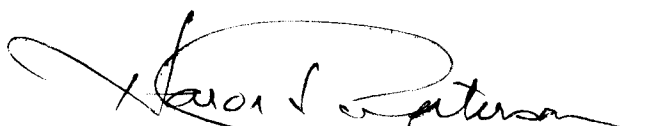
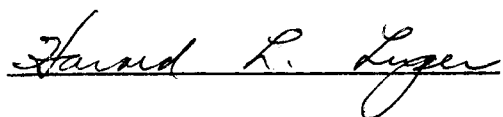


To the Graduate Council:

I am submitting herewith a dissertation written by Sandra Kay Newsom-Clark entitled "A Study of the Communicative Efficiency in Institutionalized and Non-institutionalized Aged Females." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Speech and Hearing Science.


Harold A. Peterson, Major Professor

We have read this dissertation
and recommend its acceptance:







Accepted for the Council:


Vice Chancellor
Graduate Studies and Research

A STUDY OF THE COMMUNICATIVE EFFICIENCY
IN INSTITUTIONALIZED AND
NON-INSTITUTIONALIZED
AGED FEMALES

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Sandra Kay Newsom-Clark

August 1980

3045027

DEDICATION

The author wishes to dedicate this research project to her late grandmother, Mrs. Betty Bentley, who was responsible for the author's interest in the communication skills of the aged. The following statements that she consistently repeated will always be remembered by the author:

"One thing no one can take away from you is your knowledge."

"Don't be content with what you know now--ask questions and listen to what others are saying to you."

The author's only regret is that this lady passed on eight months before the completion of this project. But, as Robert Browning so appropriately stated,

Grow old with me

The best is yet to be.

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Last, but far from least, the author is deeply grateful to her husband, James H. Clark, Jr., for cleaning, cooking, grocery shopping, doing laundry, proofreading, photocopying, collating, and . . . the list is infinite. But, the author wishes to thank him especially for his kindness, patience, consideration, encouragement, "coolness," and, most of all, his love.

ABSTRACT

The purpose of this study was to investigate the differences among communicative efficiency measures in aged female speakers who live in either an institution, i.e., an extended care facility, or the community, i.e., non-institutionalized. The specific characteristics assessed were: speaking rate, information rate, total pause duration, inter-sentence/string pause duration, intra-sentence/string pause duration, and pause frequency. These characteristics were obtained in two conditions: 1) oral reading and 2) picture description.

The 15 subjects in each group were matched in chronological age (within six months) and highest educational attainment. All subjects met the following criteria: normal hearing; native English speaker; completion of the eighth grade; negative medical or psychiatric diagnosis of respiratory disease, senile dementia, organic brain syndrome; mobile within her environment; six consecutive months at present residence; regular (or weekly) participation in social activities; and negative evidence of motor speech disorder, receptive impairment, and confusion.

Tape recordings were made in the subject's living environment with each subject performing the two tasks. These responses were then transcribed verbatim, timed, and analyzed. The level recorder was used for all pause duration measurements. Only those strings which followed approximately the first 10 seconds of the picture description were analyzed using the level recorder.

The major findings of the investigation were as follows:

1. The speaking rates during a reading task for the institutionalized speakers were significantly slower than for the non-institutionalized speakers; however, individuals within each group varied considerably;
2. The speaking rates for the two subject groups were not significantly different during a picture description task; however, subjects within these groups differed;
3. The information rates during both experimental tasks were significantly slower for the institutionalized speakers than for the non-institutionalized speakers;
4. The total pause durations during both a reading and a picture description task were significantly longer for the institutionalized group than for the non-institutionalized group;
5. The inter-sentence pause durations during a reading task were not significantly different for the two groups; however, individual subjects within each group varied considerably;
6. The inter-string pause durations for the institutionalized speakers during a picture description task were significantly longer than for the non-institutionalized speakers but individual subject variation was considerable;
7. The intra-sentence pause durations during a reading task were significantly longer for the institutionalized speakers than for the non-institutionalized speakers with individuals varying considerably;

8. The intra-string pause durations during a picture description task were not significantly different for the two groups but variation for the subjects within the two groups was noted;

9. The total pause frequencies for the two groups during a reading task were not significantly different; however, individuals varied within each group; and

10. The total pause frequencies during a picture description task for the institutionalized speakers were more frequent than for the non-institutionalized speakers but individual subject variation within each group was noted.

In summary, even though group differences were noted for several of the variables in this investigation, the heterogeneity of the non-institutionalized aged group and homogeneity of the institutionalized group should be emphasized. Further research needs include providing experience(s) with tape recording for aged speakers prior to experimental tasks, investigating communicative efficiency measures during two conditions of connected speech and including young and middle adult sample groups during the same experimental tasks as in this investigation, followed by comparisons among the groups.

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CHAPTER I

INTRODUCTION, REVIEW OF THE LITERATURE AND STATEMENT OF THE PROBLEM

A. INTRODUCTION

The number of persons 65 years of age and over has increased sharply since 1900 at which time they were approximately 4.1 percent of the total population. In 1977, the aged, defined as those 65 years and over, numbered 23.5 million of a total population of nearly 214 million (U.S. Bureau of the Census, 1976), or 10.9 percent. During this same period life expectancy increased from 47 to 70 years (Moss and Halamandaris, 1977). At the present death rates, the older population is expected to increase 35 percent to 32 million by the year 2000 and will represent 12-13 percent of the projected total population of 246-260 million (Administration on Aging, 1978). It is evident that the aged population has become an increasing segment of the total population, although the change has been gradual. Consequently, the physical and psychosocial aspects of aging have become increasingly important areas for study.

With advancing age there is a sharp increase in chronic health problems (Magladery, 1959). The most frequently occurring are heart disease, hypertension, diabetes, and arthritis (National Center for Health Statistics, 1976). In the 1975 National Council on the Aging survey, most older people stated that poor health was the worst factor about being over age 65. When these individuals were asked to explain

the basis on which they defined "old," they cited physical changes as their primary criteria. In fact, three times as many respondents cited the health factor as the greatest single problem of aging with loneliness ranked as the second factor.

Blenker (in Kalish, 1977) noted that "a state of being in which to be old--as to be young--is to be dependent" (p. 78). Rosow (1962, p. 189) cited social dependency as one such state of dependency.

As the individual ages, he loses persons who are important objects and sources of affection, stimulation, and assistance He becomes without volition a progressively isolated and disengaged non-participant in the surrounding social world, increasingly dependent on bureaucratized substitutes for missing kith, kin, and agents of former days He becomes dependent on the social conscience of the generation in positions of authority, those who currently have all that he has lost in the way of vitality and performance. In other words, in old age, without the powers of one's prime--economic, physical, mental and social--one is dependent on the ethical responses of his fellow man.

Cumming and Henry (1961) stressed the aged retired person's withdrawal from social situations. This would imply that aged individuals actively move away from interpersonal contacts. Also, Eisdorfer (in Kalish, 1977) assumed that "retirement results in a decrease in the number of automatic social contacts" (p. 132). In their observations regarding their own person-to-person contacts during the first few years of retirement, Pressey and Pressey (1966) imply that in order for the aged retiree to sustain a high number of contacts, he is required to "work at it" by "appropriately restructuring his environment" (p. 15).

Because of the general slowing of physical activities in aging and chronic health problems, the life space of the elderly tends to diminish (Clark, 1968; Birren, 1969; Lawton, Liebowitz, and Charon, 1970).

In 1971 Hansen estimated that persons over 65 spend 80 to 90 percent of their lives in the domestic (home) environment. These spatial restrictions due to a decline in the individual's energy and health may limit the person to the neighborhood grocery store, nearby church, and/or his dwelling. For the physically, mentally, economically, or socially disabled individual, life space may be further reduced to his dwelling in the community or in an institution.

The institution may be either a home for the aged, a mental hospital, or a nursing home. Even though only five percent of the aged population are in institutions (U.S. Department of Health, Education, and Welfare, 1973), this environment has been studied more extensively than any other environmental exemplar. Of these three institutions, over half of the individuals are in nursing homes; therefore, this institutional environment has been of primary research interest. In 1976 more than one million patients were in America's 23,000 nursing homes on any given day. However, this number is deceiving since it is indicated that one out of five individuals over the age of 65 will spend some time in a nursing home (Moss and Halamandaris, 1977).

According to Glaser and Strauss (1968), the typical patient in a nursing home

is approximately 82 years of age, white, a widow, was transferred to the nursing home from either their home or a hospital, will stay in the nursing home approximately 2-1/2 years, will die there, is non-ambulatory but mobile with assistance, and takes approximately 4 drugs daily. (p. 32)

It is recognized then that the aged individual's housing environment becomes increasingly significant in their lives. These environments may manifest changes for the individual.

About 40 percent of persons 65 years and over suffer some limitation of activity. But with nursing home placement an "enforced limitation or prevention of normal activities is a principal consequence" (Kalish, 1977, p. 297) for the aged individual. According to Lawton, et al., (1970), nursing homes restrict their patients and permit little "normal activity" (p. 233) within them or with the outside world. They defined "normal activity" as "cooking, washing, ironing, cleaning, shopping, going for a walk, etc." (p. 233). Kalish (1977) agreed with Lawton, et al., (1970) adding that "most nursing home patients sit from arising to bedtime" (p. 299).

In a survey of 200 nursing homes (National Council on the Aging, 1975) over two-thirds of the patients reported a typical day to include sedentary activities such as TV watching, card playing, or just sitting. In comparison with non-institutionalized aged individuals, this was an approximate 30 percent increase in these activities. Kalish (1977), in referring to institutions in general, stated that "one cannot create a normal environment when the essential element of normality--freedom--is removed" (p. 36). Therefore, the reduction in social contacts and the opportunity for "environmental restructuring" (Pressey and Pressey, 1966) concomitant with the general decline in energy and health can be a function of the aged individual's immediate environment.

From a psychosocial viewpoint, spoken communication can be used toward fulfilling a social role. It is the "instrument through which people have influence on the environment, impose behavior, and demonstrate power" (Lubinski, 1979, p. 238). Oral communication can be analyzed by efficiency measures, such as the rate at which information is conveyed, accuracy, amount and appropriateness of this information. It would appear that with a reduction in interpersonal contacts and

life space, the aged individual may manifest changes in one or several of the above components of oral communication. Both Sommer and Ross (1958) and Lipman (1968) report that oral communication skill, at least in part, is a function of the physical setting in which it occurs. There is some evidence that individuals placed in nursing homes tend to withdraw from communicative interaction (Hutchinson, 1980). Therefore, communicative efficiency measures may be indicators of the individual's social interaction skills in his present environment.

This study was designed to examine the communicative efficiency of aged speakers as a function of their immediate living environment.

B. REVIEW OF THE LITERATURE

Pauses

The act of speaking has been considered continuous even though it can be separated into discrete units. The "interruptions" (MacLay and Osgood, 1959) or "gaps" (Henderson, Goldman-Eisler, and Skarbek, 1965, 1966) in the flow of speech have been used to aid in such separations. These phenomena have been classified as hesitations, pauses or "disturbances" (Mahl, 1956) and have been studied for a variety of purposes. The abnormal duration or uneven spacing of pauses has been assumed to be indicative of a communication disorder. These diagnoses have ranged from stuttering (Johnson, Darley, and Spriestersbach, 1963) to dysnomia (Licht, 1975).

Several classification schemes for pauses have been described in the literature. However, two major types of pauses generally have been agreed upon by the majority of authors, namely filled, and unfilled. Filled pauses include occurrences of the syllables "ah," "uh," "er,"

and "um" (Dauterive, 1970; Abney, 1971); while unfilled pauses are "periods of silence" (MacLay and Osgood, 1959; Tannenbaum, Williams, and Hillier, 1965; Tannenbaum, Williams, and Wood, 1967). Unfilled pauses may include breath pauses or those for respiratory purposes (Goldman-Eisler, 1958b) as well as juncture pauses or those "which occur in a syntactic position" (Boomer and Dittmann, 1962, p. 219) of a clause, phrase, or end of a sentence.

In defining and measuring pauses, it is usual to include a lower limit of duration which has been stated somewhat arbitrarily in past studies. These cut-offs have ranged from 25 milliseconds (msec) (Love and Jeffress, 1971) to one second (Hargreaves and Starkweather, 1959). The majority of studies have utilized cut-offs between 150 and 300 msec (Goldman-Eisler, 1956, 1958b; Boomer, 1965; Tannenbaum, et al., 1967; Lass and Deem, 1971; Hawkins, 1972; Lass and Clegg, 1973).

Studies of pauses have been conducted primarily during one of two types of verbal tasks, either those of reading or spontaneous speech. Samples of spontaneous speech by adults have been obtained in various situations. These have included: extemporaneous speeches on topics of choice (Boomer and Dittmann, 1962, 1964; Boomer, 1965; Kasl and Mahl, 1967), interviews (Goldman-Eisler, 1956, 1961b; Mahl, 1956; Goldman-Eisler, et al., 1965, 1966; Henderson, et al., 1966), conferences (MacLay and Osgood, 1959) and descriptions of cartoons and summaries of their meanings (Goldman-Eisler, 1961b; Goldman-Eisler, et al., 1965; Lay and Paivio, 1969).

Henderson, et al., (1966) reported that periods of silence of unfilled pauses accounted for 10-25 percent of the total time during reading. Prior to this, Goldman-Eisler (1958b) had reported that when

an individual read spontaneous speech that he had previously produced, unfilled pauses occurring at the same grammatical points, i.e., clause boundaries, were much shorter during reading than during spontaneous speech. While all breathing pauses occurred at these boundaries in reading, less than one-third occurred at these points during spontaneous speech. She postulated that the reader seems so in control of the production process that he can organize his breathing to coincide with these grammatical points where a break would be helpful to the listener. This was later supported by Butterworth (1978) who hypothesized that most of the periods of silences in reading served the readers' rather than the speakers' cognitive processes.

In 1958 (a), Goldman-Eisler also reported that between-sentence pauses in reading tended to be roughly of the same length (1.00-1.25 seconds), whereas, in spontaneous speech, they varied considerably, with many over 2.5 seconds, reflecting the "varying cognitive demands of speech as compared with reading" (p. 230). Therefore, unfilled pauses in reading serve a different function from unfilled pauses in spontaneous speech.

Function of Pauses. Pauses by speakers have been regarded as functioning in either the semantic/lexical or syntactical decision-making process. The variations in both the frequency and duration of unfilled pauses have been considered a fluctuation of problems in determining the choice of verbal sequences and in reflecting the "grammatical processes which are involved in speech" (Goldman-Eisler, 1956, p. 141). In 1961 (b), Goldman-Eisler asked adults to describe a cartoon and then to abstract its general meaning. She reported that unfilled pauses were longer and more frequent in the cartoon

abstraction than in the cartoon description. She concluded that

. . . Cognitive activity is accompanied by arrest of external activity--unfilled pauses--for periods proportionate to difficulty of the cognitive task while emotional attitudes are reflected in vocal activity of an instantaneous or explosive nature--filled pauses (p. 25).

Several studies have supported that unfilled pauses anticipate sudden increases in information. Fluent speech consists of habitual combinations of words which have become more or less automatic. When the sequence ceases to be a matter of automaticity, i.e., when the speaker's choice is highly individualized and somewhat unexpected, speech is hesitant (unfilled pauses). Goldman-Eisler (1957) stated that pause time seemed to be a condition for a kind of "central processing which underlies new organization in speech to take place, whether it be in process of structuring, selection or symbol formation" (p. 1510).

Maclay and Osgood (1959) reported that the majority of unfilled pauses occurred more frequently at word boundaries within phrases and before lexical items. These were "non-random in occurrence and related to the dynamics of grammatical and lexical selection" (p. 40). This was later supported by Henderson, et al., (1965).

Lounsbury's (1965) hypothesis that "hesitation pauses--unfilled pauses--correspond to points of highest statistical uncertainty in the sequencing of units of any given order" (p. 98) had been tested earlier by Goldman-Eisler (1958a), using 12 originally spoken sentences with 60 unfilled pauses and Shannon's guessing technique. The assumption was that unfilled pauses in spontaneous speech were related to transition probabilities which were dependent on word frequency. She reported that sequences of words uttered fluently by the speakers

were easily predicted from context, i.e., low information content, high redundancy, by guessers who knew nothing of the speaker's intentions. However, guessers were at a loss when they were predicting the next word at the same place as the original speaker paused, i.e., high information content, low redundancy. She concluded that fluency and pauses were predictive of the amount of information contained in the words.

The occurrences of unfilled pauses within sentences have been considered to be for the purpose of word/lexical selection. Unfilled pauses were expected to occur where there was greater freedom of choices, i.e., before words of low transitional probability. Goldman-Eisler (1961a, c; 1962) reported that redundancy and fluency (high transitional probability) were as closely linked as high information and pauses (low transitional probability). Pauses at grammatical points, i.e., clause boundaries, were interpreted as serving the function of determination of overall content while pauses within this boundary were for the selection of individual lexical items.

Tannenbaum, et al., (1965, 1967) reported that unfilled pauses were symptomatic of major encoding choice points or cognitive uncertainty. Messages which were shorter took less total encoding time and had fewer unfilled pauses. Therefore, as cognitive demands increased, a corresponding increase in unfilled pauses was noted and this accounted for a slower speaking rate.

Speaking Rate. The continuous act of speaking has the inherent dimension of time which allows rate measurements to be obtained. Goldman-Eisler (1954a) was among the first to report a relationship between speaking rate and pauses. She reported that the means and standard deviations of these speaking rates for utterances of different lengths

decreased with increasing lengths of utterances. The stabilization of speaking rate was in the direction of a slowing down with the most stable rate being for utterances approximately 100 syllables in length. Those individuals who were fast talkers in their short utterances remained so in the long ones. Within any one conversation, individuals tended to maintain a certain level of speaking rate.

In 1956, Goldman-Eisler reported a close inverse relation between proportion of pausing and speaking rate. In other words, the longer and more frequent the pauses, the slower the speaking rate. This is consistent with the findings of Henze (1953). Within each of her eight subjects, Goldman-Eisler reported that the proportion of time taken up by pauses in the production of speech was generally responsible for variations in speaking rate. At the same time, however, the degree of this relationship varied from subject to subject. She concluded that speaking rate was a function of the relative duration of pauses interrupting the flow of continuous speech.

In summary, Goldman-Eisler (1954a, b; 1956) has reported that both the frequency and duration of pauses should be considered inherent elements in speaking rate. Even though the relationship between pause time and speaking rate varies among individuals, within a conversation individuals tend to maintain a certain speaking rate. Therefore, speaking rate has been shown to be a consistent integrant in an individual's speech behavior.

Geriatric Communication Skills

"It is quite reasonable to assume that the physiologic and structural changes associated with senescence will influence the speech

and language characteristics of the elderly" (Schow, Christensen, Hutchinson, and Nerbonne, 1978, p. 95). Birren, Riegel, and Robbin (1962) and Malepeai and Hutchinson (1977) reported that adults 60 to 80 years of age have slower word retrieval times. One possible effect of these latencies would be an overall slowing in speech rate as well as the "appearance of more dysfluency, particularly meditative hesitations (unfilled pauses), and interjections, revisions, and repetitions" (Schow, et al., 1978, p. 97). Mysak and Hanley (1958) provided the initial support for these speculations by reporting an overall reduction in speaking rate for aged subjects. Experimental evidence regarding language functioning among the aged is insufficient; however, Hutchinson (1980) reported that syntactic abilities are preserved with advancing age.

Mysak (1959) was one of the first to study some of the acoustic changes in speech production as a function of aging. He instructed three groups of subjects to read a short paragraph from which measures of vocal fundamental frequency, range of fundamental frequency, phonation/time ratio, (percentage of total speaking time involved in voicing) and speaking rate (words per minute) were determined. He reported that phonation/time ratios decreased as a function of age as did the overall speaking rate.

Ryan (1972) obtained recordings of 80 normally-hearing subjects equally distributed among four age groups: 40-49, 50-59, 60-69, and 70-79. From these recordings he obtained average vocal intensity, overall speaking rate (words per minute), and words per minute per sentence for both oral reading and spontaneous speech. Results included a progressive decrement in overall speaking rate with increased age, but the only significant differences were observed

between the youngest (40-49 years) and oldest (70-79 years) groups for spontaneous speech. The oral reading task also resulted in significantly slower rates for the oldest group when compared with all other groups. These data supported the general conclusions of Mysak (1959).

In 1972 Yairi and Clifton investigated the types of dysfluencies in the speech of preschool children, high school seniors, and aged persons. Dysfluency types were interjection, part-word repetition, word repetition, phrase repetition, revision, dysrhythmic phonation, and tense pause. They reported a significantly greater number of dysfluency types in the speech of the aged (69-87 years) when compared with high school seniors. Also, the preschool and aged individuals exhibited similar dysfluency patterns.

One of the more extensive studies was conducted by Gordon, Hutchinson, and Allen (1976). They evaluated connected speech samples from 10 young adults (mean age, 23 years) and 10 aged adults (mean age, 80 years) for frequency of "uncertainty behaviors," frequency and location of unfilled pauses, and various utterance length characteristics. Uncertainty behaviors were defined as revisions, hesitant interjections and fillers, unfinished utterances not revised, and number of prompts by the examiner. The results were that the aged adults differed from the young adults only with regard to uncertainty behaviors. Specifically, the aged adults exhibited significantly more hesitant interjections and fillers, e.g., "uh," "ah," "um," and "er." The two subject groups did not differ in terms of pause location or utterance.

Yorkston and Beukelman (1980), using a picture description task, analyzed the communicative efficiency of two groups of adults. The mean ages for the "normal adult" and "normal geriatric" groups were 31

and 73 years, respectively. The two measures that were used as an indication of communicative efficiency were speaking rate (in syllables per minute) and information rate (in content units per minute). In 1978 Yorkston and Beukelman defined a content unit as a "grouping of information that was always expressed as a unit by normal adult speakers" (p. 128). For both efficiency measures, the "normal geriatric" group was slower than the "normal adult" group. Therefore, according to the experimental evidence, aged individuals have a reduced speaking rate which may be a result of slower time for word retrieval and/or increased number of uncertainty behaviors. A reduction in the information or content in an aged speaker also has been reported.

C. STATEMENT OF THE PROBLEM

Communicative efficiency includes not only the rate at which verbal information is conveyed but also the amount and appropriateness of that information. The review of the literature suggests that further research in this area is needed among the aged population. Yorkston and Beukelman (1977, 1978, and 1980) and Gordon, et al., (1976) have reported the most extensive studies in this dimension. However, empirical evidence regarding the communicative efficiency measures of speaking rate, information rate, and pause durations among the aged are not available. Also, assuming that living environments may be a social factor affecting or relating to communication skills of the aged, the experimental questions in this study are:

Do the two groups of aged speakers (institutionalized vs. non-institutionalized) differ significantly in the:

- 1) speaking rate during oral reading;
- 2) speaking rate during picture description;
- 3) information rate during oral reading;
- 4) information rate during picture description;
- 5) frequency and total duration of pauses during oral reading; and
- 6) frequency and total duration of pauses during picture description?

More specifically, two pause types were investigated; namely, those occurring between as well as within sentences in the reading task. In the picture description task, these pause types were also differentiated. In addition to these, comparisons between the variables of interest for each group were investigated.

CHAPTER II

METHODS AND PROCEDURES

A. METHODS

Subjects

The methods implemented in this study involved the selection of 30 females, ranging in age from 65 to 76 years with a mean age of 71-6 who served as subjects in this study. They were divided into two groups of equal size with their living environments being the determining factor for group inclusion. The control group were individuals who lived in the community, i.e., non-institutionalized. The experimental group were individuals who lived in an extended care facility, i.e., institutionalized, which according to Snyder (1979, p. 1) is a facility

which furnishes extended care services, i.e., nursing care, rehabilitative services (physical or occupational therapy or speech pathology), medical social services for patients who no longer require the intensive medical care and/or sophisticated medical equipment available in a hospital, but who continue to need daily skilled nursing care or skilled rehabilitative services.

The control group was matched in chronological age (within six months) and highest educational attainment with the experimental group (see Tables A-1 and A-3, Appendix A). All subjects met the following selection criteria:

1. Hearing sensitivity at 30 dB HTL for 500, 1000, and 2000 Hz (ANSI, 1969) in the better ear (Spoor, 1967);
2. Native English speaker;
3. Completion of the eighth grade;

4. No medical or psychiatric diagnosis of senile dementia or organic brain syndrome;
5. No physician-diagnosed respiratory disease, e.g., emphysema, bronchitis;
6. Mobile within the living environment, i.e., subject was not confined to her room or bed, but could walk or propel her wheelchair without assistance;
7. Resided in present environment a minimum of six consecutive months;
8. Regularly (or weekly) participated in at least one activity within or outside the living environment, e.g., attending Senior Citizen Center activities, playing cards or Bingo, as determined by the subject's and/or nursing staff's reports;
9. No evidence of oral apraxia as assessed by 20 isolated oral volitional movements with the criterion of the maximum score of one for each movement (A score of one is an "accurate and immediate response to the command" [Darley, Aronson, and Brown, 1975, p. 91]).
10. No evidence of a motor speech disorder, i.e., apraxia of speech and dysarthria, as assessed by the imitative production of words and sentences of varying lengths (Darley, et al., 1975). Criterion was correct production of all phonemes in each phonetic context, excluding dialectal variations (Fisher and Logemann, 1971);
11. As judged by spouse, friend, or nursing personnel, criterion rating of either zero or one for the categories of "understanding what is said," "speaking," and "reading" from the Minnesota Test for Differential Diagnosis of Aphasia (Schuell, 1966);

12. No evidence of mental confusion or disorientation as assessed by the 10 screening items of the Multidimensional Functional Assessment: The OARS Methodology (Duke University Center for the Study of Aging and Human Development, 1978);

13. Functional visual acuity, e.g., could read newspaper print, with or without glasses; and

14. Scores of 13, 14, or 15 on 20 items from the Revised Token Test (McNeil and Prescott, 1978) which assesses "auditory processing/comprehension in increasingly difficult steps" (p. 45). Using a table of random numbers (Gibbons, 1976), two of 10 test items from each of the 10 subtests were selected for presentation.

Additional demographic information collected about the subjects included: marital status, length of widowhood (if applicable), length of time at present residence, frequency of social activities, former occupation(s), approximate years of employment, approximate years of non-employment, and present daily physician-prescribed medications and their dosages. Also, for the institutionalized group, information was obtained regarding the primary means of mobility and reason for institutional placement (see Tables A-1 and A-2, Appendix A for the non-institutionalized group data and Tables A-3 and A-4, Appendix A for the institutionalized group data).

Experimental Tasks

Goldman-Eisler (1958b) reported that the duration of unfilled pauses during oral reading and cartoon description "reflects different internal cognitive processes" (p. 73). By reporting no difference in pause time for picture-elicited and topic-elicited

speech, Lass and Clegg (1973) concluded that the same "cognitive level of verbal operation" (p. 997) is required for both stimuli. This was in agreement with Goldman-Eisler (1968). The two experimental tasks used in this study were oral reading and picture description.

The oral reading material selected for this study was a short story which had a reading grade level of 5.5 (Colvin and Root, 1976). It contained three paragraphs with words varying in length from one to four syllables in nine sentences (see Appendix B).

The picture described for the purposes of this study was the "Cookie Theft" picture from the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan, 1972). Yorkston and Beukelman (1977) reported "this picture depicted sufficient action so that normal speakers were able to talk about it for 30 to 45 seconds and the content of the speech produced was relatively predictable" (p. 175).

Therefore, based on the predictability of content in each of these tasks, measures of communicative efficiency, i.e., speaking and information rates, as well as durations of unfilled pauses, were obtained.

Recording

Prior to the experimental task session with each subject, a 1000 Hz tone was recorded on Scotch 207 magnetic tape for 10 seconds using a Sony tape recorder (model TC-377) with 7-1/2 inches per second recording speed. During this recording, the input level was adjusted by the investigator to 0-dB VU.

At the beginning of the experimental task session, the investigator recorded 20 seconds of background noise in the testing room

using a cardioid condenser microphone (Marantz Superscope, type EC-9) on a desk stand. The input level was adjusted so that the average peaks were between 0- and -5-dB VU.

The experimental tasks were recorded from the output of the microphone on a desk stand placed approximately six inches from the subject's mouth. During these recordings, the input level was adjusted by the investigator as necessary in order that the average peak values were maintained between 0- and -5-dB VU.

B. PROCEDURES

Subject Preparation

One day prior to the selection criteria session, the investigator orally read typed instructions to the subject during which the subject silently read the same. The nature of the investigation and specific measures to be made were not explained to the subjects other than the general statement that the purpose was to investigate the reading and speaking skills of the aged. This statement was used for their informed consent. Also, this allowed for the investigator and subject to become acquainted prior to any testing.

Two sessions of approximately 20 minutes in length were spent with each subject. The first was for the completion of the selection criteria and the second for the experimental tasks. Both sessions were conducted in the subject's living environment. For the non-institutionalized subjects, location of testing was by their choice; however, for the institutionalized subjects, testing was in the subject's room. These sessions were conducted on two consecutive days in the same location at approximately the same time of day.

During the experimental tasks the investigator was seated directly in front of the subject. Each subject was instructed to maintain an approximate mouth-to-microphone distance of six inches. To establish appropriate input recording levels, each subject was instructed to count aloud during which time the investigator adjusted the input volume of the tape recorder so that the average peak values were between 0- and -5-dB VU.

Testing Procedures

The experimental tasks required the subject to read orally a short story and describe a picture one time. The presentation of these tasks were alternated among the subjects. Prior to the oral reading task, the subject was asked to read silently the short story. If any word(s) was/were unfamiliar, the subject informed the investigator who produced the word(s) for the individual. The subject indicated when she was ready to begin reading aloud.

For the picture description task, the investigator instructed the subject to "Tell me everything about this picture." The subject indicated to the investigator when she was ready for the recording to begin. Recording was stopped after 30 seconds of silence or after the speaker indicated she was finished. The 30-second period of silence was not included in the total time for completion of the task.

Communicative Efficiency Measures

Using the Sony tape recorder (model TC-377), a custom-built 3.5-watt amplifier, and speaker, the investigator transcribed verbatim each subject's recording of the two experimental tasks. Following this, communicative efficiency measures, or the measurement of rate at which

verbal information was conveyed, were calculated. The two measures used in this study were the speaking and the information rates.

Speaking Rate (SR). To determine the total elapsed time for each task, the investigator used a silent-slide stopwatch (Meylan, model 207). The overall speaking rate for each task was expressed in syllables per second (SPS). The equation for this was:

$$\text{Speaking Rate (in CUS)} = \frac{\text{total number of syllables}}{\text{total elapsed time (sec)}}$$

For the oral reading task, the total elapsed time was between the productions of the first phone in the first word of the first sentence and the last phone in the last word of the ninth sentence.

For the picture description task, the total elapsed time was between the production of the first phone in the first word of the first string (see Appendix C) following approximately the first 10 seconds and the last phone in the last word of the last string. This interval was selected on the basis of preliminary data of picture descriptions from two subjects randomly selected from each subject group. For these four subjects, the speaking rate during each 10-second interval was obtained (see Table 1). The first 10-second interval revealed a higher SR while the remaining 10-second intervals showed more consistent SRs. This supported Hutton (1954) and Lass and Clegg's (1973) findings that rate variation is associated with the beginning of a connected speech task. Therefore, due to this rate variability within the picture description task of these four subjects,

Table 1. Speaking rates in syllables per second (SPS) for each 10-second interval during the picture description task for two subjects within each subject group.

Subject Group	Time Intervals (sec)										
	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110
Non-Institutionalized											
Subject 1	4.30	3.70	3.40	3.45	-	-	-	-	-	-	-
Subject 2	3.10	2.50	2.60	2.10	2.30	2.00	1.80	-	-	-	-
Institutionalized											
Subject 1	2.90	2.20	1.70	1.90	1.15	1.80	-	-	-	-	-
Subject 2	3.40	2.40	2.30	2.50	2.60	2.00	2.00	1.60	2.40	2.20	2.00

the above mentioned interval was considered the total elapsed time for all measurements in this study.

Information Rate (IR). Information rate was defined as the rate at which information was conveyed as expressed in content units per second (CUS). The equation for this was:

$$\text{Information Rate (in CUS)} = \frac{\text{total number of content units}}{\text{total elapsed time (sec)}}$$

Yorkston and Beukelman (1980) defined a content unit as "the measure of the amount of information conveyed" (p. 30). Only content words, that is, a "linguistic form within a sentence which carried the most meaning and provides the substance of a sentence, e.g., nouns, verbs, adjectives, adverbs, and pronouns" (Nicolosi, Harryman, and Kresheck, 1978, pp. 228-229), were counted as content units. Function words were excluded. The 55 content units within the oral reading passage are presented in Appendix B. No credit for additional information was given. Each of the following were counted as one content unit: "tree/trees/of the trees," "in the swamp/in the swamps/swamps/to the swamp," and "it/its."

Using the "Cookie Theft" picture (Goodglass and Kaplan, 1972) as the stimulus, 78 "normal adult" and "normal geriatric" speakers provided Yorkston and Beukelman (1980) with a list of 57 content units. Each of these content units was spoken by at least one of the 78 adults. This list of content units served as a guide for the identification of content units in the picture description task in this investigation. However, credit as a content unit was given for information synonymous

with Yorkston and Beukelman's list, e.g., "daydreaming"/"thinking about something"/"not paying attention to," "grass"/"lawn"/"yard." Information that was accurate and appropriate to the picture was also given additional credit, e.g., "she," "apron," "shrubbery," "dish towel," "perfectly beautiful day," and "outside." Appendix D contains a list of all the content units spoken by at least one of the 30 subjects. Information excluded from this list was: 1) concepts which were judged not to be related to the task, e.g., comments about the quality of the artistry, and 2) concepts which made assumptions beyond what was evident in the picture, e.g., "It must be Thursday today."

To eliminate credit for redundant information in both experimental tasks, each content unit was counted only one time.

Equipment

Portions of each subject's tape were replayed at 7-1/2 inches per second speed on a Sony tape recorder (TC-377) which was connected to a graphic level recorder (Brüel and Kjær, type 2307), a custom-built 3.5-watt amplifier and a speaker, and a voltmeter (Hewlett-Packard, model 400H). The graphic level recorder (GLR) provided a simultaneous write-out of the input signals. This write-out in 2-dB increments with amplitude or level (dB) on the ordinate and time (sec) on the abscissa was provided for each portion. The settings on the GLR for all write-outs in this study were:

paper speed: 3 cm/sec;

writing speed: 630 mm/sec;

rectifier response: rms;

lower limiting frequency: 200 Hz;

potentiometer range: 50 dB;

input potentiometer setting: 10 dB; and

input attenuation: 0 dB.

These settings remained constant for each subject. The level recordings for all subjects were produced during one time span.

The input signals from the tape recorder to the GLR were the 1000 Hz tone, background room noise, and the two experimental tasks. During the level recordings of the 1000 Hz calibration tone, the mean rms voltages obtained were 0.41 and 0.42 for the non-institutionalized and institutionalized groups, respectively. During the level recordings of the two experimental tasks the investigator aurally monitored the input signal to identify the beginning and ending of each sentence/string in the respective task. Vertical lines were drawn to indicate these points. Excessive environmental noise, e.g., intercom, cough, laugh, were identified by the investigator who placed an "X" on the write-out in the interval (see Figure 1). The duration of these intervals was not included in the pause duration measurements.

Pause Duration Measurements

For all measurements taken from the GLR write-outs, the level of the 1000 Hz tone was used as the reference level, i.e., 0 dB. Five seconds of the background room noise waveforms were used for obtaining the average high noise level for each subject. These five seconds contained the highest peak(s) in the 20-second sample. The level (dB) of each of the peaks within these five seconds was obtained and then averaged. This was considered the average high noise level for that subject (see Appendix E). For the non-institutionalized group, the

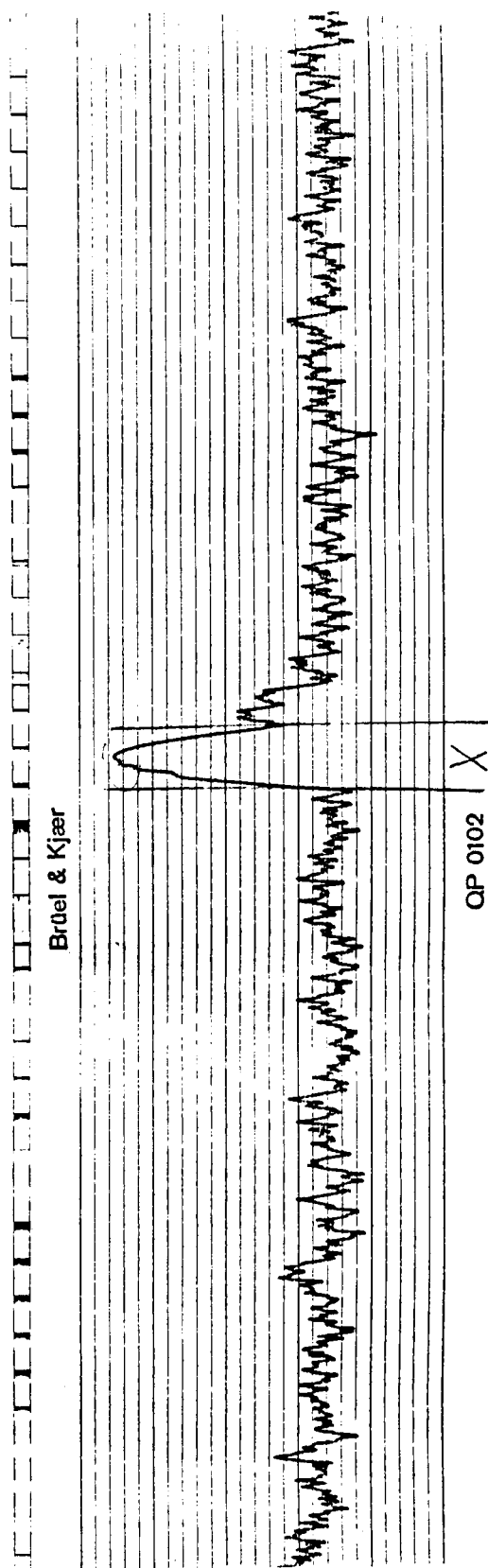


Figure 1. Graphic level recorder (GLR) write-out indicating excessive environmental noise during the recording of the oral reading and/or picture description tasks.

average high noise levels ranged from -28.00 dB to -12.04 dB with a mean of -19.63 dB. For the institutionalized group, the average high noise levels ranged from -26.54 dB to -8.99 dB with a mean of -16.70 dB. Therefore, using the aforementioned GLR settings, a pause in this study was defined as a period of silence greater than the average high noise level for that subject and equal to or greater than 4.5 millimeters (mm) in length (or 150 msec in duration).

The average high signal level was then determined by taking two 10-second intervals from each write-out of the two experimental tasks for each subject. The intervals included the highest signal peak(s), excluding environmental noise peaks earlier identified. The level of the peaks (dB) within these intervals was obtained and averaged. This was considered the average high signal level for that subject (see Appendix E). For the non-institutionalized group the average high signal levels ranged from -11.57 dB to 10.17 dB with a mean of 6.33 dB. For the institutionalized group the average high signal levels ranged from -13.52 dB to 7.23 dB with a mean of 5.40 dB.

The average high signal-to-noise ratio (S:N) was then calculated for each of the 30 subjects (see Appendix E). The minimum S:N for the non-institutionalized group was 11.83 dB and 9.95 dB for the institutionalized group.

Measurement. All pauses in each of the two experimental tasks for each subject were measured using a metric ruler. These measurements (in mm) were then converted to time measurements (in msec) using the equation:

$$\text{Pause Duration (in msec)} = \frac{\text{length of pause (mm)}}{4.5 \text{ mm}} \times 150 \text{ msec}$$

Figure 2 illustrates a level recording and points at which pause duration measurements were made. The line marked "NL" indicates the average high noise level for the subject in reference to the 0-dB line. Only those intervals between points A and B are considered pauses. The remaining intervals were less than 4.5 mm in length. The interval between points A and B in the level recording indicates points between which the signal waveform intersects with the NL line. Point A was considered the beginning and point B was considered the end of the pause.

There were two types of pauses identified in each of the experimental tasks; namely, inter- and intra-sentence/string. The general location of the inter-sentence/string pauses was determined by the vertical lines placed by the investigator on the GLR write-out. Goldman-Eisler (1956) considered the pause before the first utterance to be an "anticipatory pause" (p. 139) and suggested that it be deleted from the analysis. Using this criterion and the definition of inter-sentence pauses as those occurring between sentences, there was a total of eight possible inter-sentence pauses in the oral reading task for each subject. Excluding the pause before the first string, all inter-string pauses were measured in the picture description task. Intra-sentence/string pauses were those which occurred within the sentence or string for the respective experimental task. Intra-sentence pauses were measured within all sentences of the oral reading task except in the first and last sentences. Intra-string pauses were measured within all strings of the picture description task except in the first and last strings.

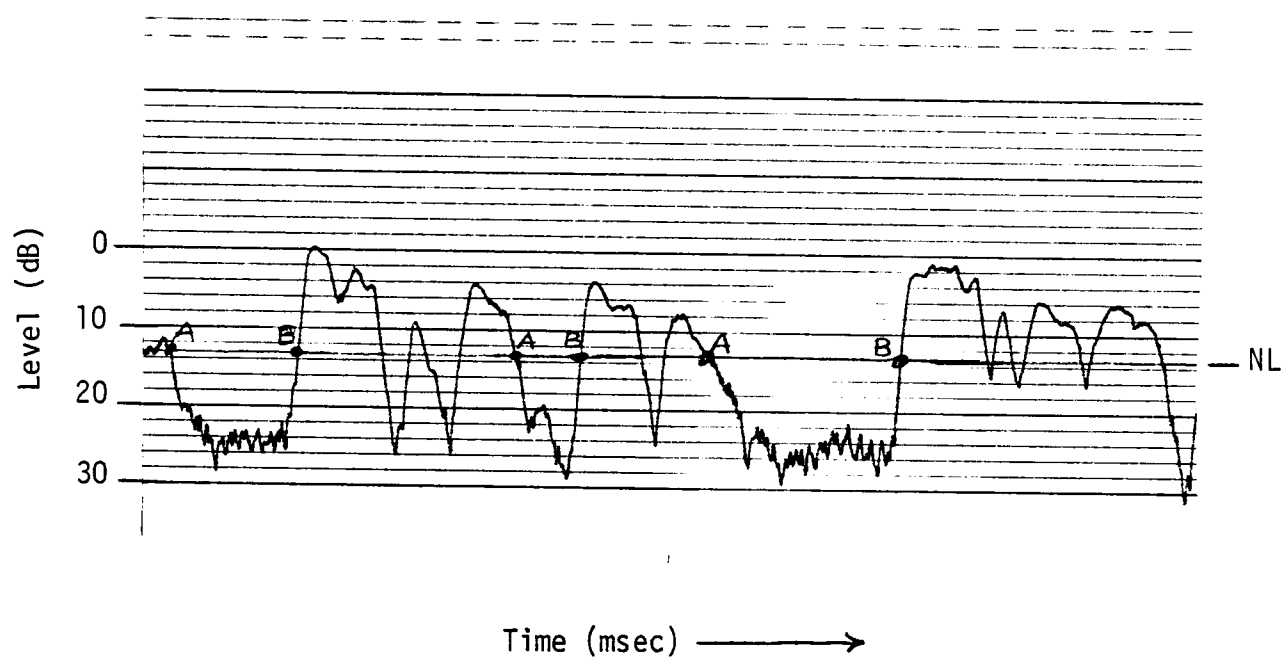


Figure 2. Graphic level recorder (GLR) write-out indicating the average high noise level and the points that pause duration measurements were made for the two experimental tasks.

CHAPTER III

RESULTS

Two groups of 15 non-institutionalized and 15 institutionalized aged female speakers orally read a passage and described a picture. The data were analyzed to investigate the effects of the two experimental variables of Group (non-institutionalized, institutionalized) and Task (oral reading, picture description) on the communicative efficiency measures of speaking and information rates as well as duration and frequency of pauses. The criterion measures for speaking and information rates were syllables per second (SPS) and content units per second (CUS), respectively. For the duration of pause, the criterion measure was milliseconds (msec) with numbers being the criterion measure for the frequency of pauses.

Both parametric and non-parametric statistics were performed on the data. Due to the large variation within the subject groups, the results of the non-parametric procedures were utilized for data interpretation. The Wilcoxon matched pairs signed-rank test was employed to determine if there were significant differences between the two experimental variables with respect to each of the criterion measures for:

- 1) speaking rate (SR);
- 2) information rate (IR);
- 3) total pause duration;
- 4) inter-sentence/string pause duration;
- 5) intra-sentence/string pause duration; and
- 6) total pause frequency.

The relationships between these variables were investigated by the Spearman rank-order correlation test. The results of each of the above analyses will be presented separately. Appendix F contains the raw data for each of the criterion measures.

A. VARIABILITY

There were three sources of variation in this study, namely, equipment, investigator, and subject. The data from two subjects were randomly selected from each subject group for remeasuring. The tape recordings of the experimental tasks for each subject were retranscribed verbatim as an accuracy check of the previous transcription. The tasks were again timed to obtain the total time for each task as well as the end of approximately the first 10 seconds during the picture description task. The strings which followed this 10-second interval were used in the level recordings. There were no differences between the two transcriptions for the experimental tasks while the difference in timing for the tasks ranged from two to four seconds.

Level recordings for the 1000 Hz tone, background room noise, and experimental tasks for each subject were duplicated immediately following the original level recordings and both sets were measured by the investigator. Variability of the recordings for the 1000 Hz tone and background room noise was computed using the standard error of the mean. The equation for these calculations was:

$$\text{Standard Error} = \sqrt{\frac{\sum (X_1 - X_2)^2}{2N}}$$

Using this equation, the standard errors were 0 and 1.26 dB for the 1000 Hz tone and background room noise, respectively. Variability of the recordings for the experimental tasks was computed using the percent variation between the first (time one) and second (time two) recordings for all variables of interest in this study. The equation for these calculations was:

$$\text{Percent Variation} = \frac{\text{mean}_{\text{time 1}}}{\text{mean}_{\text{time 2}}} - 100$$

As seen in Table 2, the percent variation for all communicative efficiency measures in both experimental tasks was 6 percent or less. When compared with the manufacturer's percent variation between repeated recordings of 30 percent, the original level recordings were considered to be reliable for all pause measurements in this study.

Two subjects from each group performed the experimental tasks a second time within one week. The tape recordings were then transcribed verbatim and timed by the investigator. Level recordings were made of the 1000 Hz tone, background room noise and experimental tasks. The standard error of measurement for the 1000 Hz tone and average high noise level was 0 and 0.06 dB, respectively. As seen in Table 3, the variation for the communicative efficiency measures ranged from one (for the SR and IR during the reading task) to 15 (for the IR during the picture description task) percent. For all the variables the time two measures were consistently less than the time one measures except for the IR during the picture description

Table 2. Means and percent measurement variability for the two experimental tasks: Speaking rate (in SPS), information rate (in CUS), total pause duration (in msec), inter- and intra-sentence/string pause duration (in msec) and pause frequency.

Variables	Reading			Picture Description		
	Mean Time 1	Mean Time 2	Percent Variation	Mean Time 1	Mean Time 2	Percent Variation
Speaking Rate (SR)	2.71	2.65	2	2.10	2.01	4
Information Rate (IR)	0.83	0.83	0	0.20	0.19	5
Total Pause Duration	1150.30	1095.31	5	2022.45	1951.13	3
Inter-sentence/string Pause Duration	799.11	752.11	6	1353.47	1318.85	3
Intra-sentence/string Pause Duration	351.19	343.20	2	668.98	632.28	5
Pause Frequency	31.75	30.25	5	35.00	33.00	6

Table 3. Means and percent subject variability for the two experimental tasks: Speaking rate (in SPS), information rate (in CUS), total pause duration (in msec), inter-sentence and intra-sentence/string pause durations (in msec), and pause frequency.

Variables	Reading			Picture Description		
	Mean Time 1	Mean Time 2	Percent Variation	Mean Time 1	Mean Time 2	Percent Variation
Speaking Rate (SR)	2.71	2.69	1	2.10	1.97	6
Information Rate (IR)	0.83	0.82	1	0.20	0.23	15
Total Pause Duration	1150.30	1025.40	11	2022.45	1868.94	8
Inter-sentence/string Pause Duration	799.11	716.20	10	1353.47	1287.52	5
Intra-sentence/string Pause Duration	351.19	309.20	12	668.98	581.42	13
Pause Frequency	31.75	29.25	8	35.00	31.50	10

task. The consistency may not only be attributed to a learning or practice effect among the subjects but also to the equipment and/or investigator's variation.

B. COMMUNICATIVE EFFICIENCY MEASURES

Speaking Rate (SR)

The group means, standard deviations, ranges, and medians for the SR in each experimental task are presented in Table 4. The means and ranges for each group are shown graphically in Figure 3.

Table 4. Group means, standard deviations, ranges, and medians for the speaking rate (in SPS) for the two subject groups and experimental tasks.

Subject Group	Tasks	
	Reading	Picture Description
Non-Institutionalized		
Mean	3.40	2.60
S.D.	0.51	0.64
Range	2.58-4.33	1.65-3.56
Median	3.57	2.60
Institutionalized		
Mean	2.80	2.40
S.D.	0.59	0.63
Range	1.79-3.54	1.52-3.32
Median	2.78	2.60

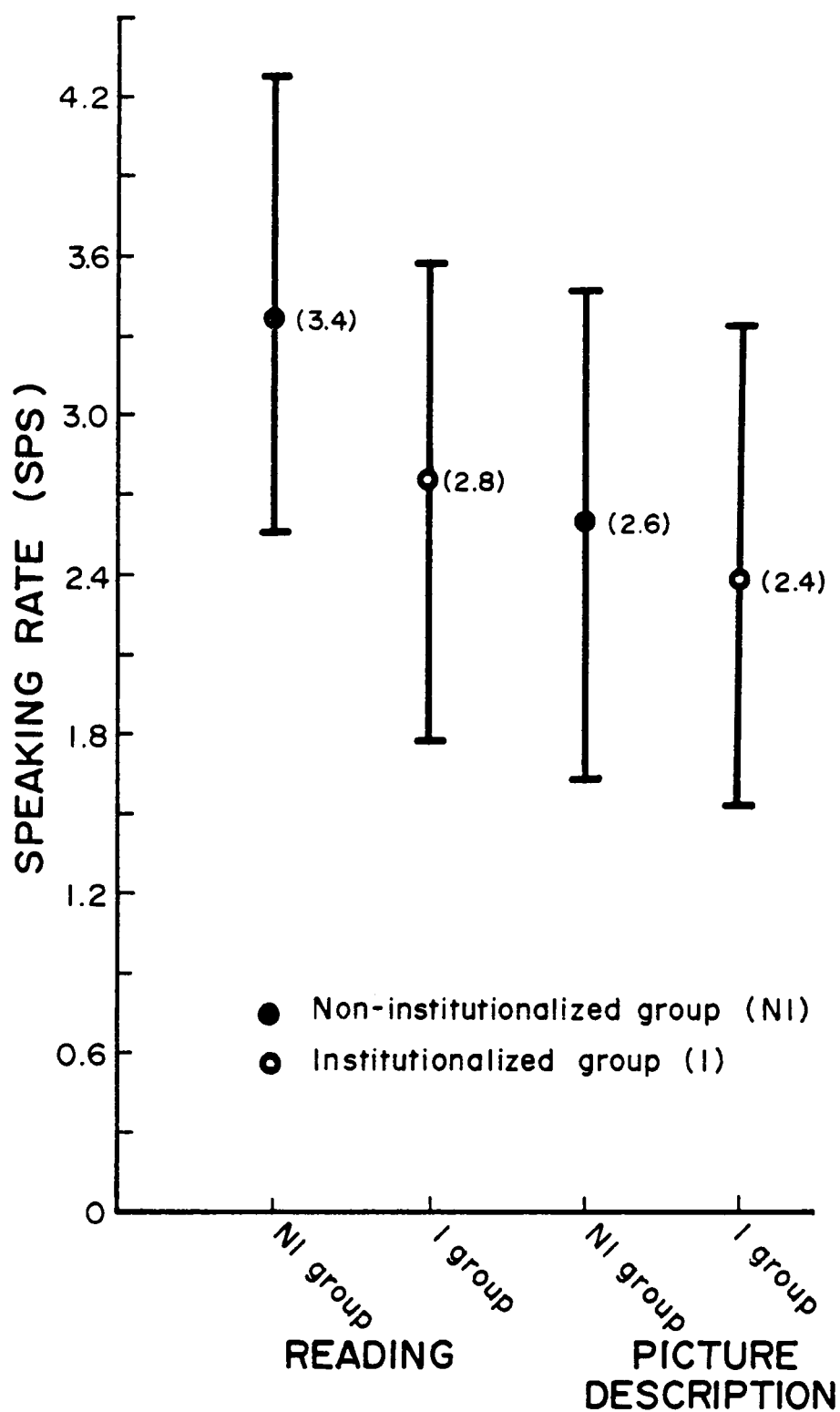


Figure 3. Mean and range of the speaking rates for the two subject groups during the reading and picture description tasks.

For the reading task the mean SR for the non-institutionalized group was 3.40 syllables per second (SPS) with a range from 2.58 to 4.33 SPS. The median was 3.57 or 0.17 SPS higher than the group mean. Having a range from 1.79 to 3.54 SPS, the institutionalized group averaged a SR of 2.80 SPS during the reading task. The median was 2.78 or 0.02 SPS lower than the group mean. Results of the Wilcoxon test for difference between the group means for SR during the reading task yielded statistical significance ($Z = -2.442$; $df = 14$; $p = 0.02$). This indicates that the SR for the institutionalized group during the reading task was significantly slower than for the non-institutionalized group. The individual subject variation will be discussed in the next chapter.

For the picture description task the mean SR for the non-institutionalized group was 2.60 SPS with a range from 1.65 to 3.56 SPS. The two measures of central tendency--the mean and median--were identical. As shown in Table 4, the mean SR for the institutionalized group was 2.40 SPS. Individual SRs ranged from 1.52 to 3.32 SPS with a median of 2.60 or 0.20 SPS higher than the group mean. Results of the Wilcoxon test on the picture description data yielded a non-significant difference ($Z = -1.02$; $df = 14$; $p = 0.31$). Figure 3 shows a slightly higher range of SRs for the non-institutionalized group (1.91 SPS) than for the institutionalized group (1.80 SPS). Even though the variability is larger for the non-institutionalized group, the SR during this task was shown not to be a factor for subject placement in either group. Individual subject variation will be presented in the next chapter.

For both groups, the SRs for the reading task averaged faster than for the picture description task. The test for correlation between the two tasks for the non-institutionalized group yielded statistical significance ($\rho = 0.42$; $df = 13$; $p = 0.04$). The SRs for the institutionalized group were less consistently related ($\rho = 0.36$; $df = 13$; $p = 0.09$). The SRs for both groups were slower during the picture description task than the reading task.

Tables 5, 6, 7, and 8 show matrices of the Spearman rank-order correlation coefficients and their significance levels for both tasks and groups for all the variables in this study. As seen in Table 5, the SR for the non-institutionalized group during the reading task was significantly correlated with the IR, total pause duration, and intra-sentence pause duration. Throughout this investigation it was logically assumed that the SR and IR were related since the subjects were provided with the same passage and were expected to read it accurately. Table 6 shows that the SR for the institutionalized group was significantly related to the IR, number of CUs, intra-sentence pause duration, and pause frequency. So Tables 5 and 6 show that unless words were omitted in the reading task (as in the institutionalized group), IR is a function of SR. Generally, the SRs for the two groups were not related to the number of content units, total pause durations, nor to between-sentence pause times but were related to the duration of pauses inserted within sentences.

In Table 7 the SR for the non-institutionalized group during the picture description task was shown to significantly correlate with the IR, total pause duration, inter- and intra-string pause durations; whereas, the SR for the institutionalized group significantly correlated

Table 5. Spearman rank-order correlation coefficients (ρ) and levels of significance (p) of all variables for the non-institutionalized group during the reading task.

Variables	SR	IR	Number of CUs	Total Pause Duration	Inter-sentence Pause Duration	Intra-sentence Pause Duration	Pause Frequency
SR	ρ	-	0.23	-0.48	-0.33	-0.46	-0.33
	p	0.001*	0.20	0.03*	0.12	0.04*	0.11
IR	ρ	-	0.27	-0.51	-0.34	-0.45	-0.35
	p		0.17	0.03*	0.11	0.05*	0.10*
Number of CUs	ρ		-	0.15	0.39	-0.12	-0.19
	p			0.29	0.08*	0.34	0.25
Total pause Duration	ρ			-	0.86	0.42	0.14
	p				0.001*	0.06*	0.31
Inter-sentence Pause Duration	ρ				-	-0.01	0.24
	p					0.48	0.20
Intra-sentence Pause Duration	ρ					-	0.21
	p						0.23
Pause Frequency	ρ						-
	p						

*beyond the 0.10 level of significance

Table 6. Spearman rank-order correlation coefficients (ρ) and levels of significance (p) of all variables for the institutionalized group during the reading task.

Variables	SR	IR	Number of CUs	Total Pause Duration	Inter-sentence Pause Duration	Intra-sentence Pause Duration	Pause Frequency
SR	ρ	-	0.42	-0.33	-0.05	-0.74	-0.72
	p	0.001*	0.06*	0.11	0.43	0.001*	0.001*
IR	ρ	-	0.60	-0.30	-0.06	-0.66	-0.77
	p		0.009*	0.14	0.42	0.004*	0.001*
Number of CUs	ρ		-	-0.06	0.22	-0.58	-0.23
	p			0.41	0.22	0.01*	0.20
Total Pause Duration	ρ			-	0.85	0.40	0.48
	p				0.001*	0.07*	0.04*
Inter-sentence Pause Duration	ρ				-	0.007	0.32
	p					0.49	0.12
Intra-sentence Pause Duration	ρ					-	0.44
	p						0.05*
Pause Frequency	ρ						-
	p						

*beyond the 0.10 level of significance

Table 7. Spearman rank-order correlation coefficients (ρ) and levels of significance (p) of all variables for the non-institutionalized group during the picture description task.

Variables	SR	IR	Number of CUs	Total Pause Duration	Inter-string Pause Duration	Intra-string Pause Duration	Pause Frequency
SR	ρ	-	0.34	-0.82	-0.60	-0.81	-0.03
	p	0.01*	0.11	0.001*	0.009*	0.001*	0.45
IR	ρ	-	0.61	-0.47	-0.35	-0.50	-0.34
	p		0.008*	0.04*	0.01*	0.03*	0.11
Number of CUs	ρ		-	-0.15	-0.005	-0.23	0.35
	p			0.30	0.49	0.21	0.10*
Total Pause Duration	ρ			-	0.88	0.73	0.07
	p				0.001*	0.001*	0.40
Inter-string Pause Duration	ρ				-	0.40	0.16
	p					0.07*	0.28
Intra-string Pause Duration	ρ					-	-0.04
	p						0.44
Pause Frequency	ρ						-
	p						

*beyond the 0.10 level of significance

Table 8. Spearman rank-order correlation coefficients (ρ) and levels of significance (p) of all variables for the institutionalized group during the picture description task.

Variables	SR	IR	Number of CUs	Total Pause Duration	Inter-string Pause Duration	Intra-string Pause Duration	Pause Frequency
SR	ρ	-	0.65	-0.80	-0.76	-0.40	0.62
	p	0.08*	0.005*	0.001*	0.001*	0.07*	0.007*
IR	ρ	-	-0.04	-0.40	-0.39	-0.40	0.38
	p		0.44	0.07*	0.08*	0.07*	0.08*
Number of CUs	ρ		-	-0.61	-0.71	0.13	0.63
	p			0.008*	0.002*	0.32	0.006*
Total Pause Duration	ρ			-	0.98	0.18	-0.72
	p				0.001*	0.27	0.001*
Inter-string Pause Duration	ρ				-	0.04	-0.73
	p					0.44	0.001*
Intra-string Pause Duration	ρ					-	-0.05
	p						0.43
Pause Frequency	ρ						-
	p						

*beyond the 0.10 level of significance

with the IR, number of CUs, total pause duration, inter- and intra-string pause durations, and number of pauses (see Table 8). So Tables 7 and 8 show that unless words/content units were omitted or repeated in the picture description task (as in the institutionalized group), IR is a function of SR. In general, the SRs for both groups during this task were not related to the number of CUs or number of pauses but were related to the total pause duration, between- and within-string pause durations.

Information Rate (IR)

The group means, standard deviations, ranges, and medians for the IR in each experimental task are presented in Table 9. The means and ranges for each group are shown graphically in Figure 4.

During the reading task the mean IR for the non-institutionalized group was 1.10 content units per second (CUS) with a range from 0.76 to 1.38 CUS. The median was 1.15 or 0.05 CUS higher than the group mean. For the institutionalized group the mean IR for the reading task was 0.80 CUS with the subjects ranging from 0.40 to 1.10 CUS. The median was 0.88 or 0.08 CUS higher than the group mean. Results of the Wilcoxon test for difference between the group means for IR during reading yielded a statistically significant difference ($Z = -2.73$; $df = 14$; $p = 0.006$) in the number of content units (CUs) during reading in favor of the non-institutionalized group. As noted previously, this merely indicates that the non-institutionalized subjects were likely to read all the words in the passage provided.

For the picture description task the mean IR for the non-institutionalized group was 0.30 CUS with a range from 0.16 to 0.39 CUS. The

Table 9. Group means, standard deviations, ranges, and medians for the information rate (in CUS) for the two subject groups and experimental tasks.

Subject Group	Tasks	
	Reading	Picture Description
Non-Institutionalized		
Mean	1.10	0.30
S.D.	0.17	0.07
Range	0.76-1.38	0.16-0.39
Median	1.15	0.28
Institutionalized		
Mean	0.80	0.20
S.D.	0.23	0.05
Range	0.40-1.10	0.11-0.29
Median	0.88	0.23

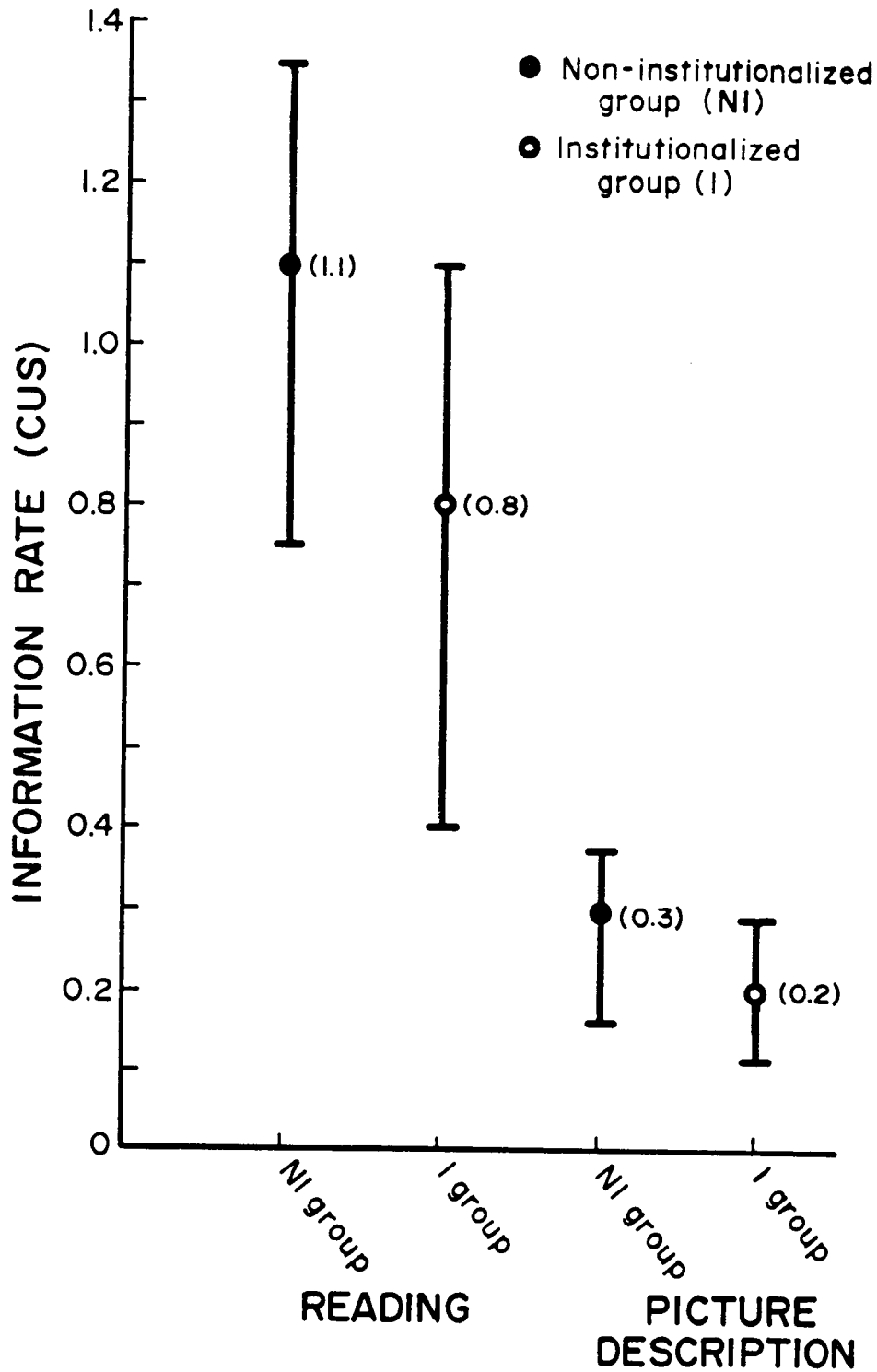


Figure 4. Mean and range of the information rates for the two subject groups during the reading and picture description tasks.

median was 0.28 or 0.02 lower than the group mean. The mean IR for the institutionalized group was 0.20 CUS with a range from 0.11 to 0.29 CUS. The median was 0.23 or 0.03 CUS higher than the group mean. Results of the Wilcoxon test revealed a statistical difference between the groups for the picture description task ($Z = -2.67$; $df = 14$; $p = 0.008$). Even though the group data were significantly different, the individual subject data showed considerable variation. This will be further discussed in Chapter IV.

For both groups the IRs for the reading task averaged higher than for the picture description task. The test for correlation showed the IRs for the non-institutionalized group during the two tasks not significantly related ($\rho = 0.18$; $df = 13$; $p = 0.26$). For the institutionalized group the correlation between the two IRs during the tasks was also non-significant ($\rho = 0.09$; $df = 13$; $p = 0.39$). As shown in Figure 4 the variation in IR between the two tasks for each group was considerable.

Table 5 (p. 39) reveals that the IR for the non-institutionalized group during the reading task significantly correlated with SR, total pause duration, intra-sentence pause duration, and pause frequency. For the institutionalized group Table 6 (p. 40) shows significant correlations between IR and SR, number of CUs, intra-sentence pause duration, and number of pauses. These tables show that unless words/CUs were omitted in the reading task (as in the institutionalized group), SR is a function of IR. For both groups the IR during this task was not related to the number of CUs, total pause duration, pauses inserted between sentences, nor the number of pauses but was related to pauses inserted within sentences.

The IR for the non-institutionalized group during the picture description task significantly correlated with SR, number of CUs, total pause duration, inter- and intra-string pause durations (see Table 7, p. 41). For the institutionalized, IR was significantly correlated with SR, total pause duration, inter- and intra-string pause durations, and pause frequency (see Table 8, p. 42). These tables show that unless redundant, inappropriate, or inaccurate information was provided in this task (as in the institutionalized group), SR is a function of IR. For both groups IR was not related to the number of CUs and number of pauses, but was related to the total pause duration, inter- and intra-string pause durations.

Figures 5 and 6 illustrate the two communicative efficiency measures for the picture description task plotted for each subject in the two subject groups. As seen in Figure 5, four of 15, or 27 percent, of the non-institutionalized subjects were within the first standard deviation (S.D.) of the mean on both measures, with all subjects within the second S.D. However, nine of 15, or 60 percent, of the institutionalized subjects were within the first S.D., with all subjects within the second S.D. (see Figure 6). These figures illustrate that the non-institutionalized group were more variable than the institutionalized group for these measures.

A measure necessary for IR was the number of CUs during the experimental tasks for the subject groups. Therefore, the group means, standard deviations, ranges, and medians for the number of CUs in each experimental task are presented in Table 10. The means and ranges for each group are shown graphically in Figure 7.

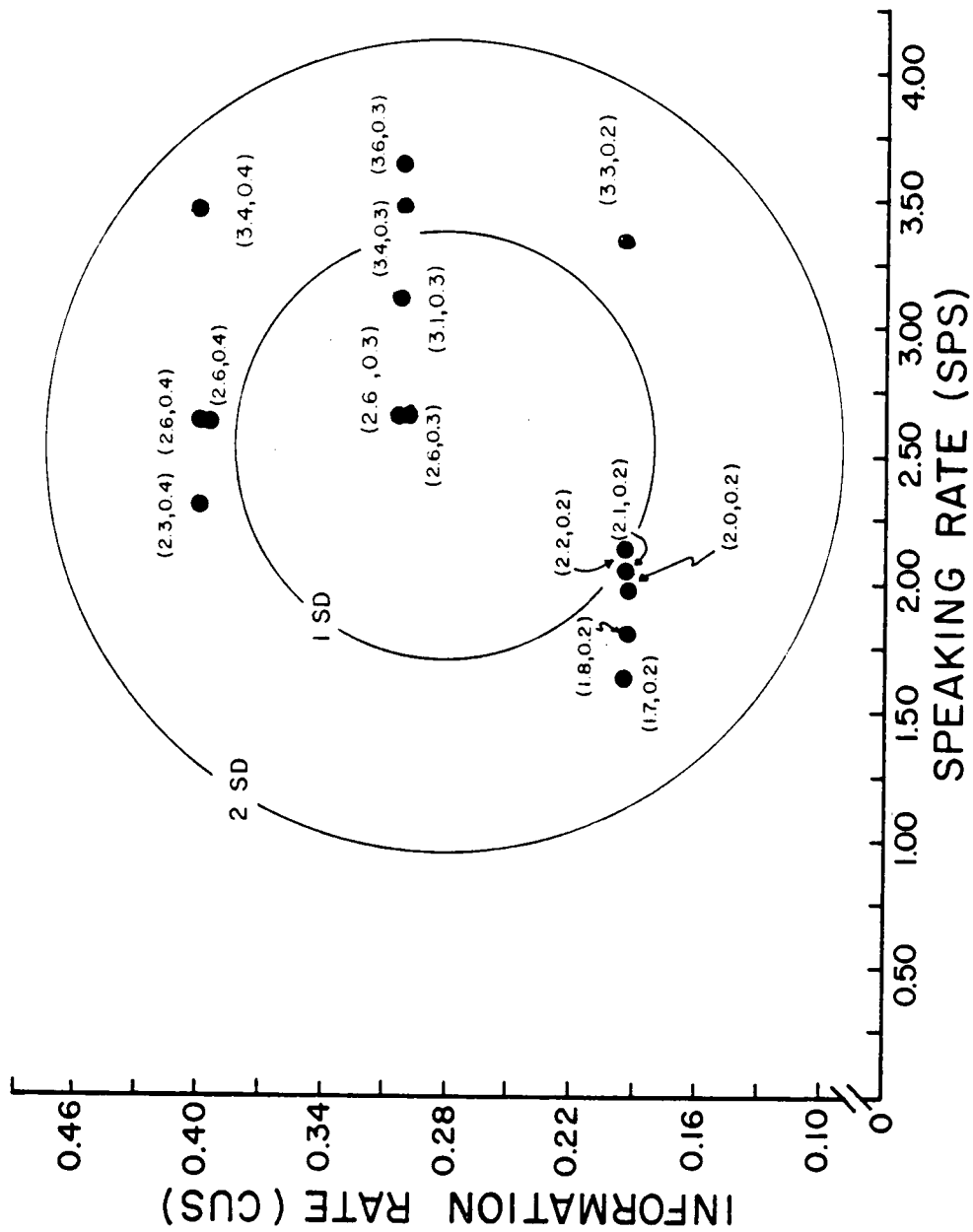


Figure 5. Speaking rates (in SPS) and information rates (in CUS) for the 15 non-institutionalized speakers during the picture description task.

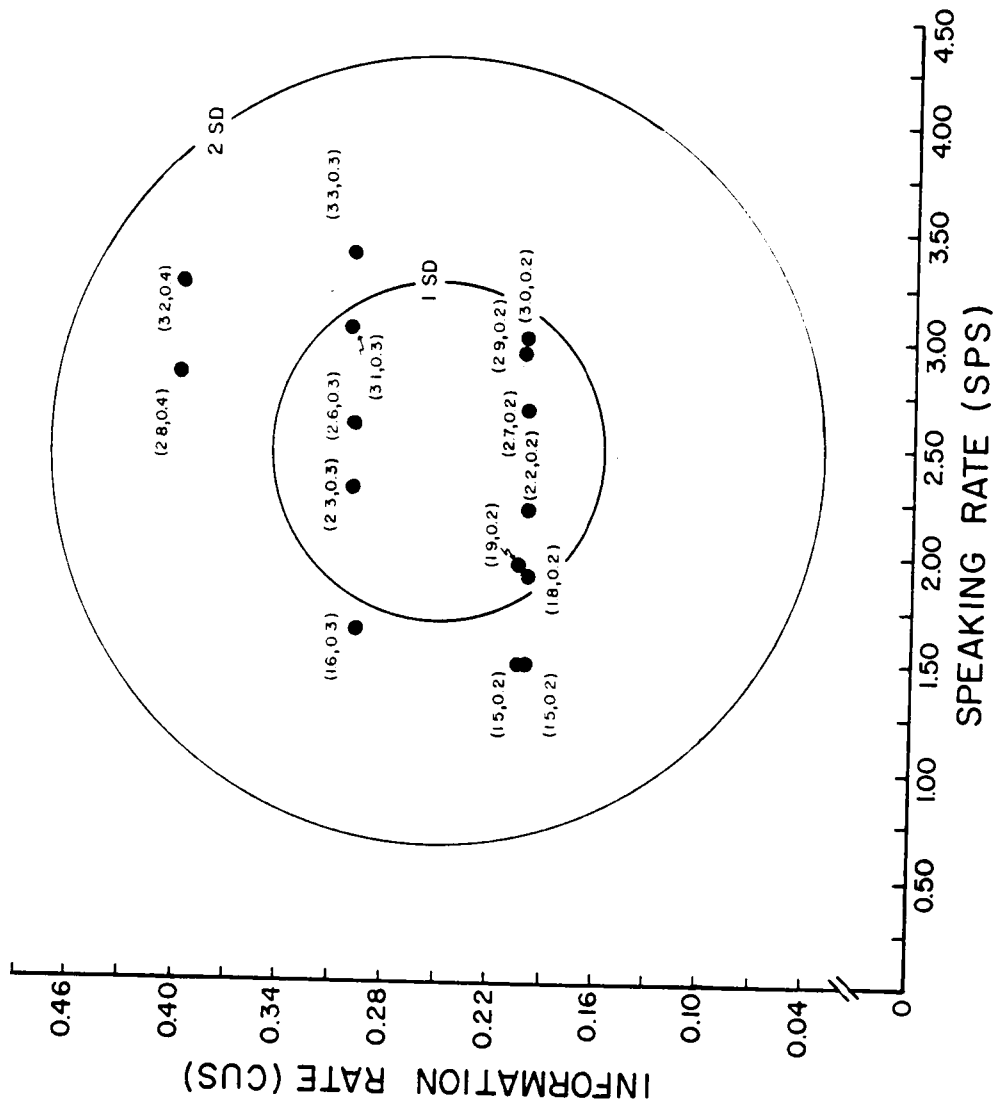


Figure 6. Speaking rates (in SPS) and information rates (in CUS) for the 15 institutionalized speakers during the picture description task.

Table 10. Group means, standard deviations, ranges, and medians for the number of content units for the two subject groups and experimental tasks.

Subject Group	Tasks	
	Reading	Picture Description
Non-Institutionalized		
Mean	54.80	14.70
S.D.	0.41	4.03
Range	54-55	9-23
Median	55	15
Institutionalized		
Mean	52.50	14.90
S.D.	4.88	4.22
Range	36-55	8-22
Median	55	15

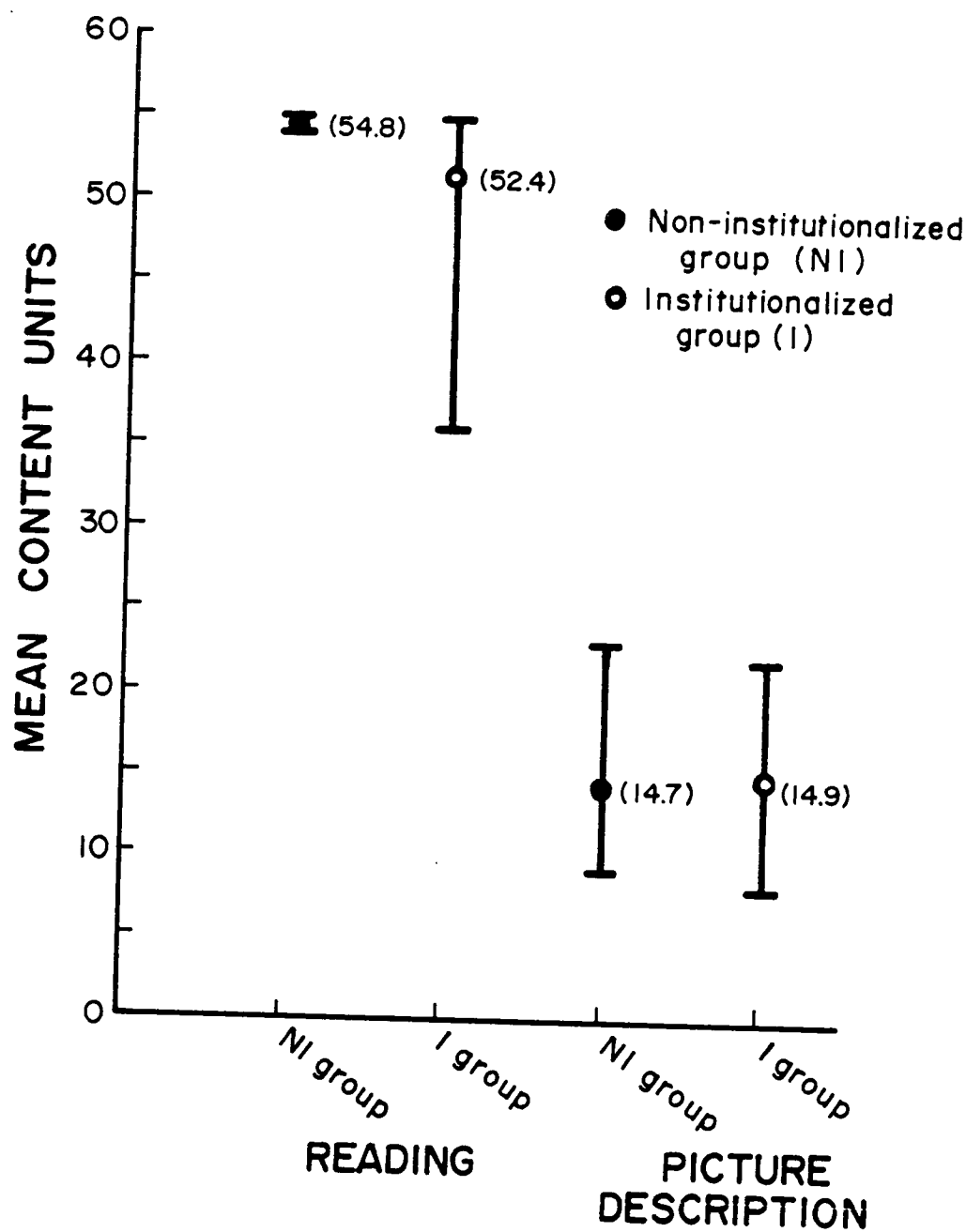


Figure 7. Mean and range of the number of content units during the reading and picture description tasks for the two subject groups.

During the reading task the mean number of CUs for the non-institutionalized group was 54.8 with a range from 54 to 55. The maximum number of CUs in the passage was 55 (see Appendix B). The median for this group was the same as the mean. The mean number of CUs for the institutionalized group during this task was 52.5 with a range from 36 to 55; however, the median was not identical to the mean. When the Wilcoxon test was corrected for ties in the data, a significant difference was revealed between the groups for the number of CUs in the reading task ($Z = -2.37$; $df = 14$; $p = 0.02$). As shown in Figure 7, the individual subject variation within the institutionalized group was considerable. Further discussion of this will be presented in the next chapter.

For the picture description task the mean for the non-institutionalized group was 14.7 CUs with a range from 9 to 23. The median was 15.0 or 0.3 CUs greater than the group mean. For the institutionalized group the mean number of CUs was 14.9 with a range from 8 to 22. The median for this group was the same as for the non-institutionalized group (15). Results of the Wilcoxon test (corrected for ties) yielded a non-significant difference between the groups for the number of CUs in the picture description task ($Z = 0.16$; $df = 14$; $p = 0.88$). This indicates that the number of CUs in the picture description task was not a significant variable for group differentiation.

For both groups the number of CUs averaged more for the reading task than for the picture description task. Table 5 (p. 39) reveals a significant correlation for the non-institutionalized group between the number of CUs and inter-sentence pause duration during the reading

task with the number of CUs for the institutionalized group (see Table 6, p. 40) significantly correlated with SR, IR, and intra-sentence pause duration. These tables show that for both groups the number of CUs during the reading task was not related to any of the other variables in this study.

During the picture description task the number of CUs for the non-institutionalized group was related to the IR and number of pauses (see Table 7, p. 41). Table 8 (p. 42) reveals significant correlations between the number of CUs and SR, total pause duration, inter-string pause duration, and number of pauses. These tables show that the number of CUs for both groups was not related to SR, IR, total pause duration, or pauses inserted between and within strings but was related to the number of pauses.

Total Pause Duration

The group means, standard deviations, ranges, and medians for the total pause duration in each experimental task are presented in Table 11. The means and ranges for each group are shown graphically in Figure 8.

For the reading task the mean total pause duration for the non-institutionalized group was 1085 msec with a range from 802.4 to 1373.6 msec. The median was 1079.97 or 5.03 msec lower than the group mean. For the institutionalized speakers the group mean was 1264 msec with a range from 702.53 to 1701.39 msec. The median was 1274.04 or 10.04 msec higher than the group mean. Results of the Wilcoxon test yielded a statistically significant difference between the two groups for the reading task ($Z = -1.87$; $df = 14$; $p = 0.06$).

Table 11. Group means, standard deviations, ranges, and medians for the total pause duration (in msec) for the two subject groups and experimental tasks.

Subject Group	Tasks	
	Reading	Picture Description
Non-Institutionalized		
Mean	1085.00	1641.00
S.D.	151.47	520.48
Range	802.40-1373.60	789.16-2554.48
Median	1079.97	1614.58
Institutionalized		
Mean	1264.00	2409.00
S.D.	251.00	1068.64
Range	702.53-1701.39	916.10-5402.74
Median	1274.04	2430.29

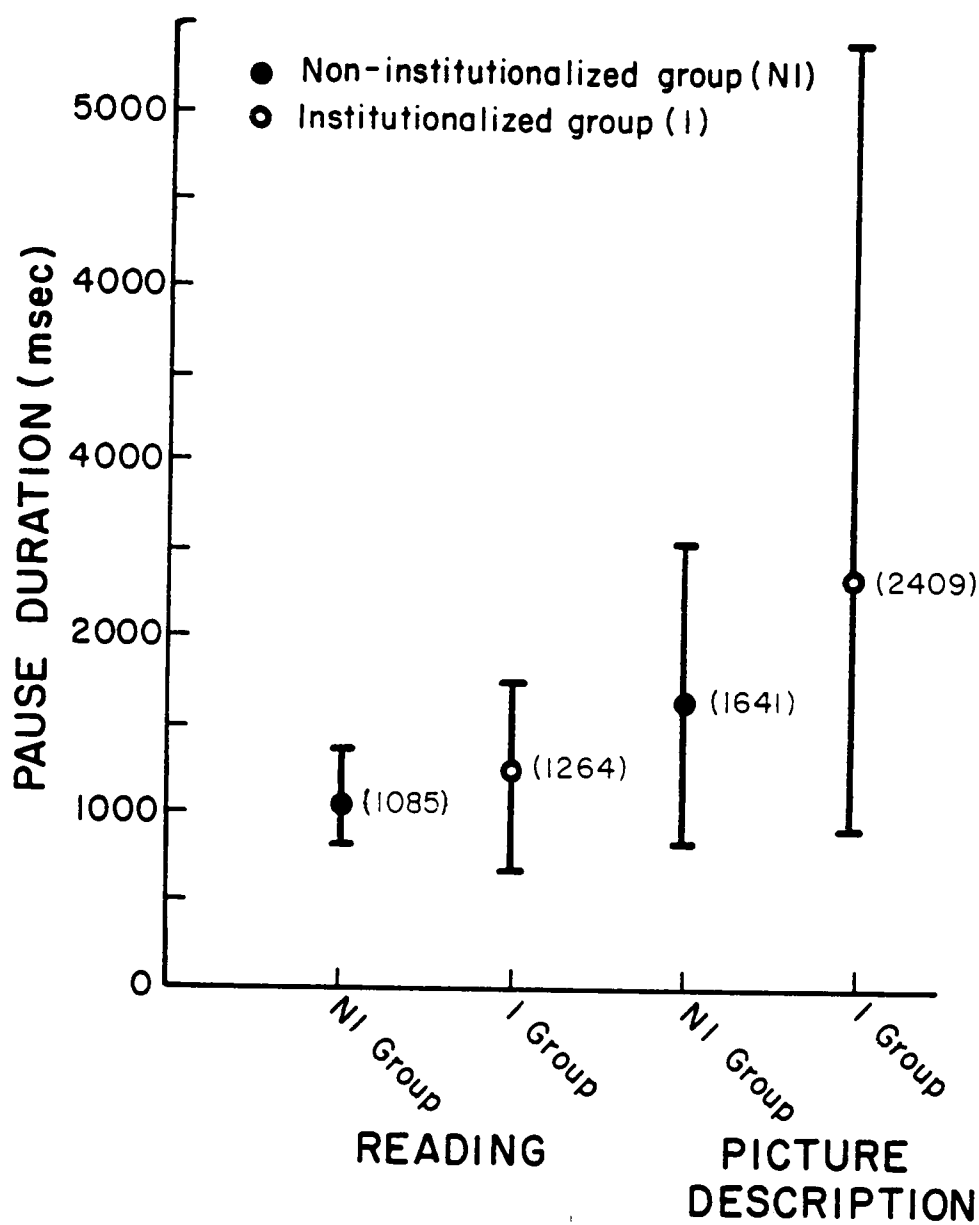


Figure 8. Mean and range of total pause durations for the two subject groups during the reading and picture description tasks.

The mean total pause duration for the non-institutionalized group during the picture description task was 1641 msec with a range from 789.16 to 2554.48 msec. The median was 1614.58 or 26.42 msec lower than the group mean. For the institutionalized group the mean total pause duration was 2409 msec with a range from 916.10 to 5402.74 msec. The median was 2430.29 or 21.29 msec higher than the group mean. Results of the Wilcoxon test yielded a statistically significant difference between the two groups for the picture description task ($Z = -2.27$; $df = 14$; $p = 0.02$). Examination of the S.D.s and range differences in Table 11 indicates that the institutionalized group was also more variable than the non-institutionalized group for both tasks. A discussion of individual subject variation will be presented in the next chapter.

For both groups the total pause duration during the picture description task averaged longer than during the reading task. The test for correlation revealed this as statistically non-significant ($\rho = 0.30$; $df = 13$; $p = 0.14$). For the institutionalized group the correlation between the total pause duration during the two tasks was also not statistically significant ($\rho = 0.30$; $df = 13$; $p = 0.14$). This indicates that for both subject groups the total pause duration during the reading task was not related to the total pause duration during the picture description task.

Table 5 (p. 39) indicates that the total pause duration for the non-institutionalized group in the reading task was significantly correlated with the SR, IR, inter- and intra-sentence pause durations. For the institutionalized group the correlations which were significant were with inter- and intra-sentence pause durations, and number of pauses (see Table 6, p. 40). These tables show that for both groups the total

pause duration was not related to either the SR, IR, number of CUs, or the number of pauses but was related to the pauses inserted between and within sentences during the reading task.

For the picture description task Table 7 (p. 41) indicates significant correlations between the total pause duration and SR, IR, inter- and intra-string pause durations for the non-institutionalized group. Table 8 (p. 42) shows the total pause duration for the institutionalized group during the picture description task significantly correlated with SR, IR, number of CUs, inter-string pause duration, and number of pauses. These tables show that for both groups total pause duration was not related to the number of CUs, intra-string pause duration, or number of pauses but was related to SR, IR, and inter-string pause duration. Generally, the total pause duration for both tasks and groups was related to SR, IR, and between-sentence/string pause durations.

Inter-sentence/string Pause Duration

The group means, standard deviations, ranges, and medians for the inter-sentence/string pause durations in the experimental tasks are presented in Table 12. The means and ranges for each group are presented in Figure 9.

For the reading task the mean for the non-institutionalized group was 768 msec with a range from 504.17 to 1002.08 msec. The median was 770.83 or 2.83 msec higher than the group mean. The mean for the institutionalized group was 811 msec with a range from 391.66 to 1061.90 msec. The median was 845.83 or 34.83 msec higher than the group mean. Results of the Wilcoxon test yielded a statistically non-significant difference between the group means ($Z = -0.85$; $df = 14$;

Table 12. Group means, standard deviations, ranges and medians for the inter-sentence/string pause duration (in msec) for the two subject groups and experimental tasks.

Subject Group	Tasks	
	Reading	Picture Description
Non-Institutionalized		
Mean	768.00	1050.00
S.D.	131.17	372.54
Range	504.17-1002.08	443.33-1658.33
Median	770.83	1043.33
Institutionalized		
Mean	811.00	1950.00
S.D.	197.32	1079.46
Range	391.66-1061.90	636.45-5030.95
Median	845.83	1853.92

$p = 0.39$). Examination of Table 12 reveals that the non-institutionalized group was less variable than the institutionalized group. The mean inter-sentence pause duration for this task for the non-institutionalized group was 70.87 percent of the total duration while 64.16 percent of the total pause duration was spent in between-sentence pauses for the institutionalized group.

Figure 10 shows the mean pause durations for the two subject groups for each of the eight between-sentence pauses. For the non-institutionalized group sentence 5 shows the longest pause (878.6 msec) while sentence 2 shows the longest pause (988.5 msec) for the institutionalized group. Both groups show a similar pattern for sentences 6, 7, 8, and 9, but dissimilar for the remaining four.

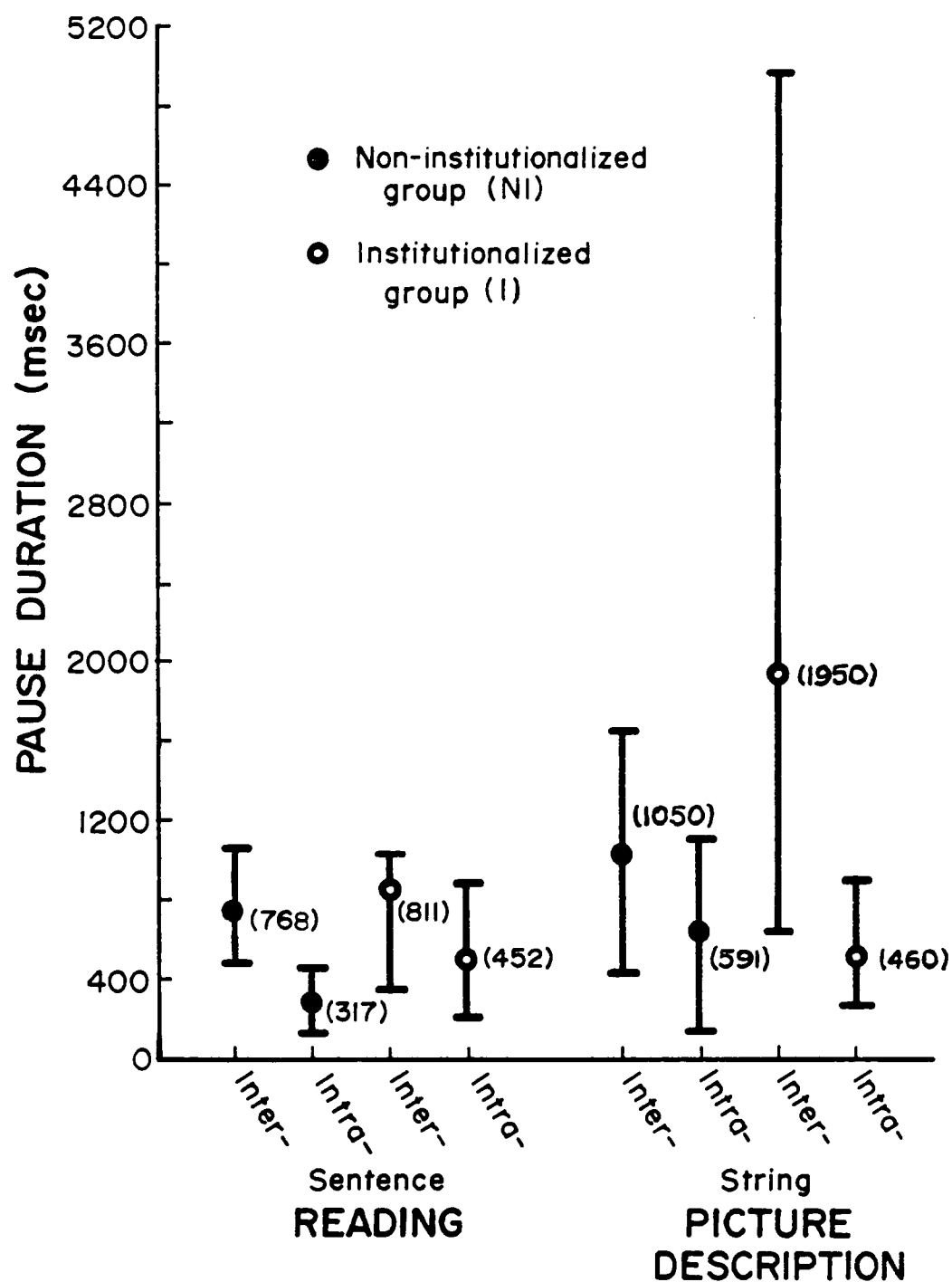


Figure 9. Mean and range of inter- and intra-sentence/string pause durations in the reading and picture description tasks for the two subject groups.

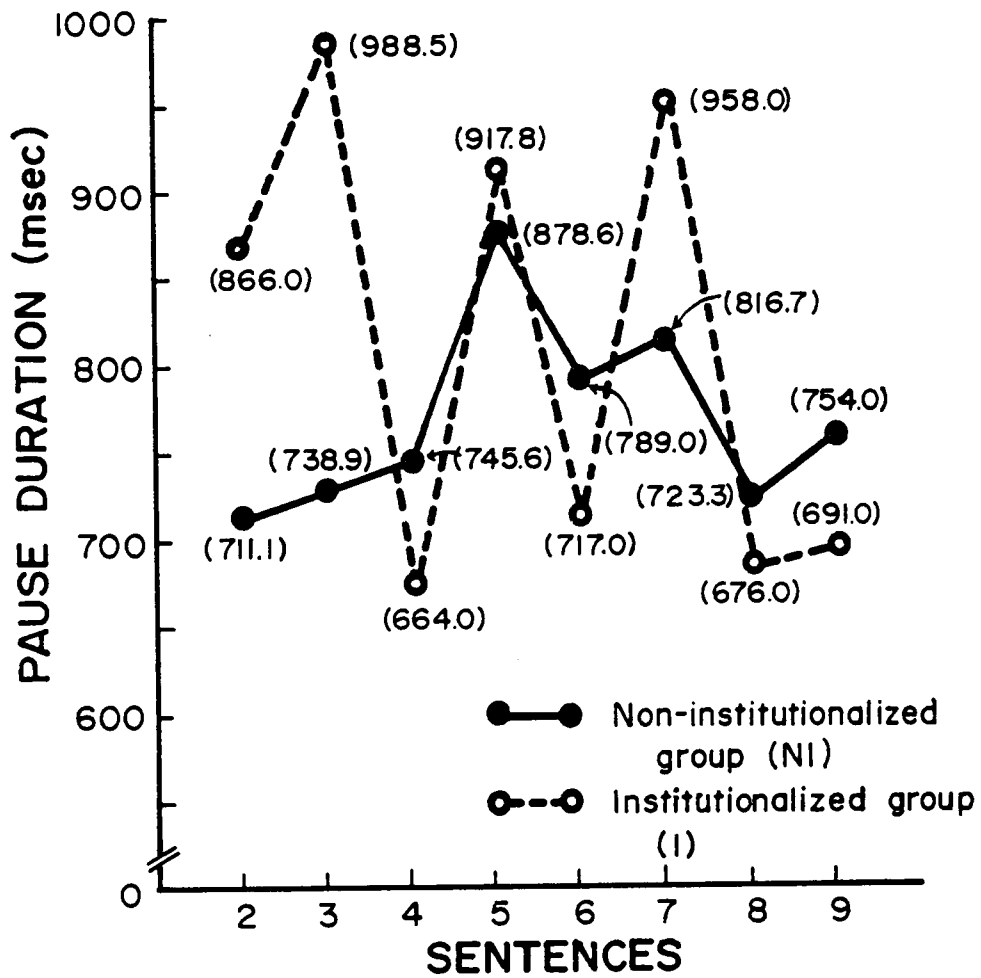


Figure 10. Mean inter-sentence pause durations for the two subject groups during the reading task.

All subjects reported that oral reading was less practiced than silent reading, e.g., "I haven't read aloud in years." Therefore, the first half (or sentences 2 through 5) of the passage may have been used by the subjects for adaptability to the task. Table F-4 (in Appendix F) indicates that the smallest difference in range for both groups was for sentence 9 (633.33 and 966.66 msec for the non-institutionalized and institutionalized groups, respectively), while the largest range was for sentence 5 for the non-institutionalized group (1666.66 msec) and sentence 7 for the institutionalized group (3650 msec).

For inter-string pauses in the picture description task the mean for the non-institutionalized group was 1050 msec, or 64 percent of the total pause duration, with a range of 443.33 to 1658.33 msec. The median was 1043.33 or 6.67 msec lower than the group mean. The mean for the institutionalized group was 1950 msec, or 81 percent of their total pause duration due to inter-string pauses, with a range from 636.45 to 5030.95 msec. The median was 1853.92 or 96.08 msec lower than the group mean. Results of the test for difference between group means for the inter-string pause duration yielded statistical significance ($Z = -2.61$; $df = 14$; $p = 0.009$). A discussion of individual subject differences will be presented in the next chapter.

For both groups the inter-string pause duration averaged longer than the inter-sentence. The test of correlation between the two tasks for the non-institutionalized group revealed statistical non-significance ($\rho = 0.04$; $df = 13$; $p = 0.34$). A non-significant correlation between the two tasks also was revealed for the institutionalized group ($\rho = 0.10$; $df = 13$; $p = 0.36$). This indicates

that the between-sentence/string pause times were not significantly related for the two tasks.

Table 5 (p. 39) reveals that the inter-sentence pause duration for the non-institutionalized subject group during the reading task was related to the number of CUs and total pause duration. In Table 6 (p. 40) the inter-sentence pause duration was significantly related only to the total pause duration. Therefore, for both groups during the reading task the total pause duration was highly dependent on the between-sentence pauses.

Table 7 (p. 41) indicates that the inter-string pause duration for the non-institutionalized group during the picture description task was related to SR, IR, total pause duration, and intra-string pause time. As seen in Table 8 (p. 42), the inter-string pause duration for the institutionalized group was significantly related to SR, IR, number of CUs, total pause duration, and number of pauses. These tables show that unless the number of pauses increases during the picture description task (as in the institutionalized group), total pause duration is a function of inter-string pause duration. The pause time between strings was not related to the number of CUs, intra-string pause duration or number of pauses but was related to SR and IR.

Intra-sentence/string Pause Duration

The group means, standard deviations, ranges, and medians for the intra-sentence/string pause duration in each experimental task are presented in Table 13. The means and ranges for each group are shown graphically in Figure 9.

Table 13. Group means, standard deviations, ranges, and medians for the intra-sentence/string pause duration (in msec) for the two subject groups and experimental tasks.

Subject Group	Tasks	
	Reading	Picture Description
Non-Institutionalized		
Mean	317.00	591.00
S.D.	60.39	262.53
Range	214.10-419.30	211.11-1161.33
Median	319.56	481.94
Institutionalized		
Mean	452.00	460.00
S.D.	145.05	173.41
Range	294.08-813.40	250.00-884.00
Median	396.15	429.44

For the reading task the group mean for the non-institutionalized speakers was 317 msec, with a range from 214.1 to 419.3 msec. The median was 319.56 or 2.56 msec higher than the group mean. The mean for the institutionalized group was 452 msec with a range of 294.08 to 813.4 msec. The median was 396.15 or 55.85 msec lower than the group mean. Results of the test for difference yielded a statistical significance between the two groups ($Z = -2.61$; $df = 14$; $p = 0.009$). For the non-institutionalized group, intra-sentence pauses were 29.21 percent of the total pause duration; whereas, 35.84 percent of the total pause duration was spent in within-sentence pauses for the institutionalized group. Individual subject variation will be presented in the next chapter.

The mean for the non-institutionalized group during the picture description task was 591 msec, or 36 percent of the total pause duration, with a range from 211.11 to 1161.33 msec. The median was 481.94 or 109.06 msec lower than the group mean. For the institutionalized group the mean was 460 msec, or 19 percent of the total pause duration, with a range from 250 to 884 msec. The median was 429.44 or 30.56 msec lower than the group mean. Results of the Wilcoxon test yielded a non-significant difference between the two groups for this variable ($Z = -1.59$; $df = 14$; $p = 0.11$). Therefore, the pauses within the strings in the picture description task did not differentiate the two groups.

For both subject groups the intra-string pause durations were longer than the intra-sentence pause durations. The test for correlation between the two tasks for the non-institutionalized group yielded a significant relationship ($\rho = 0.37$; $df = 13$; $p = 0.09$).

A significant relationship was also revealed between the two tasks for the institutionalized group ($\rho = 0.40$; $df = 13$; $p = 0.07$). Therefore, the pause times within-sentences/strings are related for the two tasks for both the non-institutionalized and institutionalized groups.

In Table 5 (p. 39) the intra-sentence pause duration for the non-institutionalized group was related to the SR, IR, and total pause duration. For the institutionalized group Table 6 (p. 40) reveals a significant relationship between intra-sentence pause duration and SR, IR, number of CUs, total pause duration, and number of pauses. These tables show that for both groups during the reading task the pauses inserted within sentences were not related to the number of CUs, inter-sentence pause durations, or the number of pauses, but were related to the SR, IR, and total pause duration.

Table 7 (p. 41) shows that the intra-string pause duration for the non-institutionalized group was significantly related to SR, IR, total pause duration, and inter-string pause duration. As seen in Table 8 (p. 42), the intra-string pause duration for the institutionalized group was related only to SR and IR. Therefore, Tables 7 and 8 reveal that for both groups intra-string pause duration during the picture description task was related to SR and IR, but not to number of CUs, total pause duration, inter-string pause duration, or number of pauses.

Total Pause Frequency

The group means, standard deviations, ranges, and medians for the total number of pauses in each experimental task are presented in Table 14. The means and ranges for each group are shown graphically in Figure 11.

Table 14. Group means, standard deviations, ranges, and medians for the frequency of pauses for the two subject groups and experimental tasks.

Subject Group	Tasks	
	Reading	Picture Description
Non-Institutionalized		
Mean	31.00	23.00
S.D.	13.11	13.36
Range	15-56	8-62
Median	31	18
Institutionalized		
Mean	30.00	33.00
S.D.	12.74	15.73
Range	9-48	12-74
Median	27	33

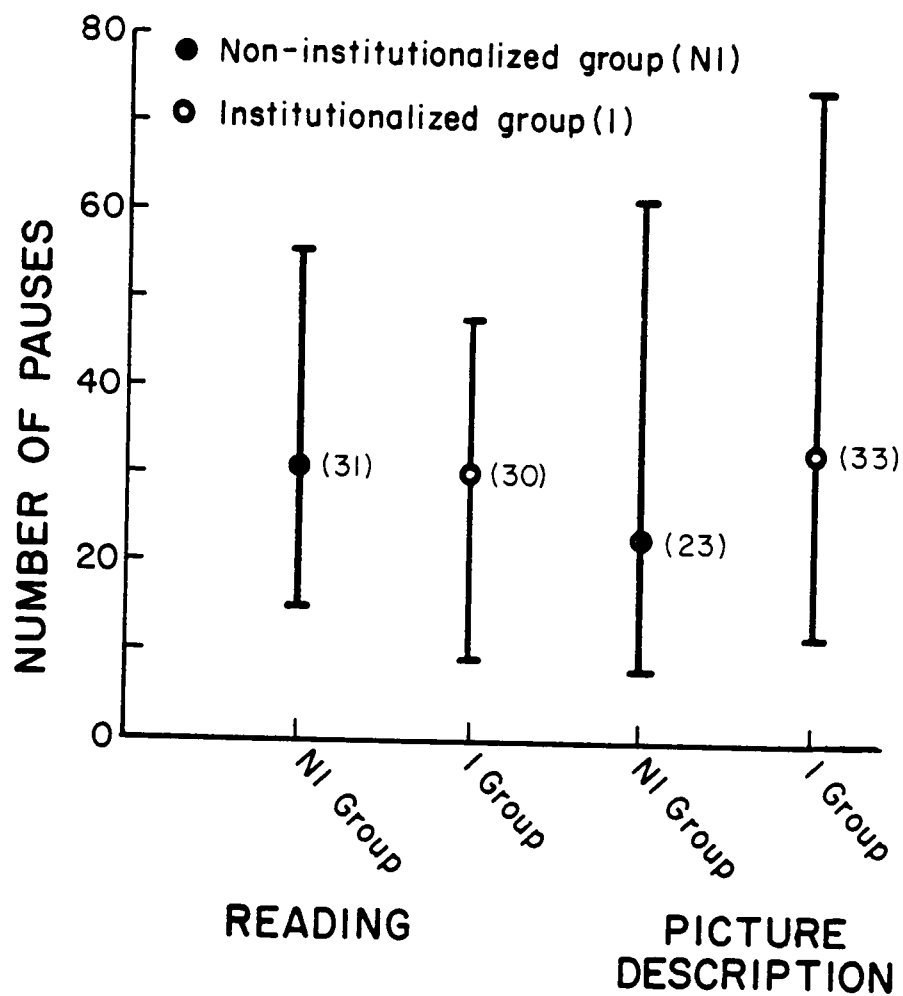


Figure 11. Mean and range of the number of pauses for the two subject groups during the reading and picture description tasks.

The group mean for the non-institutionalized speakers during the reading task was 31 pauses with a range from 15 to 56 pauses. The median was the same as the group mean. For the institutionalized group the mean number of pauses was 30 with a range between 9 and 48 pauses. The median was 27 or 3 pauses less than the group mean. Results of the test for difference yielded statistical non-significance ($Z = 0.20$; $df = 14$; $p = 0.84$). So the number of pauses in the reading task did not differ between the groups. Individual subject variation will be discussed in Chapter IV.

For the picture description task the group mean for the non-institutionalized speakers was 23 pauses, ranging from 8 to 62. The median was 18 or 5 pauses less than the group mean. The group mean for the institutionalized speakers was 33 pauses with a range from 12 to 74 pauses. The median was the same as the group mean. Results of the Wilcoxon test (corrected for ties) yielded a significant difference between the two groups ($Z = -1.76$; $df = 14$; $p = 0.08$). A discussion of individual subject variation will be presented in the next chapter.

During the reading task the non-institutionalized group averaged more pauses than during the picture description task. The test for correlation revealed statistical non-significance ($\rho = 0.31$; $df = 13$; $p = 0.13$). However, the institutionalized group averaged more pauses during the picture description task. The test for correlation yielded statistical non-significance also ($\rho = 0.29$; $df = 13$; $p = 0.15$). Therefore, the total number of pauses for the two tasks were not related for either subject group.

Table 5 (p. 39) shows that for the non-institutionalized group the total number of pauses for the reading task was related only to the IR. Table 6 (p. 40) shows that for the institutionalized group the number of pauses was significantly related to the SR, IR, total pause duration, and intra-sentence pause duration. Therefore, these tables indicate that for both groups IR was the only variable that was significantly related to the number of pauses.

Table 7 (p. 41) reveals that the number of pauses for the non-institutionalized group during the picture description task was related only to the number of CUs. As seen in Table 8 (p. 42), the total pause frequency for the institutionalized group was significantly related to SR, IR, number of CUs, total pause duration, and inter-string pause duration. These tables show that the number of CUs is a function of the total number of pauses. For both groups the number of pauses in the picture description task was not related to SR, IR, total pause duration, or inter- and intra-string pause durations.

C. SUMMARY OF RESULTS

The major results of this study are as follows:

1. The speaking rates during a reading task for the institutionalized speakers were significantly slower than for the non-institutionalized speakers;
2. The speaking rates during a picture description task for the two subject groups were not significantly different;
3. The information rates during both experimental tasks were significantly slower for the institutionalized speakers than for the non-institutionalized speakers;

4. The total pause durations during both a reading and picture description task were significantly longer for the institutionalized speakers than for the non-institutionalized speakers;

5. The inter-sentence pause durations during a reading task were not significantly different for the two groups;

6. The inter-string pause durations for the institutionalized speakers during a picture description task were significantly longer than for the non-institutionalized speakers;

7. The intra-sentence pause durations during a reading task were significantly longer for the institutionalized speakers than for the non-institutionalized speakers;

8. The intra-string pause durations during a picture description task were not significantly different for the two groups;

9. The total pause frequencies during a reading task for the two groups were not significantly different; and

10. The total pause frequencies during a picture description task for the institutionalized speakers were more frequent than for the non-institutionalized speakers.

In summary, the group of institutionalized speakers revealed slower speaking and information rates as well as longer total pause durations and longer within-sentence pause durations during the reading task. For the picture description task, this group revealed slower information rates with longer total pause durations, longer between-string pause durations, and more pauses.

In addition to the group differences, the following relationships were revealed among the variables:

1. The SR for the non-institutionalized group during both a reading and a picture description task was significantly related to the IR, total pause duration, and intra-sentence/string pause duration; whereas, for the institutionalized group the significant correlations for SR during both tasks were with IR, number of CUs, intra-sentence/string pause duration, and number of pauses;

2. The IR for the non-institutionalized group during a reading task was significantly related with the number of pauses; however, during a picture description task, the IR was correlated with the number of CUs;

3. The number of CUs for the non-institutionalized group during a reading task revealed a significant relationship with the inter-sentence pause duration but during a picture description task the number of CUs and number of pauses were related; and

4. During a reading task the total pause durations for both the non-institutionalized and institutionalized groups were related to the inter- and intra-sentence pause durations. The total pause duration for the institutionalized group was also related to the number of pauses in a reading task.

CHAPTER IV

DISCUSSION

Appendix F (pp. 106-132) reveals that the two subject groups showed similar relationships for a number of variables. During the reading task the majority of subjects showed a faster SR than in the picture description task, which is in agreement with Lass and Noll (1970). Since SR and IR are positively related, the subjects exhibited a faster IR in the reading task. One of the two components of IR is the number of CUs. In the passage for the oral reading task there was a constant number of CUs provided, i.e., 55. However, during the picture description task the number of CUs available to the subjects was not fixed. A total of 58 CUs were provided by the 30 subjects in this study but the non-institutionalized and institutionalized groups used an average of 14.7 and 14.9 CUs, respectively. So even though the total number of CUs available to the subjects for the two tasks were approximately the same, the number of CUs spoken was significantly different for the two tasks.

Another variable which was similar for both groups was that of the total pause duration in the picture description task which was longer for the majority of subjects in both groups. This is in accordance with Tannenbaum, et al., (1965) who reported that "periods of silence are proportionate to the difficulty of the task" (p. 137). According to Goldman-Eisler (1961b), a spontaneous speech task requires a "higher level of cognitive activity" (p. 25) than an oral reading task.

According to Henze (1953) and Goldman-Eisler (1956), the degree of relationship between pause time and speaking time varies from subject to subject. Henderson, et al., (1966) reported that unfilled pauses account for 10 to 15 percent of the total time during reading. As shown in Figures G-1 and G-3 (in Appendix G), the pause time for the two subject groups during the reading task only varied from 1.3 to 1.5 percent. However, during the picture description task the pause time for the two groups varied from 2 to 8 percent (see Figures G-2 and G-4, Appendix G).

Therefore, the two subject groups in this study were not significantly different for the inter-sentence pause duration and number of pauses during the reading task nor for the SR and intra-string pause duration during the picture description task. However, for the remaining variables of interest in both tasks, the two groups revealed significant differences. Both the group and individual subject differences will be discussed below for each variable.

A. SUBJECT/GROUP VARIATION

The non-institutionalized and institutionalized groups differed significantly for the following variables in the reading task: SR, IR, total pause duration, and intra-sentence pause duration. The slower SR may be attributed to the longer total pause duration and since the total pause time includes both inter- and intra- pauses, the intra-sentence pause time contributed to the slower SR. That is, the longer the intra-sentence pause duration, the slower the SR. This is in agreement with Shipp and Hollien (1971) who noted that an increased pause

time in reading for the aged (over 65 years) was the result of intra-sentence pauses. The authors postulated this might have been necessary "because of fatigue, a need for oxygen replacement, or because of visual acuity problems in the reading process" (p. 4). The group difference in SR in this study may be attributed to several institutionalized subjects reading inaccurately. This inaccurate reading might have been due to visual processing difficulties, i.e., the subject may have been able to focus on the letters or words in the reading passage but may have had difficulty in the analysis-synthesis process or in the association of visual input to motor output. These subjects may have experienced difficulties in recognizing, recalling, or synthesizing the letters and/or words.

Umeda and Quinn (1980) reported that oral reading is an uncommon experience in adulthood; therefore, these possible visual processing delays may be due to the subjects' unfamiliarity with the task. Due to this unfamiliarity, the subjects may have slowed their rates. Associated with this was the report by all institutionalized subjects that they have limited opportunities for reading, either silent or oral. These subjects reported an average of 30 minutes daily used for silent reading, usually consisting of either the Bible or the newspaper. The non-institutionalized subjects reported more frequent opportunities for both silent and oral reading. Approximately one to two hours daily was reported by the non-institutionalized subjects as being spent in silent reading; whereas, oral reading was usually during church and/or social club activities, visits with grandchildren/great-grandchildren, or during volunteer work. The availability of "suitable" reading material, the motivation to obtain such material, and/or the subjects' past dislike

for reading are factors for consideration in the slow SR of institutionalized individuals.

Glaser and Strauss (1968) reported that reading for comprehension slows the reading rate. The institutionalized subjects may have read the experimental passage for comprehension even though the instructions did not include questions about the passage. Several subjects reported that "When I read out loud, I understand it better." So the institutionalized subjects may have read the passage for the purpose of comprehension; whereas, the non-institutionalized individuals did not have this purpose.

Minor variations in structure and function might be related to speed and/or accuracy of adjustments for connected speech. Ryan (1980) speculated that a reduced SR in reading may act as a coping mechanism to accommodate increased ranges of articulator movements thereby maintaining a habitual level of feedback. Zemlin (1968) reported a reduction in salivary and other mucous secretions in the aged so this might decrease the lingual function and smooth coarticulatory adjustments. With regard to this, Ryan and Burke (1974) postulated that older subjects appeared at the mild end of the dysarthria continuum based on the dimensions of slow rate of articulation, imprecise consonants, air loss, laryngeal tension, and voice tremor. Therefore, these structural and/or physiologic changes in the aged may contribute to the reduction in SR during the reading task.

Another factor for consideration for the reduction in SR for the institutionalized speakers is that this was the first time any of the subjects had been tape recorded. Therefore, all reported that they had to "talk good," which may be interpreted as meaning more precise

articulation. This precision in articulation as well as their apprehensiveness about their performance on the task may have influenced the rate at which they read the passage.

In addition to the above possible reasons, the demographic information for the institutionalized subjects (see Table A-4, Appendix A) revealed an average of 4.06 medications taken daily. This supports Glaser and Strauss (1968) who reported the typical institutionalized individual as taking four medications daily. Non-institutionalized subjects reported an average of 1.27 medications taken daily (see Table A-2, Appendix A). This may be related to the general reduction in neuromuscular activity in aging which has been posited as causing slower SRs and longer pause times in reading in aged male speakers (Mysak, 1958; Mysak and Hanley, 1959; Ryan, 1972). Therefore, these same neuromuscular changes may affect the SRs in aged female speakers. Mysak (1959) also mentioned in connection with the reduced rates possible changes in auditory, visual, and kinesthetic feedback of the speech servo-system.

The longer intra-sentence pause duration during the reading task for the institutionalized subjects may have been due to word retrieval difficulties which relate to visual processing problems as mentioned earlier. Goldman-Eisler (1961a) indicated that the pauses within utterances were utilized for lexical selection. This appears to be supported in this study since the institutionalized subjects experienced inaccurate reading as exhibited by word and/or phrase substitutions.

The institutionalized subjects exhibited a slower IR in the reading task than the non-institutionalized subjects. This may be

attributed to the reading inaccuracy of several subjects as revealed by word (CU) or line substitutions, omissions, and/or additions. Because of the word (CU) omissions, these subjects provided fewer CUs than the non-institutionalized subjects thereby reducing the IR.

Therefore, during the reading task the slower SR and IR for the institutionalized subjects may be attributed to: 1) longer intra-sentence pause duration due to word retrieval/visual processing difficulties, i.e., word omission, substitution, etc.; 2) reduced opportunity for oral reading in extended care facilities; 3) changes in articulatory structures and functions; 4) negative psychological factors due to being tape recorded as evidenced by precise articulation; and/or 5) reading for the purpose of comprehension.

During the picture description task the non-institutionalized and institutionalized groups differed significantly for the following variables: IR, total pause duration, inter-string pause duration, and pause frequency. The slower IR for the institutionalized subjects may be attributed to the longer inter-string pause durations which contribute significantly to the total pause duration. These subjects produced more strings than the non-institutionalized subjects and, therefore, used more inter-string pauses which related significantly to the pause frequency. The between-string pauses were longer in duration thereby increasing the total elapsed time for completion of the task. Even though the subjects in the extended care facilities talked longer, they provided only slightly more CUs (0.2) than the subjects in the community. The additional information consisted primarily of personal experiences as related to the picture. This supports Bollinger (1974) who reported that aged subjects exhibit strong past associations which

affect the lexical selection in oral communication. It is therefore postulated that due to the association with an event in the picture provided for the task, the institutionalized subjects reported this association to the investigator and increased the total elapsed time for the task. During this the subjects repeated CUs which, of course, reduced the IR.

The increase in total elapsed time for the picture description task by the institutionalized subjects also may be due to the psychosocial factors of added attention, change in the daily routine, and apprehensiveness regarding their performances. Lubinski (1979) stated that the individuals in an institution perceive spoken communication as limited in quantity. Furthermore, institutionalized individuals perceive the communication occurring in this environment as "meaningless," "disparaging," and "of no value." She further states that communication in this environment is limited by logistical managements within the institution, the number and variety of partners available, and the modes of communication available to the individuals. The institutionalized subjects in this study reported that most of their daily communication was with the nursing staff and/or other patients in the facility. These subjects reported that the content during spoken communication consisted primarily of comments regarding their health or related to the facility.

The institutionalized speakers reported participation in fewer social activities per week (2.13); whereas, the non-institutionalized speakers reported an average of 3.53 social activities per week. This decline in social activities may be due to the aged person disengaging herself from social situations (Cumming and Henry, 1961) or it may be

due to a decline in motivation for activity, either physical or mental (Birren, 1969). Eisdorfer (in Kalish, 1977) noted that "automatic social contacts" decrease with the aged and these individuals may have to "seek out" others to interact with; whereas, these were more readily available in earlier years. The reduction in "acceptable" social contacts along with the general decline in health and energy restricts the institutionalized individuals more than the non-institutionalized speakers. Hutchinson (1980) indicated that individuals in extended care facilities tend to withdraw from communicative interaction which supports Birren's (1969) theory of disengagement. Therefore, institutionalized speakers are restricted not only in the number of social contacts which encourage spoken communication but also in the topics of discussion.

The longer inter-string pause durations and more frequent pauses may be attributed to the greater number of medications being taken which may increase lipid accumulation and thereby influence the alerting systems at the brainstem. This neural delay may contribute to the delayed auditory and kinesthetic feedback system loops; thereby increasing the time between utterances or strings. It is suggested that individuals who are in contact with the aged institutionalized speaker allow time for this feedback loop (Mysak, 1959) to be completed.

B. IMPLICATIONS FOR FUTURE RESEARCH

From the results of this study it was determined that future research is needed to more thoroughly investigate the communicative efficiency of speech in the aged speaker. Specifically, the following areas warrant study:

1. Provision of experience(s) with tape recording for aged speakers prior to experimental tasks in order to alleviate possible apprehension about recording procedures;

2. Investigation of communicative efficiency measures during two conditions of connected speech, namely, during the topic of choice by the speaker and by the investigator; and

3. Inclusion of young adult (20-25 years) and middle adult (45-50 years) sample groups during the experimental tasks in this investigation, followed by comparisons among groups.

CHAPTER V

SUMMARY AND CONCLUSIONS

The purpose of this study was to investigate the differences among communicative efficiency measures in aged female speakers who live in either an institution, i.e., an extended care facility, or the community, i.e., non-institutionalized. The specific characteristics assessed were: speaking rate, information rate, total pause duration, inter-sentence/string pause duration, intra-sentence/string pause duration, and pause frequency. These characteristics were obtained in two conditions: 1) oral reading and 2) picture description.

The 15 subjects in each group were matched in chronological age (within six months) and highest educational attainment. All subjects met the following criteria: normal hearing; native English speaker; completion of the eighth grade; negative medical or psychiatric diagnosis of respiratory disease, senile dementia, organic brain syndrome; mobile within her environment; six consecutive months at present residence; regular (or weekly) participation in social activities; and negative evidence of motor speech disorder, receptive impairment, and confusion.

Tape recordings were made in the subject's living environment with each subject performing the two tasks. These responses were then transcribed verbatim, timed, and analyzed. The level recorder was used for all pause duration measurements. Only those strings which followed approximately the first 10 seconds of the picture description were analyzed using the level recorder.

The major findings of the investigation were as follows:

1. The speaking rates during a reading task for the institutionalized speakers were significantly slower than for the non-institutionalized speakers; however, individuals within each group varied considerably;
2. The speaking rates for the two subject groups were not significantly different during a picture description task; however, subjects within these groups differed;
3. The information rates during both experimental tasks were significantly slower for the institutionalized speakers than for the non-institutionalized speakers;
4. The total pause durations during both a reading and a picture description task were significantly longer for the institutionalized group than for the non-institutionalized group;
5. The inter-sentence pause durations during a reading task were not significantly different for the two groups; however, individual subjects within each group varied considerably;
6. The inter-string pause durations for the institutionalized speakers during a picture description task were significantly longer than for the non-institutionalized speakers but individual subject variation was considerable;
7. The intra-sentence pause durations during a reading task were significantly longer for the institutionalized speakers than for the non-institutionalized speakers with individuals varying considerably;

8. The intra-string pause durations during a picture description task were not significantly different for the two groups but variation for the subjects within the two groups was noted;

9. The total pause frequencies for the two groups during a reading task were not significantly different; however, individuals varied within each group; and

10. The total pause frequencies during a picture description task for the institutionalized speakers were more frequent than for the non-institutionalized speakers but individual subject variation within each group was noted.

In summary, even though group differences were noted for several of the variables in this investigation, the heterogeneity of the non-institutionalized aged group and homogeneity of the institutionalized group should be emphasized. Further research needs include providing experience(s) with tape recording for aged speakers prior to experimental tasks, investigating communicative efficiency measures during two conditions of connected speech and including young and middle adult sample groups during the same experimental tasks as in this investigation, followed by comparisons among the groups.

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APPENDICES

APPENDIX A

DESCRIPTION OF SUBJECTS

Table A-1. Chronological age, highest educational attainment, marital status, individual(s) who live(s) with subject, length of time at present residence and frequency of social activities for the non-institutionalized subjects.

Subject Number	Age (yr.-mo.)	Highest Educational Attainment	Marital Status	Lives With	Time at Present Residence (years)	Frequency of Social Activities (times per week)
1	74-1	M.S.	Single	Self	1	8
2	73-0	M.A.	Single	Self	2	4
3	74-9	B.A.	Married	Husband	40	3
4	68-9	12th Grade	Divorced (24 years)	Self	7	2
5	75-3	12th Grade	Single	Self	5	4
6	75-1	8th Grade	Married	Husband	41	2
7	67-1	B.S.	Married	Husband	13	4
8	65-11	12th Grade	Widow (1 year)	Self	30	2
9	71-6	2 Years College	Married	Husband	20	3
10	70-0	B.A.	Married	Husband	39	3
11	69-7	8th Grade	Widow (6 years)	Self	4	3
12	72-1	8th Grade	Married	Husband	20	4
13	75-10	11th Grade	Married	Husband	59	5
14	74-1	12th Grade	Married	Husband	41	3
15	65-0	1 Year College	Married	Husband and Mother	9	4

Table A-2. Former occupation(s), number of years of employment, number of years of non-employment, present daily physician-prescribed medication(s) and dosages, and type of medication for the non-institutionalized subjects.

Subject Number	Former Occupation(s)	Years of Employment	Years of Non-Employment	Present Daily Medication(s) and Dosages	Type of Medication
1	College Professor	27	8	None	None
2	High School Teacher	31	10	None	None
3	Middle School Teacher	56	4	None	None
4	None	--	--	Benadryl 25 mg (2X) Hydropres 50 mg (1X)	Antihistamine Diuretic; Anti-hypertensive
5	Cook	27	2	Hydrodiuril 100 mg (1X) Indocin 25 mg (4X)	Diuretic; Anti-hypertensive Anti-inflammatory (for arthritis)
6	Grocery Store Owner	30	15	Aldomet 500 mg (3X) Elavil 25 mg (2X) Esidrix 50 mg (2X) Isordil 10 mg (4X)	Anti-hypertensive Anti-depressant Anti-hypertensive Anti-anginal
7	High School Teacher; Bookkeeper	6	35	Atromide 25 mg (4X) Nabrosyn 250 mg (2X) Serax 25 mg (4X)	Anti-lipid Anti-inflammatory (for arthritis) --

Table A-2 (continued)

Subject Number	Former Occupation(s)	Years of Employment	Years of Non-Employment	Present Daily Medication(s) and Dosages	Type of Medication
8	Department Store Clerk	4	39	None	None
9	Secretary	20	10	Hydroprex 25 mg (1X)	Diuretic; Anti-hypertensive
10	Elementary School Teacher	17	8	Regroton 50 mg (1X)	Anti-hypertensive
11	Restaurant Owner; Post Office Clerk; Department Store Clerk	30	Still Working Part-Time	Thyroid 2 g (1X)	Anti-hypothroid
12	None	--	--	None	None
13	Bookkeeper	29	15	Aldoryl 25 mg (2X) Tagamet 300 mg (2X)	Anti-hypertensive Antihistamine
14	None	--	--	Valium 5 mg (1X)	Anti-convulsant
15	Mortgage Banker	25	9	Hygroton 50 mg (1X) Premarin 20 mg (1X)	Diuretic; Anti-hypertensive Hormone (Estrogen)

Table A-3. Chronological age, highest educational attainment, marital status, length of time in institution, primary means of mobility, reason for institutional placement, and frequency of social activities for the institutionalized subjects.

Subject Number	Age (yr-mo)	Highest Educational Attainment	Marital Status	Time in Institution (years)	Primary Means of Mobility	Reason for Placement	Frequency of Social Activities (times per week)
1	72-6	8th Grade	Widow (20 years)	6	In Wheelchair	Physical Condition	2
2	71-10	2 Years College	Single	2	In Wheelchair	Physical Condition	3
3	69-10	8th Grade	Widow (6 years)	3	In Wheelchair	Physical Condition	2
4	75-2	8th Grade	Widow (22 years)	1	With Walker	Physical Condition	1
5	70-6	B.A.	Widow (12 years)	1	Ambulatory	Economic	1
6	74-7	B.S.	Single	1	Ambulatory	Economic	1
7	69-2	12th Grade	Widow (12 years)	3	In Wheelchair	Physical Condition	3
8	66-4	12th Grade	Widow (7 years)	4	Ambulatory	Economic	2
9	73-6	M.A.	Widow (15 years)	2	Ambulatory	Economic	3

Table A-3 (continued)

Subject Number	Age (yr-mo)	Highest Educational Attainment	Marital Status	Time in Institution (in years)	Primary Means of Mobility	Reason for Placement	Frequency of Social Activities (times per week)
10	74-7	12th Grade	Divorced (25 years)	1	Ambulatory	Physical Condition	2
11	67-1	B.S.	Single	1	Ambulatory	Economic	4
12	65-5	1-1/2 years of College	Single	1	In Wheelchair	Physical Condition	3
13	75-1	12th Grade	Widow (14 years)	1/2	In Wheelchair	Physical Condition	1
14	75-7	11th Grade	Widow (18 years)	1	In Wheelchair	Physical Condition	2
15	73-8	M.S.	Divorced (21 years)	1/2	Ambulatory	Physical Condition	2

Table A-4. Former occupation(s), number of years of employment, number of years of non-employment, present daily physician-prescribed medications and dosages, and type of medication for the institutionalized subjects.

Subject Number	Former Occupation(s)	Years of Employment	Years of Non-Employment	Present Daily Medication(s) and Dosages	Type of Medication
1	Secretary	26	15	Compazine 5 mg (every four hours) Entozyme ? mg (1X) Valium 5 mg (2X)	Anti-depressant Nutritional Anti-convulsant
2	High School Teacher	23	10	Agoral ? mg (1X) Lasix 40 mg (4X) Librium 10 mg (2X) Macrodantin 100 mg (1X)	Laxative Diuretic; Anti-hypertensive Anti-convulsant Unit Dose Systems
3	Legal Secretary	15	17	Compazine 5 mg (every eight hours) Inderol 20 mg (2X) Macrodantin 100 mg (1X)	Anti-depressant Anti-anginal Unit Dose Systems
4	Housemother	30	9	Dyozide ? mg (1X) Micheol 2 mg (1X) Surfax ? mg (1X) Valium 2 mg (1X)	Diuretic -- Laxative Anti-convulsant
5	--	--	--	Materna 20 mg (1X) Synthroid 2 mg (4X) Trilisate 500 mg (1X)	Hormonal Anti-hypothroid Anti-inflammatory (for arthritis)

Table A-4 (continued)

Subject Number	Former Occupation(s)	Years of Employment	Years of Non-Employment	Present Daily Medication(s) and Dosages	Type of Medication
6	Department Store Manager	16	10	Aldactone 25 mg (4X) B12 1000 mg (1X) K 250 mg (1X) Lasi 40 mg (4X) Materna 25 mg (1X)	Diuretic; Anti-hypertensive Nutritional Nutritional Diuretic Hormonal
7	--	--	--	Materna 35 mg (2X) NPH 25 mg (1X)	Hormonal --
8	Post Office Clerk	36	13	Aotane 5 mg (1X) Dilantin 100 mg (1X) Materna 20 mg (1X) Valium 2 mg (2X)	-- Anti-convulsant Hormonal Anti-convulsant
9	Real Estate Broker	20	8	Diabenese 50 mg (1X) Halotestin 5 mg (4X) Hydrodiuril 100 mg (4X) Serapes 5 mg (4X) Thyroid ? mg (4X)	Anti-diabetic Hormonal Diuretic; Anti-hypertensive -- Anti-hypothyroid
10	Factory Supervisor	32	9	Aldactone ? mg (2X) Effersyllium 20 mg (4X) Elavil 25 mg (2X) Isordil 5 mg (4X) Lanotin 125 mg (1X) Lasix 20 mg (1X)	Diuretic; Anti-hypertensive Laxative Anti-depressant Anti-anginal -- Diuretic; Anti-hypertensive

Table A-4 (continued)

Subject Number	Former Occupation(s)	Years of Employment	Years of Non-Employment	Present Daily Medication(s) and Dosages	Type of Medication
11	School Cafeteria Supervisor	15	10	Alaquin ? mg (4X) Lanotin 25 mg (1X) Lasix 20 mg (1X) Motrin 300 mg (1X)	-- -- Diuretic; Anti-hypertensive Anti-inflammatory (for arthritis) Anti-anginal
12	Nurse's Aide	10	13	Persantine 500 mg (2X) Clinoril 150 mg (1X) Dilantin 50 mg (1X) Flexeril 10 mg (1X) Indocin 25 mg (2X) Ruvert ? mg (2X) Trilisate ? mg (1X)	Anti-inflammatory Anti-convulsant Muscle Relaxant Anti-inflammatory (for arthritis) Equilibrium Anti-inflammatory (for arthritis)
13	Restaurant Owner	18	14	Dilor 400 mg (4X) Feosol Spansules ? mg (1X) Isordil 10 mg (2X) Lanoxin 125 mg (2X) Maerodantin 50 mg (2X) Rasix 20 mg (4X)	Antihistamine Nutritional Anti-anginal Anti-anginal -- --

Table A-4 (continued)

Subject Number	Former Occupation(s)	Years of Employment	Years of Non-Employment	Present Daily Medication(s) and Dosages	Type of Medication
14	--	--	--	Artane 2 mg (2X) Naprosyn 250 mg (1X)	Anti-convulsant Anti-inflammatory (for arthritis)
15	High School Teacher	30	10	Ruvert ? mg (1X) Valium 2 mg (1X) Dalmane 30 mg (4X)	Equilibrium Anti-convulsant Anti-insomnia

APPENDIX B

PASSAGE¹ FOR THE ORAL READING TASK WITH THE CONTENT UNITS BRACKETED AND NUMBERED

The [bald cypress] is a [well-known] [tree] that [thrives]
[in the swamps] of the [southern] [United States.] [It] has a
[flaky] [bark] and [long] [drooping] [branches.] It can [survive]
[with its knotted roots] [under water,] and its [wood] [resists decay.]
[Because of the size and shape] of the trees, [they] make the swamps
[very] [dark.]

When [I] was a [young] [boy,] I [played] [in the cool] swamps where
cypress trees were [abundant.] I [picked] [blackberries] in the swamp
and [sold] [them] [at the market] for [twenty] [cents] [a gallon.]
[One day] I [saw] a [huge,] [black,] [poisonous] [snake] as I was
picking [berries.] I was [so afraid] I [ran] [home] and [never]
[returned] to the swamp [again.]

But the swamps and [especially] the cypress trees [bring back]
[wonderful] [memories] of [my] [childhood.]

¹Colvin, G., and Root, F., Reading Evaluation--Adult Diagnosis
(Syracuse, NY: Literacy Volunteers of America, 1976), p. 12.

APPENDIX C

RULES FOR STRING IDENTIFICATION IN THE PICTURE DESCRIPTION TASK³

The following rules determined the beginning and end of a string in the verbatim script for the picture description task. Strings are in brackets.

1. A string is broken if two adjacent words have no grammatical relationship to each other. Example: [The boy and girl are trying to steal some cookies and their mother does not see them.] [The stool is falling.]

2. A string is broken if there is a falling intonation pattern which can be interpreted as indicating the end of an utterance.

3. In the absence of a prosodic pattern marking the end of an utterance, a string is broken just prior to the second "and" when a series of independent clauses is connected with "and." Example: [The children are taking cookies from the jar and their mom's not watching] [and they're going to fall.]

4. A string is not broken by the presence of a "filler" sound ("uh," "um," "er") or word ("okay," "well"). Example: [The boy is falling off the . . . un, okay, uh . . . stool.]

5. A string is not broken by appositives. Example: [There are two kids, a boy and a girl, who are stealing cookies.]

³Yorkston, K.M., and Beukelman, D.R., A system for assessing grammaticality in connected speech samples of mildly aphasic individuals, Clinical Aphasiology: Proceedings of the Conference (Minneapolis: BRK Publishers, 1978), p. 134.

APPENDIX D

CONTENT UNITS IN THE PICTURE DESCRIPTION² TASK

apron	from the cookie jar/out of the cookie jar/into the cookie jar
been cooking	general statement about the disaster
behind the mother	
boy	getting her feet wet
brother	girl
cabinet door is opened	going to fall off/going to fall/ falling off/about to fall/ about to fall off
cabinets	
children	grass
cookies/cookie	hand her some cookies/handing his sister a cookie/reaching one down to his sister
cupboard looks bare	
curtains	has gotten another cookie
(curtains) have a border over the top	has her finger at her mouth
daydreaming/not paying any attention/ thinking about something/got some- thing else on her mind	helping him
daylight	house next door/garage
dish cloth/dish towel	inside
dishes/cups/plates	kitchen
doesn't have very many (dishes)	lady
dried/drying	little
fall and get hurt/might get hurt	laughing
faucet's turned on	mother/mom/mama
	on the floor

²Goodglass, H., and Kaplan, E., Boston Diagnostic Aphasia Examination (Philadelphia: Lea and Febiger, 1972), Stimulus Card 1.

on the shelf

on the stool

outside

puddle

reaching up for some/reading up
to get a cookie/holding up her
hand to get a cookie

running over/overflowing

shrubbery/shrubs/bushes

sink

sister

standing in it/standing in water

stealing/swiping

telling the little boy to be quiet/
trying to keep her brother quiet/
telling him to be quiet/warn him
not to make any noise

toddle/falling over/turning over

trees

two

walk/sidewalk

washing

water

window

(window) is open

yard

APPENDIX E

AVERAGE HIGH SIGNAL AND NOISE LEVELS AND AVERAGE HIGH SIGNAL- TO-NOISE RATIOS (S:N) FOR THE TWO SUBJECT GROUPS

Table E-1. Average high signal and noise levels and average high signal-to-noise ratios (S:N) for the two subject groups.

Subject Group	Average High Signal Level (dB)	Average High Noise Level (dB)	Average High S:N (dB)
<u>Non-Institutionalized</u>			
1	10.17	-24.00	34.17
2	3.99	-28.30	32.29
3	5.47	-20.54	26.01
4	5.70	-25.00	30.70
5	5.97	-13.00	18.97
6	6.03	-18.57	24.60
7	0.49	-16.29	16.78
8	3.22	-14.81	18.03
9	0.42	-12.04	12.46
10	9.05	-14.45	23.50
11	9.41	-16.69	26.10
12	-11.57	-23.40	11.83
13	- 9.18	-21.20	12.02
14	- 9.68	-23.50	13.82
15	- 4.59	-22.63	18.04
<u>Institutionalized</u>			
1	5.03	-16.96	21.99
2	4.32	- 8.99	13.31
3	5.03	-13.00	18.03
4	-13.52	-23.47	9.95
5	3.20	-10.58	13.78
6	4.48	-17.50	21.98
7	4.59	-12.63	17.22
8	2.13	-15.52	17.65
9	6.18	-16.00	22.18
10	4.77	-15.47	20.24
11	6.43	-26.54	32.97
12	5.44	-15.94	21.38
13	5.23	-16.40	21.63
14	4.32	-18.54	22.86
15	7.32	-22.98	30.21

APPENDIX F

RAW DATA FOR CRITERION MEASURES

Table F-1. Number (No.) of syllables, total elapsed time (in sec) and the overall speaking rate (in SPS) for the two subject groups and experimental tasks.

Subject Group	Reading			Picture Description		
	No. of Syllables	Total Elapsed Time (sec)	Speaking Rate (SPS)	No. of Syllables	Total Elapsed Time (sec)	Speaking Rate (SPS)
<u>Non-Institutionalized</u>						
Subject 1	173	40	4.33	97	31	3.13
2	173	56	3.09	105	57	2.02
3	173	47	3.68	175	52	3.37
4	183	71	2.58	119	58	2.05
5	175	49	3.57	124	36	3.44
6	179	58	3.09	81	49	1.65
7	173	47	3.68	136	52	2.62
8	174	46	3.78	171	50	3.42
9	175	49	3.57	135	62	2.18
10	172	44	3.91	130	50	2.60
11	177	46	3.85	121	69	1.75
12	174	62	2.81	111	49	2.27
13	179	64	2.80	236	89	2.65
14	175	60	2.92	135	52	2.60
15	173	45	3.84	217	61	3.56
<u>Institutionalized</u>						
Subject 1	173	51	3.39	75	41	1.82
2	178	64	2.78	208	68	3.05

Table F-1 (continued)

Subject Group	Reading			Picture Description		
	No. of Syllables	Total Elapsed Time (sec)	Speaking Rate (SPS)	No. of Syllables	Total Elapsed Time (sec)	Speaking Rate (SPS)
Subject 3	181	79	2.29	92	60	1.53
4	179	53	3.38	142	45	3.15
5	165	92	1.79	72	44	1.63
6	176	69	2.55	99	65	1.52
7	204	90	2.27	164	63	2.60
8	179	64	2.72	199	66	3.01
9	177	50	3.54	167	62	2.69
10	231	110	2.10	218	97	2.24
11	177	91	1.95	225	78	2.88
12	174	55	3.16	128	69	1.85
13	177	52	3.40	279	84	3.32
14	172	57	3.02	136	49	2.77
15	175	53	3.30	93	41	2.26

Table F-2. Number (No.) of content units, total elapsed time (in sec) and information rate (in CUS) for the two subject groups and experimental tasks.

Subject Group	Reading			Picture Description		
	No. of Content Units	Total Elapsed Time (sec)	Information Rate (CUS)	No. of Content Units	Total Elapsed Time (sec)	Information Rate (CUS)
<u>Non-</u>						
<u>Institutionalized</u>						
Subject 1	55	40	1.38	9	31	0.29
2	55	56	0.98	9	57	0.16
3	55	47	1.17	12	52	0.23
4	54	71	0.76	12	58	0.21
5	55	49	1.22	14	36	0.39
6	55	58	0.95	9	49	0.18
7	54	47	1.15	18	52	0.35
8	55	46	1.20	17	50	0.34
9	54	49	1.10	13	62	0.21
10	55	44	1.25	17	50	0.34
11	55	46	1.20	15	69	0.22
12	55	62	0.89	17	49	0.35
13	55	64	0.86	23	89	0.26
14	55	60	0.92	18	52	0.37
15	55	45	1.22	17	61	0.28
<u>Institutionalized</u>						
Subject 1	55	51	1.08	8	41	0.20
2	55	64	0.86	22	68	0.32
3	55	79	0.70	9	60	0.15
4	55	53	1.04	16	45	0.36
5	52	92	0.57	12	44	0.27
6	54	69	0.78	12	65	0.19

Table F-2 (continued)

Subject Group	Reading			Picture Description		
	No. of Content Units	Time Elapsed Time (sec)	Information Rate (CUS)	No. of Content Units	Time Elapsed Time (sec)	Information Rate (CUS)
Subject 7	36	90	0.40	17	63	0.27
8	55	64	0.86	10	66	0.15
9	55	50	1.10	13	62	0.21
10	52	110	0.47	18	97	0.19
11	52	91	0.57	18	78	0.23
12	55	55	1.00	15	69	0.22
13	51	52	0.98	21	84	0.25
14	50	57	0.88	18	49	0.37
15	55	53	1.04	14	41	0.34

Table F-3. Total pause duration (in msec) and total number of pauses for the two subject groups and experimental tasks.

Subject Group	Reading		Picture Description	
	Total Pause Duration (msec)	Number of Pauses	Total Pause Duration (msec)	Number of Pauses
<u>Non-Institutionalized</u>				
Subject 1	1024.59	15	804.86	11
2	910.83	18	1796.88	20
3	960.42	16	1146.23	23
4	1157.39	26	2202.77	12
5	1056.11	38	789.16	8
6	1215.77	36	2554.48	17
7	1079.97	31	1614.58	16
8	970.35	21	1501.38	18
9	802.40	48	2138.84	29
10	1129.16	16	1894.14	31
11	1088.32	38	2006.56	32
12	1373.60	20	2061.89	14
13	1314.06	40	1464.48	62
14	1189.99	56	1495.83	18
15	1002.77	44	1137.67	32
<u>Institutionalized</u>				
Subject 1	1336.89	15	3338.89	12
2	1192.00	32	1960.92	39
3	1097.54	48	2356.39	32
4	1389.14	39	1551.09	39
5	1652.28	46	3131.94	22
6	1274.04	31	5402.74	20
7	1515.52	47	1542.55	37
8	1325.31	27	2443.64	35

Table F-3 (continued)

Subject Group	Reading		Picture Description	
	Total Pause Duration (msec)	Number of Pauses	Total Pause Duration (msec)	Number of Pauses
Subject 9	1197.91	9	1823.05	27
10	1701.39	42	2462.01	52
11	1071.47	27	1369.24	33
12	1061.80	13	2430.29	34
13	702.53	24	916.10	24
14	1127.08	18	2466.50	22
15	1315.41	25	2944.44	12

Table F-4. Inter-sentence pause durations (in msec) for the non-institutionalized group.

Subject Number	Sentence									Mean
	2	3	4	5	6	7	8	9	n	
1	633.33	900.00	733.33	850.00	633.33	800.00	600.00	833.33	8	747.92
2	333.33	216.66	750.00	833.33	733.33	700.00	400.00	733.33	8	587.50
3	966.66	550.00	500.00	750.00	650.00	633.33	333.33	650.00	8	629.17
4	400.00	900.00	633.33	—*	1083.33	1266.66	366.66	516.66	7	738.09
5	650.00	966.66	733.33	800.00	833.33	766.66	883.33	833.33	8	808.33
6	1066.66	733.33	800.00	666.66	616.66	866.66	833.33	833.33	8	802.08
7	516.66	900.00	666.66	833.33	766.66	800.00	766.66	833.33	8	760.41
8	700.00	733.33	666.66	800.00	1000.00	716.66	700.00	733.33	8	756.25
9	600.00	500.00	766.66	600.00	433.33	333.33	400.00	400.00	8	504.17
10	816.66	566.66	550.00	983.33	700.00	983.33	766.66	800.00	8	770.83
11	666.66	966.66	633.33	566.66	766.66	866.66	1200.00	666.66	8	791.66
12	783.33	700.00	633.33	1666.66	966.66	866.66	1400.00	916.66	8	991.66
13	1050.00	1100.00	983.33	950.00	1116.66	916.66	866.66	1033.33	8	1002.08
14	633.33	616.66	1200.00	1233.33	866.66	966.66	600.00	816.66	8	866.66
15	850.00	733.33	933.33	766.66	666.66	766.66	733.33	716.66	8	770.83

*less than 150 msec

Table F-5. Inter-sentence pause durations (in msec) for the institutionalized group.

Subject Number	Sentence									
	2	3	4	5	6	7	8	9	n	Mean
1	1016.66	1183.33	883.33	1133.33	850.00	1066.66	866.66	1133.33	8	1016.66
2	1200.00	850.00	933.33	1133.33	800.00	933.33	500.00	833.33	8	897.92
3	733.33	633.33	633.33	916.66	716.66	516.66	833.33	633.33	8	702.08
4	1116.66	1416.66	633.33	1383.33	866.66	966.66	1083.33	650.00	8	1014.58
5	916.66	-*	-*	1766.66	1066.66	466.66	166.66	650.00	6	838.88
6	1083.33	500.00	-*	1533.33	166.66	833.33	866.66	166.66	7	735.71
7	400.00	-*	566.66	200.00	1283.33	3650.00	433.33	900.00	7	1061.90
8	1216.66	1166.66	766.66	766.66	900.00	816.66	900.00	900.00	8	929.16
9	1700.00	700.00	750.00	616.66	916.66	700.00	700.00	683.33	8	845.83
10	200.00	3383.33	733.33	900.00	750.00	-*	733.33	483.33	7	1026.19
11	866.66	400.00	650.00	483.33	466.66	200.00	800.00	766.66	8	579.16
12	516.66	716.66	433.33	700.00	266.66	1233.33	950.00	733.33	8	693.75
13	350.00	333.33	450.00	483.33	216.66	516.66	383.33	400.00	8	391.66
14	566.66	683.33	500.00	700.00	483.33	483.33	600.00	466.66	8	560.41
15	1100.00	883.33	700.00	1050.00	1000.00	1033.33	316.66	966.66	8	881.25

*less than 150 msec

Table F-6. Inter-string pause durations (in msec) for the non-institutionalized group.

Subject	String												n	Mean
	1	2	3	4	5	6	7	8	9	10	11	12		
1	183.33	400.00	983.33	200.00	1133.33	300.00	1083.33	466.66					8	593.75
2	633.33	1266.66	966.66	1450.00	450.00	1466.66	700.00						7	990.47
3	800.00	800.00	166.66	1000.00	616.66	-*	700.00						6	680.55
4	333.33	1316.66	1250.00	-*	1266.66	-*	1400.00	2366.66					6	1322.22
5	400.00	-*	366.66	450.00	-*	433.33	566.66						5	443.33
6	1533.33	-*	2166.66		1866.66	1066.66							4	1658.33
7	1100.00	433.33	633.33	283.33	2366.66	-*	1333.33	766.66	200.00				8	889.58
8	1166.66	1633.33	1800.00	250.00	-*	-*	733.33	766.66					6	1058.33
9	400.00	1766.66	333.33	1583.33	216.66	2866.66	3833.33						7	1571.42
10	833.33	1183.33	3866.66	1016.66	2566.66	1133.33	2566.66	1366.66	700.00	1583.33	1050.00	800.00	12	1555.55
11	1466.66	233.33	1366.66	233.33	700.00	1166.66	750.00						7	845.23
12	816.66	950.00	1000.00	-*	716.66	1100.00	1483.33	3333.33					7	1342.85
13	516.66	783.33	-*	1133.33	1633.33	1166.66	1116.66	-*	1200.00	866.66	433.33	1583.33	10	1043.33
14	316.66	700.00	566.66	1433.33	-*	1666.66	1400.00						6	1013.89
15	150.00	1333.33	800.00	700.00	1483.33	633.33	916.66	-*	166.66	416.66	-*		9	733.33

*less than 150 msec

Table F-7. Inter-string pause durations (in msec) for the institutionalized group.

Subject	String																			n	Mean
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
1	4733.33	4450.00	2433.33	1533.33	2316.66	1666.66	3066.66													3088.89	
2	1133.33	1233.33	1166.66	1500.00	1833.33	1666.66	1966.66	850.00	2433.33											1531.48	
3	766.66	13133.33	1116.66	400.00	300.00	966.66	800.00	1116.66	700.00	600.00	1800.00	666.66								1863.89	
4	966.66	2000.00	816.66	1466.66	433.33	1133.33	2533.33	383.33	1350.00	766.66										1145.00	
5	5500.00	2083.33	1266.66	3200.00	2700.00	316.66														2511.11	
6	1083.33	1466.66	7400.00	5966.66	1733.33	6616.66	10950.00													5030.95	
7	523.33	933.33	1450.00	700.00	3483.33	416.66	516.66	766.66	1900.00	200.00	566.66	4433.33	5516.66	1433.33						1102.08	
8	1566.66	2066.66	2166.66	7700.00	750.00	816.66	750.00	1366.66	550.00	1250.00	583.33	1250.00	1750.00	2666.66	533.33	3900.00				2198.09	
9	1900.00	1583.33	2183.33	283.33	516.66	1300.00	550.00	1366.66	666.66	1233.33	583.33	200.00	2733.33	15100.00	1733.33	183.33	1283.33			1441.11	
10	566.66	816.66	666.66	550.00	1266.66	1066.66	683.33	383.33												1051.92	
11	683.33	833.33	1000.00	766.66	966.66	1066.66	683.33	383.33												797.41	
12	933.33	1266.66	1466.66	1583.33	2083.33	2583.33	1866.66	1916.66	716.66											1546.29	
13	216.66	1033.33	433.33	1666.66	3583.33	1283.33	383.33	400.00	1650.00											616.45	
14	950.00	1300.00	666.66	4116.66	5933.33	1283.33	700.00	3400.00												2130.75	
15	883.33	2533.33	1583.33	4966.66	4766.66	1283.33														2316.11	

*less than 150 msec

Table F-8. Intra-sentence pause durations (in msec) for the non-institutionalized group.

Subject Number	Sentence								n	Mean
	2	3	4	5	6	7	8			
1	-*	366.66	-*	166.66	216.66	233.33 400.00	-*		5	276.66
2	-*	483.33	300.00	150.00 333.33	433.33 150.00	316.66 516.66	350.00 200.00		10	323.33
3	-*	200.00 400.00 150.00	400.00	500.00	-*	166.66 516.66	316.66			
4	166.66 450.00	266.66 766.66 550.00	433.33 333.33 400.00 616.66	300.00 150.00 666.66	416.66 600.00 350.00	233.33 566.66 266.66	433.33		8	331.25
5	283.33 283.33	166.66 200.00 500.00 166.66 200.00	166.66 383.33 150.00 283.33	166.66 166.66 200.00 200.00 266.66	166.66 200.00 316.66 516.66 350.00	150.00 316.66 400.00 200.00 333.33 166.66	216.66 150.00 166.66		19	419.30
6	566.66	150.00 166.66 233.33 233.33 716.66 800.00	250.00 750.00 616.66 183.33 183.33	183.33 250.00 1166.66 283.33 416.66	400.00 383.33 700.00 350.00 650.00	183.33 600.00 183.33 266.66 283.33	433.33		30	247.77
									28	413.69

Table F-8 (continued)

Subject Number	Sentence							
	2	3	4	5	6	7	8	n
7	433.33	200.00		166.66	150.00	150.00	166.66	
		616.66	200.00	183.33	200.00	200.00	1500.00	
		183.33		150.00	433.33	266.66	483.33	
				300.00		233.33	166.66	
8	-*	183.33	-*	166.66	283.33	233.33	233.33	
				166.66	150.00	216.66		
				166.66		216.66		
				366.66		233.33		
9	266.66	300.00	216.66	166.66	166.66	150.00	166.66	
	300.00	316.66	183.33	200.00	150.00	283.33	166.66	
	400.00	266.66	383.33	183.33	166.66	466.66	200.00	
		333.33	266.66	216.66	500.00	433.33	450.00	
10		466.66		633.33	233.33	300.00	150.00	
		233.33		383.33	1083.33	233.33	150.00	
					200.00	400.00	166.66	40
								298.33
11	233.33	850.00	-*	150.00	600.00	-*	-*	
	233.33	250.00			283.33			
	266.66							
								8
11	233.33	283.33	383.33	933.33	150.00	300.00	150.00	
		216.66	400.00	333.33	166.66	183.33	183.33	
		500.00	633.33	166.66	150.00	216.66	216.66	
		533.33	300.00	266.66	166.66	200.00	200.00	
		300.00		450.00	300.00	150.00		30
					233.33			296.66

Table F-8 (continued)

Subject Number	Sentence								n	Mean
	2	3	4	5	6	7	8			
12	900.00 166.66 166.66	683.33	466.66	150.00 416.66	166.66 566.66 166.66	200.00 533.33	200.00 533.33	—*	12	381.94
13	300.00 333.33 266.66	150.00 433.33 666.66 166.66 266.66 933.33 200.00 283.33 166.66 166.66	200.00 166.66 250.00	566.66 166.66 333.33 433.33 150.00 166.66	200.00 650.00 150.00 266.66	366.66 233.33 366.66 466.66	183.33			
14	333.33 666.66 533.33	166.66 366.66 200.00 483.33 933.33 400.00 283.33 183.33 166.66	200.00 166.66 216.66 533.33 166.66 183.33 283.33	566.66 183.33 200.00 200.00 583.33 433.33 233.33	166.66 166.66 550.00 200.00 533.33 150.00 616.66 166.66	166.66 166.66 400.00 566.66 266.66 750.00 200.00	233.33 200.00 466.66 216.66 183.33 233.33 233.33		32	311.98
									48	323.33

Table F-8. (continued)

Subject Number	Sentence								Mean
	2	3	4	5	6	7	8	n	
15	200.00	183.33	183.33	266.66	233.33	166.66	150.00		
	166.66	150.00	166.66	166.66	250.00	233.33	200.00		
		500.00	183.33	200.00	200.00	266.66			
		283.33	166.66	200.00	466.66	266.66			
		383.33	400.00	233.33	166.66	266.66			
			300.00	200.00	183.33	166.66			
				166.66					
				266.66					
				166.66					
								36	231.94

*less than 150 msec

Table F-9. Intra-sentence pause durations (in msec) for the institutionalized group.

Subject Number	Sentence							
	2	3	4	5	6	7	8	n
1	-*	150.00	400.00	500.00	533.33	566.66	333.33	
		200.00	216.66	166.66		200.00		
		166.66		166.66		666.66		
				216.66				14
2	200.00	233.33	200.00	150.00	150.00	250.00	150.00	320.23
	150.00	150.00	616.66	166.66	183.33	300.00	483.33	
	883.33	650.00	166.66	833.33	150.00	883.33		
		166.66		216.66	166.66	150.00		
		200.00			216.66	250.00		
		166.66			183.33			
					150.00			31
3	666.66	583.33	183.33	316.66	833.33	183.33	166.66	
	150.00	200.00	166.66	566.66	183.33	833.33	150.00	
	166.66	700.00	200.00	166.66	550.00	583.33	516.66	
	150.00	583.33	800.00	166.66	566.66	700.00	566.66	
	216.66	200.00	150.00	600.00	166.66	233.33	550.00	
		800.00	183.33	750.00	150.00	733.33	183.33	
			800.00	166.66		233.33		
				200.00		166.66		
				683.33				47
								395.46

Table F-9 (continued)

Subject Number	Sentence							
	2	3	4	5	6	7	8	Mean
4	716.66	233.33	750.00	150.00	800.00	200.00	183.33	
		300.00	933.33	166.66	150.00	733.33	200.00	
		283.33	400.00	700.00	200.00	150.00	166.66	
		166.66	183.33	316.66	200.00	300.00	166.66	
		200.00			616.66	716.66	183.33	
		1250.00			566.66	283.33	333.33	
		200.00				150.00		
		200.00				633.33		
						150.00		
								38 374.56
5	1816.66	1033.33	266.66	583.33	783.33	166.66	166.66	
	816.66	700.00	150.00	166.66	216.66		1000.00	
	1916.66	600.00	216.66	166.66	250.00		566.66	
	200.00	166.66	3266.66	1600.00	300.00		783.33	
	183.33	366.66	1916.66	4433.33	216.66		466.66	
		1266.66	1583.33	433.33	150.00		3316.66	
		1566.66	250.00		666.66		816.66	
		250.00	166.66					
		233.33						
		200.00						
		400.00						45 813.40

Table F-9 (continued)

Subject Number	Sentence							
	2	3	4	5	6	7	8	n
6	383.33	433.33	833.33	366.66	833.33	333.33	550.00	
	2533.33	383.33	200.00	700.00	400.00	266.66		
	833.33	516.66	1316.66	1066.66	166.66	250.00		
		316.33		166.66	716.66	166.66		
		533.33		250.00		183.33		
		416.66		150.00				
7		500.00						30
		383.33						538.33
	466.66	533.33	200.00	383.33	166.66	1566.66	266.66	
	1150.00	816.66	316.66	333.33	466.66	1616.66	433.33	
	450.00	500.00	400.00	766.66		366.66		
	366.66	366.66	166.66	500.00				
	200.00	733.33	233.33	216.66				
	250.00	150.00	1033.33	150.00				
		150.00	266.66	483.33				
		333.33		200.00				
		183.33		216.66				
		400.00		966.66				
		533.33		216.66				
		533.33		233.33				
		333.33						
250.00								46
								453.62

Table F-9 (continued)

Subject Number	Sentence								Mean
	2	3	4	5	6	7	8	n	
14	233.33	516.66	533.33	150.00	516.66	583.33	533.33		
	650.00	566.66	550.00	1533.33	766.66	500.00	566.66		
		483.33		783.33					
		166.66						17	566.66
15	166.66	883.33	833.33	166.66	183.33	233.33	150.00		
	616.66	183.33	200.00	850.00	150.00	450.00	766.66		
	1233.33			166.66	150.00	966.66	283.33		
					200.00	150.00	416.66		
					1000.00				
					200.00			24	434.16

*less than 150 msec

Table F-10 (continued)

Subject	String												Mean
	1	2	3	4	5	6	7	8	9	10	11	12	n
13	-*	-*	-*	766.66	150.00	1366.66	1150.00	-*	1266.66	183.33	466.66	-*	52
				316.66	850.00	366.66	183.33		166.66	250.00	850.00		
				150.00	150.00	150.00	350.00		683.33	233.33	400.00		
				433.33	300.00	200.00	350.00		166.66		166.66		
				516.66	300.00	600.00	1033.33		383.33		300.00		
				700.00		150.00	366.66		333.33		216.66		
				900.00		150.00	266.66		266.66				
				600.00			150.00						
							316.66						
							766.66						
14	266.66	466.66	166.66	683.33	166.66	183.33	-*						12
	250.00			566.66	200.00								
	500.00				350.00								
15	150.00	216.66	-*	466.66	266.66	233.33	166.66	-*	183.33	1366.66	700.00		23
	183.33					183.33	766.66		416.66	1083.33	783.33		
	200.00					183.33			533.33	266.66	233.33		
					1983.33	200.00			166.66	350.00			

*less than 150 msec

Table F-11 (continued)

Subject Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	n	Mean
13	200.00	183.33	166.66	233.33	150.00	166.66	200.00	216.66	1250.00	266.66	283.33	233.33	366.66	216.66	350.00	166.66	216.66	400.00	..*	58	279.65
		166.66	150.00		433.33	483.33	283.33	150.00	366.66	516.66	183.33	183.33	183.33	200.00	166.66	233.33					
					166.66	200.00	950.00	166.66	183.33	150.00	150.00	200.00	200.00	233.33	166.66						
					700.00	566.66		333.33	166.66			266.66		200.00	200.00						
					166.66	150.00		433.33													
14	283.33	500.00	166.66	600.00	183.33	..*	166.66	216.66												15	335.55
			200.00	600.00	416.66			150.00													
			566.66	150.00				683.33													
15	..*	200.00	883.33	400.00	..*	..*		150.00												6	602.33
			283.33	733.33	1150.00																

*less than 150 msec

APPENDIX G

TOTAL ELAPSED TIME, PAUSE AND SPEAKING

TIMES FOR THE SUBJECTS AND TASKS

Table G-1. Total elapsed time (in sec), pause and speaking times (in sec) during the reading task for the two subject groups.

<u>Non-Institutionalized</u>			
Subject	1	40	1.03
	2	56	0.91
	3	47	0.96
	4	71	1.16
	5	49	1.06
	6	58	1.22
	7	47	1.08
	8	46	0.97
	9	49	0.80
	10	44	1.13
	11	46	1.09
	12	62	1.37
	13	64	1.31
	14	60	1.19
	15	45	1.00
<u>Institutionalized</u>			
Subject	1	51	1.14
	2	64	1.19
	3	79	1.10
	4	53	1.39
	5	92	1.65
	6	69	1.27
	7	90	1.52
	8	64	1.33
	9	50	1.20
	10	110	1.70
	11	91	1.07
	12	55	1.06
	13	52	0.70
	14	57	1.13
	15	53	1.32

Table G-2. Total elapsed time (in sec), pause and speaking times (in sec) during the picture description task for the two subject groups.

Subject Group		Total Elapsed Time (sec)	Pause Time (sec)	Speaking Time (sec)
<u>Non-Institutionalized</u>				
Subject	1	31	0.81	30.19
	2	57	1.80	55.20
	3	52	1.15	50.85
	4	58	2.20	55.80
	5	36	0.79	35.21
	6	49	2.56	46.44
	7	52	1.62	50.38
	8	50	1.50	48.50
	9	62	2.14	59.86
	10	50	1.89	48.11
	11	69	2.01	66.99
	12	49	2.06	46.94
	13	89	1.47	87.53
	14	52	1.50	50.50
	15	61	1.14	59.86
<u>Institutionalized</u>				
Subject	1	41	3.34	37.66
	2	68	1.96	66.04
	3	60	2.36	57.64
	4	45	1.55	43.45
	5	44	3.13	40.87
	6	65	5.40	59.60
	7	63	1.54	61.46
	8	66	2.44	63.56
	9	62	1.82	60.18
	10	97	2.46	94.54
	11	78	1.37	76.63
	12	69	2.43	66.57
	13	84	0.92	83.08
	14	49	2.47	46.53
	15	41	2.94	38.06

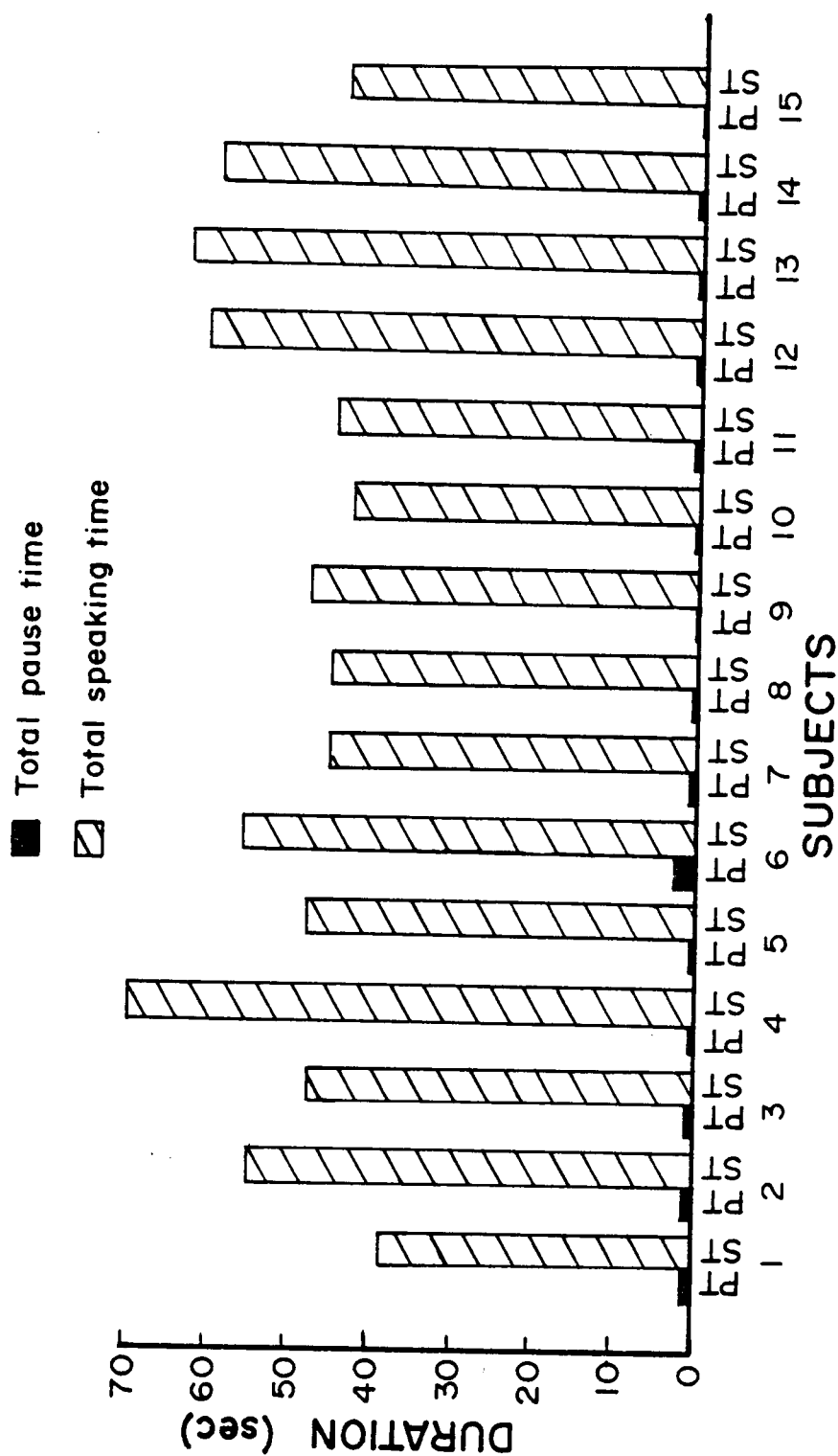


Figure G-1. Pause (PT) and speaking (ST) times (in sec) for the 15 non-institutionalized subjects during the reading task.

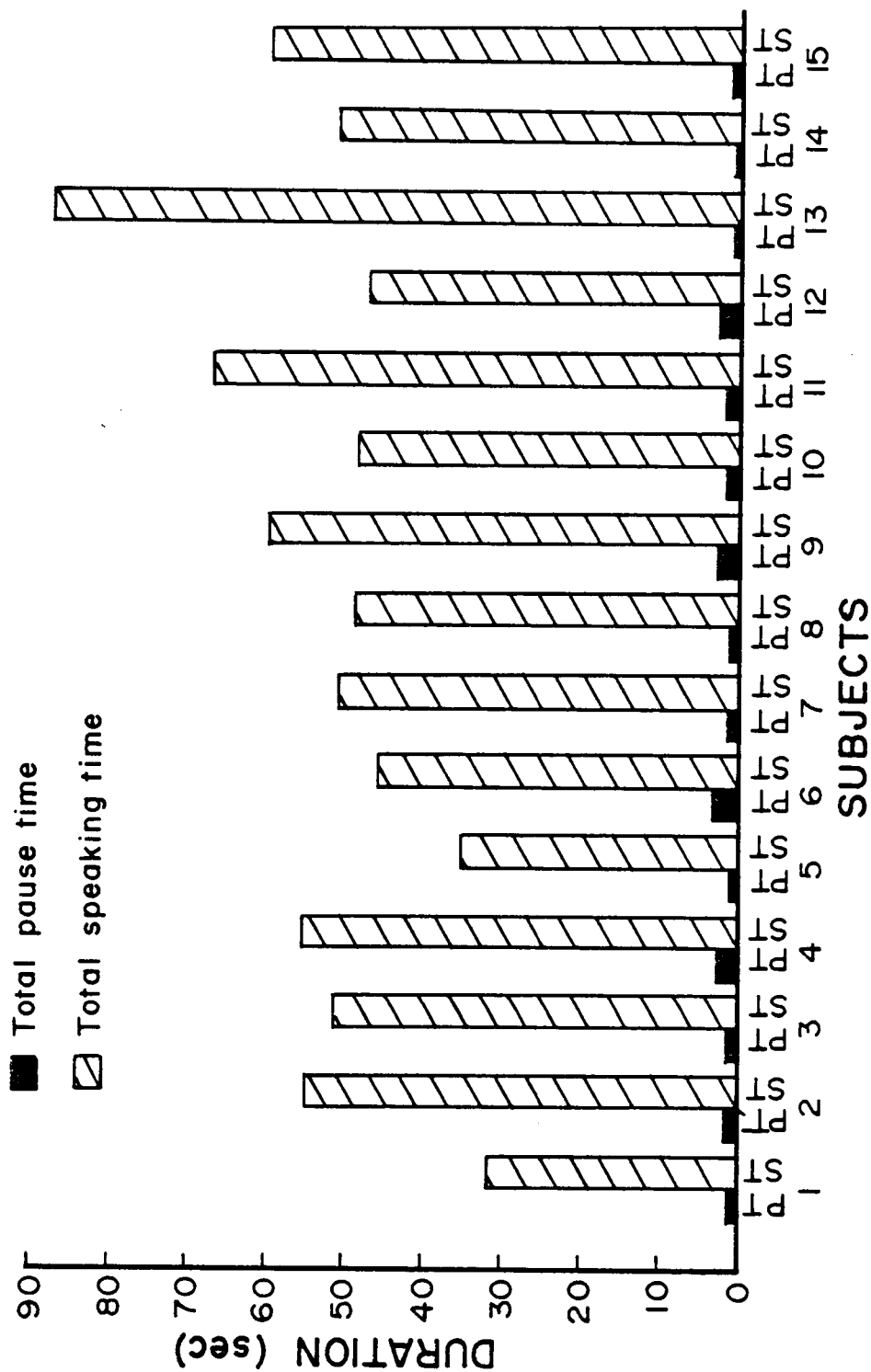


Figure G-2. Pause (PT) and speaking (ST) times (in sec) for the 15 non-institutionalized subjects during the picture description task.

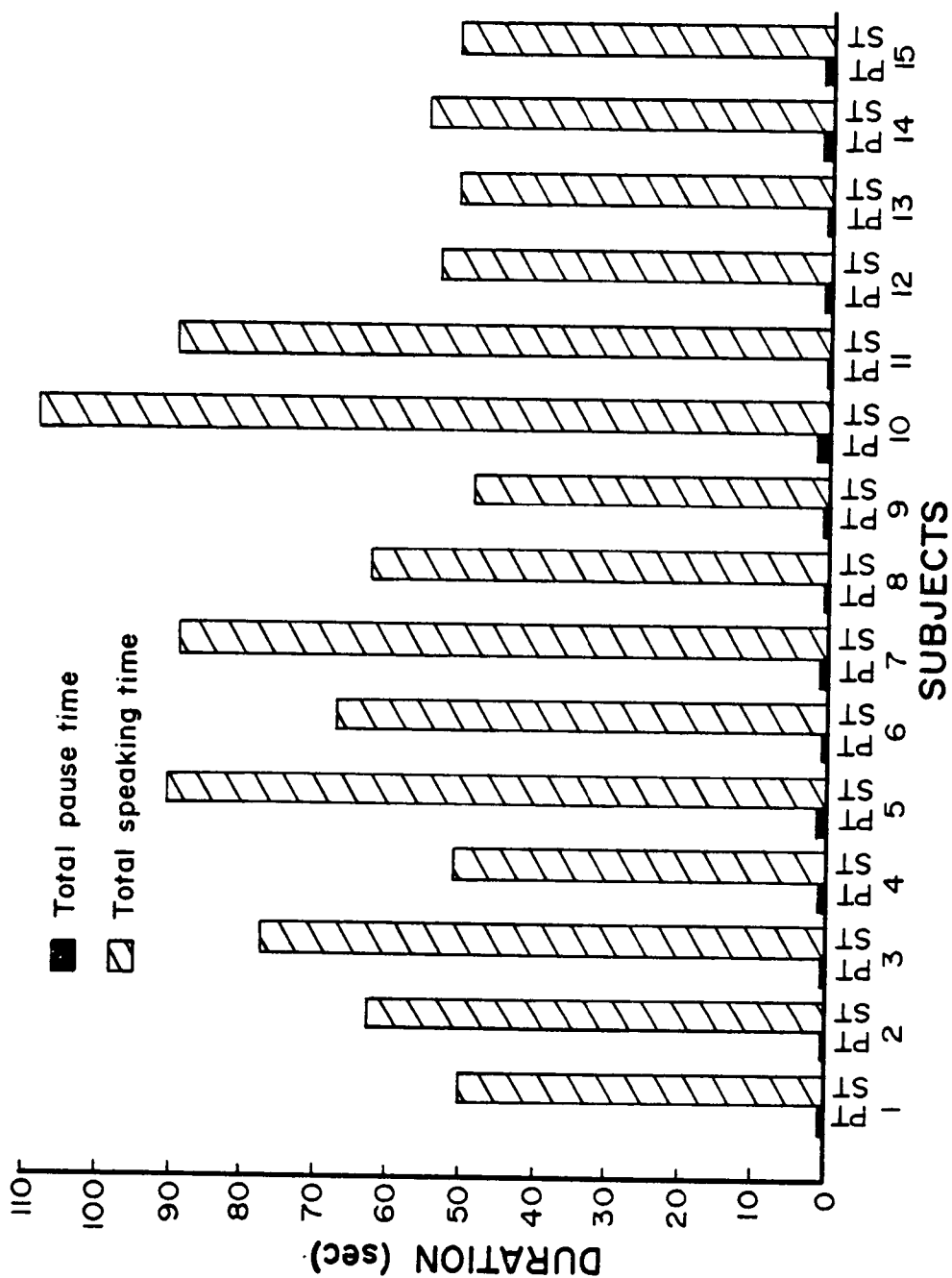


Figure G-3. Pause (PT) and speaking (ST) times (in sec) for the 15 institutionalized speakers during the reading task.

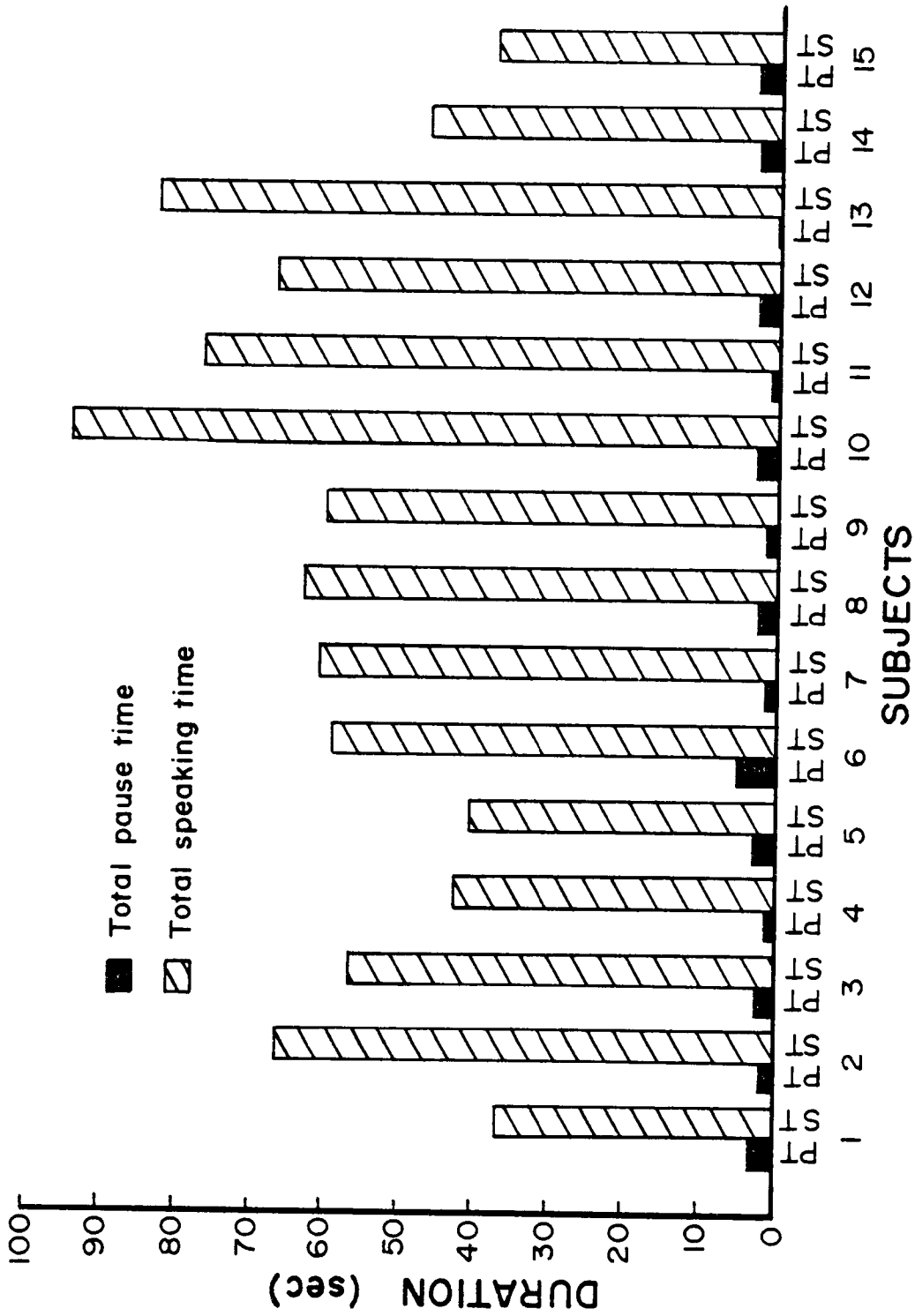


Figure G-4. Pause (PT) and speaking (ST) times (in sec) for the 15 institutionalized speakers during the picture description task.

VITA

Sandra Kay Newsom-Clark was born in Paintsville, Kentucky, on June 1, 1950. She received her elementary and secondary education in Paintsville and was graduated from Paintsville High School in 1967. In 1971 she graduated cum laude from Eastern New Mexico University with a Bachelor of Science degree in Speech Pathology and Audiology. In the same year she graduated cum laude from Vanderbilt University with a Master of Science degree in Speech and Hearing Science.

She then was the regional speech pathologist with the Mountain Comprehensive Care Center in Paintsville, Kentucky, for one and a half years, after which she returned to Vanderbilt University for additional coursework in Learning Disabilities for the summer months. During the next year she was a speech and language pathologist with the Veterans Administration Center in Johnson City, Tennessee.

After three years of employment as assistant professor in the Audiology and Speech Pathology Department at Appalachian State University in Boone, North Carolina, she enrolled in the doctoral program in Speech and Hearing Science at The University of Tennessee, Knoxville, Tennessee, in September, 1977. She received the Doctor of Philosophy degree in Speech and Hearing Science in August, 1980. Upon completion of her studies, she will accept the position of Department Head of Communicative Disorders at Fort Sanders Presbyterian Hospital in Knoxville, Tennessee.