26 10 dB S/N), and another 29.20 to the 0 dB S/N level, yielding a total loss of 63.98. Furthermore, the loss from quiet to the 10 dB S/N level was 5.58 greater than from 10 dB S/N to 0 dB S/N. Hence, black speakers had significantly greater reductions from quiet to 10 dB S/N than from 10 dB to 0 dB S/N.

There was a reverse trend in the white speaker and listener scores where the greater percentage of loss occurred from the 10 dB S/N to the 0 dB S/N listening conditions as opposed to the black speaker trend where the greater loss was consistently between the quiet and 10 dB S/N listening conditions. Table 3A shows the white speakers scores dropped only 18.00 from the quiet (74.74) to 10 dB S/N (56.74), but diminished another 30.62 from 10 dB S/N to 0 dB S/N (26.12); the total range was reduced 48.62 compared to the black 63.98 total, a significant 15.36 difference. Thus, the percentage loss in speech recognition scores between quiet and 10 dB S/N and quiet to 0 dB S/N was 12.62, which is about twice the magnitude of the parallel black speaker score of 5.58.

This imposing pattern prevailed throughout the study with statistical support as demonstrated by the significant ($p < .001$) listening condition x speaker interaction and the significant ($p < .001$) listening condition x listener interaction (Table 1). The implication here is that the black speakers' scores were more adversely affected when comparing the quiet and noise conditions than were the white speaker scores, but additional noise (speech signal constant), e.g., from 10 dB S/N to 0 dB S/N, affected the black speakers less than the white speakers. Furthermore, while the overall difference between black and white speakers was 5.41 (52.53-47.12, Table 3A), listening conditions pooled, the difference increased threefold to 15.36 when the listening conditions were considered as a variable. Indeed, this is extremely relevant and pertinent data considering the fact that noise is certainly present in classroom situations.

These differences cannot be flippantly attributed to chance, statistical chance, or statistical artifact as the listening condition x listener and listening condition x speaker interactions were significant at the .001 level of confidence. Also, the classroom noise was added to the tapes in the laboratory, precluding any speculation that psychologically the speaker groups were affected differently during the recording stage. All listeners heard the same tape under the same stringent treatment, implementation and control. The reason for this pattern of response cannot be speculated from these data as it was not a controlled part of the study, but it is pertinent information and warrants further experimentation. The excessive black listener loss from quiet to 10 dB S/N can be construed or conjectured to possibly relate to Goldman and Sanders (1969) finding that disadvantaged subjects failed pure tone hearing screening tests in less than ideal listening conditions but passed in a quiet setting. They speculated that the disadvantaged need more favorable signal-to-noise ratios because their environment is noisy and important information is given at a greater intensity to overcome noise interference. His results were consistent with those of McAdoo (1967). A possible revelation as to where the reversal occurred -- but with no suggest of why -- can be gleaned from the second-order interactions, which also reached statistical significance.

3. Second-Order Interactions

Examination of the second-order interactions (Table 5) with speaker vs. listener parameters relative to listening treatments and race showed similar patterns. Black listener scores were 84.28, 42.20 and 25.32 for black speakers at the quiet, 10 dB S/N and 0 dB S/N ratio listening conditions. All three means significantly differed from each other at the .001 level of confidence (Appendices B20, B21 and B22). The trend for the black listeners responding to the black speakers was similar to the above speaker scores as revealed in the 42.08 loss from quiet (84.28) to 10 dB S/N (42.20) and another 16.88 to the 0 dB S/N value (25.32). The black listener-white speakers scores were 78.24, 51.76 and 26.92 with significant differences for all

Table 5

Speakers and Listeners Speech Recognition Scores Relative to the Quiet, 10 dB S/N and 0 dB S/N Ratio Listening Conditions in the Second-Order Interaction Effects

A. Quiet

Speakers	Listeners: Black	Listeners: White
Black	84.28%	75.80%
White	78.24%	71.24%

B. 10 dB S/N

Speakers	Listeners: Black	Listeners: White
Black	42.20%	48.32%
White	51.76%	61.72%

C. 0 dB S/N

Speakers	Listeners: Black	Listeners: White
Black	25.32%	6.80%
White	26.92%	25.32%

combinations at the .001 level (Appendices B23, B24 and B25). The same parallel trend occurred where the greater loss was found between quiet and 10 dB S/N.

Likewise, white listener scores followed a parallel pattern, e.g., 75.80, 48.32 and 6.80 scores of the black speakers in the quiet, 10 dB S/N and 0 dB S/N conditions; these means all significantly differed from each other (Appendices B26, B27, and B28) as did the white listener-white speaker means of 71.24, 61.72 and 25.32, respectively (Appendices B29, B30 and B31). Clearly, the white listeners always exhibited their greater loss from 10 dB S/N to 0 dB S/N. The loss is quite dramatic when the white listeners respond to the black speakers in the 0 dB S/N parameter, because the drop from 10 dB S/N to 0 dB S/N is 41.52 (48.32-6.80). The 6.80 value at the 0 dB S/N treatment is one of the most dramatic findings of the study. It suggests white listeners had almost no functional speech recognition of black speakers in the 0 dB S/N ratio listening condition. On the other hand, white listener-white speaker 25.32 value at the 0 dB S/N was not significantly differentiated from the comparable black listener-white speaker 26.92 value. In this regard, black listener-black speakers and black listener-white speaker values at 0 dB S/N were nearly identical and not statistically differentiated. Thus, the white listener-white speaker value was significantly higher, 18.52 (25.32-6.80) at 0 dB S/N (Appendix B37), while the parallel black listener difference between black and white speakers was a nonsignificant 1.60 (26.92-25.32) (Appendix B36). In Table 5A, B and C, the total quiet to 0 dB S/N range for black listeners-black speakers was 58.96 compared to the 52.32 black listener-white speaker value, a 7.96 difference between the two ranges. But the parallel white listener-black speakers' range was 69.00 vs. 45.92 for the white listener-white speaker value, a difference of 23.08 -- or more than three times the magnitude of the black range comparison for the speaker populations. Thus, in this most difficult listening condition the black listeners recognized black and white speakers equally well but white listeners virtually gave almost no correct responses to the black speakers; they obtained the identical score (25.32) for the white speakers that the black listeners obtained for the black speakers.

Table 5 shows black and white listeners vs. black and white speakers scores at each of the three listening conditions. In the quiet condition, black listeners scored 84.28 and 78.24 for the black and white speakers, respectively, but this difference was not statistically significant (Appendix B32). Likewise, in the first treatment, white listeners scored 75.80 and 71.24 for the black and white speakers, respectively; and this difference, too, failed to reach statistical significance (Appendix B33). Here the data reveal that in the quiet listening condition the speakers were of comparable intelligibility to both black and white listeners. There was also no difference between black and white speakers for the black listeners in the 0 dB S/N condition. Significant differences ($p < .001$) did occur (Appendix B34) in the 10 dB S/N condition where black listener scores were 42.20 and 51.76, respectively, for the black and white speakers, and white listener scores were 48.32 vs. 61.72 for the black and white speakers with significance at the .001 level (Appendix B35). The outstanding difference (Appendix B37) occurred in the 0 dB condition where the white listeners only recognized 6.80 of the black speakers compared to 25.32 for the white speakers. Thus, in the quiet condition black and white speakers were comparably intelligible to listeners as in the 0 dB S/N condition for black listeners. Black and white speaker scores were different in the 10 dB S/N condition and the 0 dB S/N noise listening condition for the white listeners.

Table 5 also permits a comparison of the black and white speaker scores relative to black and white listeners at the three listening conditions. In quiet, black speakers were significantly more intelligible (Appendix B38) to black listeners than to white listeners as indicated in the overall values, listening conditions pooled (Table 4). White speaker values for black listeners 78.24 vs. 71.24 for white listeners were not significantly different (Appendix B39) which was also in keeping with the overall values and listening conditions pooled (Table 4). Thus, in the quiet condition, black speakers were more intelligible to black listeners than to white listeners, but white speakers were not differentiated by listener groups. In the 10 dB S/N condition, the 42.20 vs. 48.32 means were not statistically differentiated re listener groups (Appendix B40) but the white speaker values 51.76 vs. 61.72 were significantly different at the .010 level (Appendix B41), again in keeping with overall values. Thus, white speakers were heard significantly better by white listeners.

Hence, the second-order analysis in Table 5 supported the overall interference effect of noise on intelligibility. Also, it suggested that black speakers were more intelligible in the quiet and 0 dB S/N listening conditions to the black listeners than to the white listeners, while the white speakers were scored comparably (e.g., without statistical difference between mean contrasts) in the quiet and 0 dB S/N conditions. These results were in keeping with the main effects and first-order interactions. When the black and white listeners contrasted black and white, there was no significant difference in the quiet condition or in the 0 dB S/N condition for black listeners. However, in contrast, white listeners had much greater difficulty with the black speakers in the 0 dB S/N condition. Both black and white listeners found white speakers significantly more intelligible in the 10 dB S/N listening condition as well.

One extremely pertinent trend evolved that was not a major focus of the original study, but is nevertheless worthy of discussion. In psychoacoustic parlance, by definition, an adult listener has "normal" intelligibility scores when his range falls between 90-100% for normal adult speakers. A score of 75-89% is suggestive of impending difficulty, 60-74% is considered a moderate discrimination loss, 50-59% is quite poor, and below 50% there is question of severely diminished communicable efficiency. These so-called normative data are based on results obtained in a quiet acoustical laboratory setting (like the IAC chamber used in this investigation) with adult speakers, hopefully free of speech problems. In essence, the intelligibility scores elicited in the quiet condition suggest that first-grade children as speakers precipitate some intelligibility problems as the range was between 71-84%, races pooled.

Furthermore, the introduction of noise devastated most listener scores, regardless of the race variable. Scores were depleted to about 7% in one instance, but more typically scores diminished to about 16% and rarely exceeded 56%. Thus, the intelligibility of the adult teacher-listener in a noise infiltrated classroom is low enough to consider the teacher functionally hearing deficient for that given situation.

Without question, the context, structure and use of running speech enhances communication interaction but not without a certain deprivation of communicative efficiency. The extent of this effect warrants further investigation that will evolve as an outgrowth and extension of this study.

V

CONCLUSIONS

The following conclusions relate specifically to black and white undergraduate student listeners for black and white first-grade urban school children in the Springfield, Massachusetts, locale. Also, the student listeners were often marginally familiar with the dialect patterns so influences may vary somewhat relative to the experienced teacher-listener situation. The crucial semantic and syntactic components of language were experimentally isolated. Thus, these results are suggestive and do not replicate a total communicative classroom process. Projections to the general population and regular classroom situations should consider these restrictions.

A. Listeners

1. Black listener scores for black speakers were comparable to white listener scores for white speakers.

2. Black listeners generally had significantly better speech recognition for black speakers than white listeners for black speakers.

3. Black listeners and white listeners speech recognition scores were equal relative to the white speakers.

4. Overall black listener scores were significantly better than the overall white listener scores (this occurred because of the better black listener scores for black speakers but comparable black listener scores for the black and white speakers).

B. <u>Speakers</u>

1. Black speakers were less intelligible than white speakers in the overall analysis.

2. Black speakers were significantly more intelligible to black listeners than to white listeners in most listening conditions.

3. Black speakers and white speakers were scored comparably by the black listeners in most conditions and in the quiet condition by the white listeners.

4. Black speakers were scored significantly poorer than the white speakers by the white listeners in most instances.

5. Black speaker scores were diminished more with classroom noise interference than white speaker scores by both black and white listeners.

C. <u>Quiet-Noise Listening Conditions</u>

1. The nature of the acoustic environment was a significant variable throughout the study:

   a. The quiet listening condition consistently precipitated the best speech recognition (intelligibility) scores for black and white experimental subjects.

   b. The 10 dB S/N speech-classroom noise listening treatment consistently ranked second for the speech recognition scores with black and white subjects.

   c. The 0 dB S/N speech-classroom noise listening treatment consistently ranked lowest in speech recognition scores for black and white subjects.

2. Classroom noise consistently imposed a marked significant loss in the magnitude of the speech recognition scores.

3. Classroom noise precipitated 30-50% speech recognition losses when noise was introduced:

a. Black speakers and black listeners had statistically significant greater speech recognition losses from quiet to 10 dB S/N than from 10 dB S/N to 0 dB S/N.

b. Black speakers and black listeners had statistically significant greater speech recognition losses from quiet to 10 dB S/N than white speakers and white listeners.

c. White speakers and white listeners had statistically significant greater speech recognition losses from 10 dB S/N conditions to the 0 dB S/N condition than from the quiet condition to the 10 dB S/N condition.

d. White speakers and white listeners had statistically significant greater speech recognition losses from the 10 dB S/N to 0 dB S/N conditions than the black speakers and the black listeners.

4. Classroom noise significantly diminished the speech recognition scores of white listeners for black speakers more than it diminished the white listeners' scores for white speakers.

5. Classroom noise significantly diminished the speech recognition scores of the black listeners for the black speakers and the white speakers but with equal magnitude.

6. Classroom noise had a greater adverse effect on black speaker scores than for white speaker scores.

7. Noise can reduce speech recognition scores to scores as low as 20-30%, seriously questioning functional teacher efficiency.

8. At 0 dB S/N, white listener speech recognition is nearly nonexistent for black speakers with serious question as to whether context,

syntax and semantics input can adequately compensate for this deprivation in the initial teacher-student interactions.

D. Implications

1. Potential white teachers who had minimal experience with the black dialect may have serious psychoacoustic problems with black children (aged 5-6) particularly when classroom noise is present.

2. Black listeners do not have the same psychoacoustic deficit with white children.

3. Specially programmed psychoacoustic auditory training may be appropriate for the white teacher who aspires to teach in the urban classroom.

4. The speech intelligibility of first graders did not reach the 90-100% range in quiet for the normal listener that is expected with adult speakers relative to normative data. Indeed, the range was between 71-84%, races pooled.

5. Noise drastically interfered with the prospective teacher-listener intelligibility so that typically scores diminished to 16% and, in one extreme instance, to as low as 7%, yielding a marked functional "learning deficiency" of the prospective white teacher for the classroom environment.

6. It is questionable that context, structure and conversational speech can compensate for the loss of communicative efficiency imposed by classroom noise in the lower grades.

7. Normative data is needed on the intelligibility of adult listeners for different age children and the intelligibility of children for children.

VI

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VII

APPENDICES

APPENDIX A

CHARACTERISTICS OF BLACK ENGLISH

SYNTAX

Some of the more important and consistent syntactic features of black language and their applicable syntactic rules are summarized in the following examples:

Standard English	Black Language

1. Rule: The contracted forms 've and 's for the auxilliary have in the present tense forms may be deleted.

He's gone home already.	He gone home already.
I've been here for hours.	I been here for hours.

2. Rule: There is no obligatory suffix s marker used to identify the present tense of a verb if the subject of that verb is in the third person singular.

He runs home.	He run home.
The man walks	The man walk.

3. Rule: The plural marker is absent for certain nouns that are classified by a plural quantifier.

I have five cents.	I got five cent.

4. Rule: The possessive marker is indicated by the order of the words and not by the presence of 's.

John's cousin	John cousin

5. Rule: The word gonna is a future indicator in black language. When is and are are followed by gonna, they are deleted, and gonna may be effected in a number of ways when it follows I.

He is going to eat.	He gonna eat.
I will eat.	I'mana eat.
	I 'mon eat.
	I 'ma eat.

6. Rule: The form be is used as the main verb which does not vary with the subject (no tense specification) and may express recurrent action.

He is here all the time.	He be here.

7. Rule: Word order change is used to express the conditional rather than if.

I asked if he wanted to go.	I ask did he want to go.

8. The nominative form of the pronoun is used in apposition to the noun subject of the sentence.

My brother is bigger than you.	My brother, he bigger than you.
That teacher yells at the kids all the time.	That teacher, she yells at the kids all the time.

9. Rule: The double negative is frequently used instead of the single negative.

He doesn't known anything.	He don't know nothin'.

10. Rule: The use of the copula is not obligatory.

I am going	I going.
He is a bad boy.	He a bad boy.

PHONOLOGY

Consonant Cluster Reduction. In black language, the final phoneme of a consonant cluster of a word may be omitted, the ed suffix when added to a word may be reduced. The es pluralization is commonly added to words ending in s plus p, t, or k. Words such as band and past may be pronounced han' and pas'. The reduction of ed suffix occurs when both members of the final cluster are either voiced or voiceless. For example, looked and messed are pronounced lookt and mest, respectively. Pluralization of words that end in s plus p, t, or k add the es plural and not the s plural. The words desk, post, wasp and nest would be pronounced desses, poses, wasses and nesses.

The "th" Sounds. The representation of th in black language depends on the phonemic environment in which it occurs. For instance in the initial position of a word the voiced interdental fricative th is often pronounced as d, i.e., this becomes dis. The voiceless interdental fricative, as in thin, is sometimes pronounced with a t (tin). When th occurs within a word the voiced th is represented by v and the voiceless th by f; the same substitutions occur for the final position of words. Thus, in black language it is not uncommon to hear for then, author and mouth, den, aufuh and mouf. Often when preceded by n the th may be substituted for t or be omitted completely, i.e., tenth (tent') and month (mon').

R-lessness and L-lessness. It is not uncommon in black language for the r and l to be reduced to uh, i.e., steal, sister become steauh and sistuh. The r and l may also be omitted when it precedes a consonant in a word or follows an o or u, which produces homonyms of words as toe and toll. The r and l may also be omitted between vowels, i.e., carol would be pronounced ca'ol.

Final B, D, and G. In standard English devoicing of some consonants in unstressed syllables may occur. However, in black language this devoicing may take place for the stressed and unstressed syllables, as in acit for acid and foot for food. Voiced plosives b, d and g may be pronounced as p, t and k at the end of a syllable. For example, pig, lid, and lab would be pronounced pik, lit, lap, respectively. The distinctions between these words after devoicing and their homonyms are maintained by the prolongation of the vowels.

Vowel Glide. The vowels or diphthongs, ay and oy are pronounced with a glide when they precede a voiceless consonant, such as kite and flight. When the vowel precedes a voiced sound or a pause the glide is deleted. For example, side and boy would be pronounced sahd and boah.

Nasalization. The dropping of g of ing, singin' is common in many dialects. Vowels which precede a nasal sound may be nasalized and the nasal sound not pronounced. Thus, words such as rum, run and rung might be homophonous in black language. The vowels i and e preceding a nasal sound are not distinguished as a result of the following nasal sound.

Stress Patterns. Some standard English words of more than one syllable have their stress on the second syllable rather than the first. The stress for some of these words may be reversed in black language, i.e., policé, pólice; hotél, hótel.

Articles "A" and "An". In black language, as in some varieties of white southern speech, the article "a" is used regardless of how the following word begins. For example, the indefinite article for arrow and man would be a arrow and a man rather than an arrow and a man.

SEMANTICS

Unlike the phonological and syntactic elements of black language, its lexicon has had some special appeal for white Americans, even to the extent of considerable vocabulary borrowing. However, such borrowing in no way legitimized this aspect of black language since these words were regarded as "slang" expressions. Dillard (1972) states "There is a certain exoticism, even cuteness, about ethnic slang." Slang and other variations in lexicon are regarded by many linguistic scholars to be representative of superficial differences between black language and standard English, and that the vocabulary and its semantic reality is the same for the two language systems. Very little research has been done in this area; however, there is some evidence that contradicts this "no difference" premise.

Kochman (1972) concluded that ". . .by blending style and verbal power, through "rapping," "sounding," and "running it down," the black in the ghetto establishes his personality; through "shucking," "gripping," and "copping a plea" he shows his respect for power; through "jiving" and "signifying" he stirs up excitement." Kochman's description exemplifies the variety of verbal behavior engaged in by ghetto blacks and the terms used to describe that behavior. According to Kochman a variety of verbal behavior may be distinguished by identifiable features of form, style and function that are unique to speakers of black language.

Entwisle (1970) contended that despite the fact that two groups use the same lexicon (vocabulary) of a language the semantic experiences could be different. Also, semantic elements of a linguistic system would be subject to the same conditions that create dialect differences. Entwisle (1966A and B) used word association tasks to investigate semantic differences among white and black children from different socio-economic backgrounds. Marked differences were found between white and black children in their ability to match the stimulus word to a word of the same form class. Black inner-city first-graders were only slightly behind white inner-city first-graders in this word association task but both groups were significantly better than the suburban white child. This difference between inner-city children and white suburban children reversed itself in the third grade.

Entwisle and Greenberger (1968) investigated differences between black and white children and between middle-class and poor children in their three most common responses to each stimulus word of a word association task. It was found that differences did in fact exist which strongly suggest that certain words may have a particular semantic reality for black children that differs for white children.

The work by Kochman and Entwisle suggests that there are semantic differences between black and white language systems. The magnitude of these differences is not known, and thus, the communicative effect of vocabulary differences cannot presently be determined. Nevertheless, when semantic differences are combined with phonological and syntactic differences there may be serious educational consequences for the black child whose classroom milieu is dominated by standard English usage.

The features of black language described above represent characteristics of phonology, syntax and semantics that are found in the speech and language of many black Americans. These features will vary in magnitude depending on socio-economic level, geographic region, etc. However, their existence differentiates black language from standard English, influences mutual intelligibility, and thus, presents important educational considerations.

APPENDIX B

F-Tests for Means

Analysis	F-Ratio	Degrees of Freedom	p <
1	235.28	1, 48	.001
2	1,228.50	1, 48	.001
3	341.45	1, 48	.001
4	0.96	1, 24	Non-Sig.
5	13.05	1, 24	.001
6	14.42	1, 48	.001
7	0.04	1, 48	Non-Sig.
8	234.64	1, 48	.001
9	911.98	1, 48	.001
10	126.95	1, 48	.001
11	38.98	1, 48	.001
12	343.58	1, 48	.001
13	167.57	1, 48	.001
14	198.50	1, 24	.001
15	666.75	1, 24	.001
16	80.57	1, 24	.001
17	57.81	1, 24	.001
18	569.24	1, 24	.001
19	298.79	1, 24	.001
20	225.57	1, 24	.001
21	467.77	1, 24	.001
22	39.36	1, 24	.001
23	62.98	1, 24	.001
24	262.70	1, 24	.001
25	70.31	1, 24	.001
26	86.19	1, 24	.001
27	541.21	1, 24	.001
28	228.61	1, 24	.001
29	5.39	1, 24	.050
30	120.78	1, 24	.001
31	117.40	1, 24	.001
32	3.32	1, 24	Non-Sig.
33	1.22	1, 24	Non-Sig.
34	15.40	1, 24	.001
35	14.55	1, 24	.001
36	.43	1, 24	Non-Sig.
37	23.77	1, 24	.001
38	6.53	1, 48	.020
39	3.79	1, 48	Non-Sig.
40	3.72	1, 48	Non-Sig.
41	7.57	1, 48	.010