FACTORS AFFECTING RAPID READING IN KANNADA

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Dedicated

to

My dearest Dad and Mom

whose watchful eye, unconditional love

and constant encouragement

made me the person I am today.

CERTIFICATE

This is to certify that this dissertation entitled "FACTORS AFFECTING RAPID READING IN KANNADA" is a bonafide work, done in part fulfillment for the degree of "MASTER OF SCIENCE (SPEECH AND HEARING)", of the student with Register No. M 9301.

MYSORE

1995

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CERTIFICATE

This is to certify that this dissertation entitled ***"FACTORS AFFECTING RAPID READING IN KANNADA",*** *has been prepared under my supervision and guidance.*

MYSORE

1995

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DECLARATION

I hereby declare that this dissertation entitled "FACTORS AFFECTING RAPID READING IN KANNADA" is the result of my own study under the guidance of Dr. (Mrs.) P. KARANTH, Professor and Head of the Department of Speech Pathology, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any university for any other diploma or degree.

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1995

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INTRODUCTION

INTRODUCTION

Education depends primarily on communication through spoken or written words. Early in history, education depended largely on verbal communication, but since the invention of the printing press the written word has become a requisite to practically all phases of education. Reading the printed word enables us to enjoy many of the good things of life, to communicate with each other and to share experiences of others through recorded history, scientific records, stories, plays and poetry.

Development of reading begins at age two, with naming pictures in a book and proceeding to identify printed geometric forms at age three. Salient capital letters are recognized at around four years of age and salient printed words are recognized at around five to six years of age.

The process of reading involves the capacity to perceive, to recognize symbols and to integrate them into meaningful sequences. It involves some capacity for abstract reasoning. Any person who has some dysfunction or developmental lag in reading, emotional block in learning or is "just a slow reader" is handicapped regardless of his endowment of general intelligence or his abilities in other fields.

In the initial stages of reading printed words, children usually tend to read the word as a whole instead of recognizing

the syllabic contents of the word. Later, the ability to identify the syllables in a word and then combine them to read out a word is achieved. As this skill develops, reading becomes more and more proficient.

With experience in reading, the rate of reading gradually improves. Reading takes place not by syllable to syllable reading, but by rapidly scanning through the syllables/phonemes of the word and reading the word as fast as possible. For eg. reading rates of a college student varies from that of a primary school student.

There is much research literature on the perceptual identification of words. Recognition without context refers to the absence of context other than a list of successively presented items, or the context provided by individual differences in personality and other factors. Most of the studies have been concerned with the effects of various word attributes such as frequency, structural attributes, meaningfulness, pronunceability, concreteness and emotional connotations. Much of the literature that is currently available in this area, however, is based on alphabetic scripts like English and need to be verified with reference to non alphabetic scripts such as syllabic and ideographic scripts.

This study attempts to find out differences in reading rates due to the effect of variables like word frequency and word concreteness or abstractness in a semisyllabic script.

Application of such studies is found in work on brain damaged and dyslexic patients. Psycholinguistic theories derived from studies on normals are used to understand more about the nature and type of disorders found in dyslexic subjects and vice versa. An immediate and direct benefit of such an application is the refinement of remedial measures taken up in the field of Psycholinguistics.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Reading, a language function is considered by some theorists as a process of decoding printed symbols into sound and then extracting meaning from it. Conscious mastery is a necessary precondition for the development of fluent reading.

Reading can take place by means of two routes. The first of these procedures is called the whole-word procedure or the direct procedure. This depends upon the child having previously learned a direct correspondence between the letter string and the spoken representation. Access to unfamiliar words is limited with this procedure. The other procedure in the Phonologicaily mediated route (PMR) or the phonics procedure. Here spelling to sound rules are used to link print to pronunciation rather than previously learned direct correspondences between individual printed words and their spoken forms.

Due to different theories of reading different methods to teach reading have been advocated.

They can be broadly classified as:

1. Sight Methods (whole-word route) and

2. Sound Methods (grapho-phoneme route)

METHODS OF TEACHING READING

Various methods of learning:

I. SIGHT METHODS:

a) WORD WHOLES:

The gestalt school of psychology offered a theory of perception based on gestalt or shape. The recognition of words by sight, from their configuration and other visual features, is the basis of the look and say method of learning to read.

b) SENTENCE METHOD:

The different meanings (with different pronunciations) of the word depend closely on the words around it and their meaning and the order in which they are arranged. Thus, it is argued a child learning by sentence method will have clues to the nature and meaning of individual words from the rest of the sentence which are denied to someone learning entirely by word wholes.

II. SOUND METHODS:

a) THE ALPHABETICAL METHODS:

The learner is taught the names of the letters and has to recognize them by these names, eg. A-apple, B-bat etc. When the pupil has acquired his alphabet, he is introduced to words. For each he is required to say the letters and then the word-bee-aytee-bat. By this means he memorizes the words and the spelling.

b) PHONICS METHODS:

Here, the letters are given their sounds and the pupil has to blend or run these into one another to make up the pronunciation of the word. This depends on his knowing the word already, for no pronunciation of individual letter sounds build up exactly into the sound of the whole word.

c) LETTER PHONICS:

In this approach, individual letters are sounded and the sounds run together to approximate to the sound of the whole word. However, the limitations are that there are only 26 letters in English, but these stand for over 40 sounds. The usual way of dealing with this is to introduce the sounds in sequence in the early readers to ensure that the learner understands one way of sounding before proceeding to others.

MODELS OF READING:

Models of reading incorporate both routes and attempt to explain the process of reading and the disorders of reading.

1. One influential model has been proposed by Johnston and Mc Clelland (1980). In the first stage, letter - position preprocessing, each letter in a word is simply segregated from its background, and its ordinal position noted. The outcome is that the word has been encoded as a sequence of unanalyzed visual blobs, each labeled with its ordinal position in the sequence of blobs. In the next stage, feature detection, each blob is

subjected to feature analysis. At the next stage of abstract letter detection, all 26 letters of the alphabet are represented by individual letter detectors. Every feature detector in the feature-detection stage is linked to every letter detector in the letter detector stage. The letter detector for any letter is used to identify that letter regardless of its precise visual form. That is why the letter detectors are reduced to abstract; ie, they do not provide information about specific visual form.

2. FRITH'S THREE-PHASE MODEL:

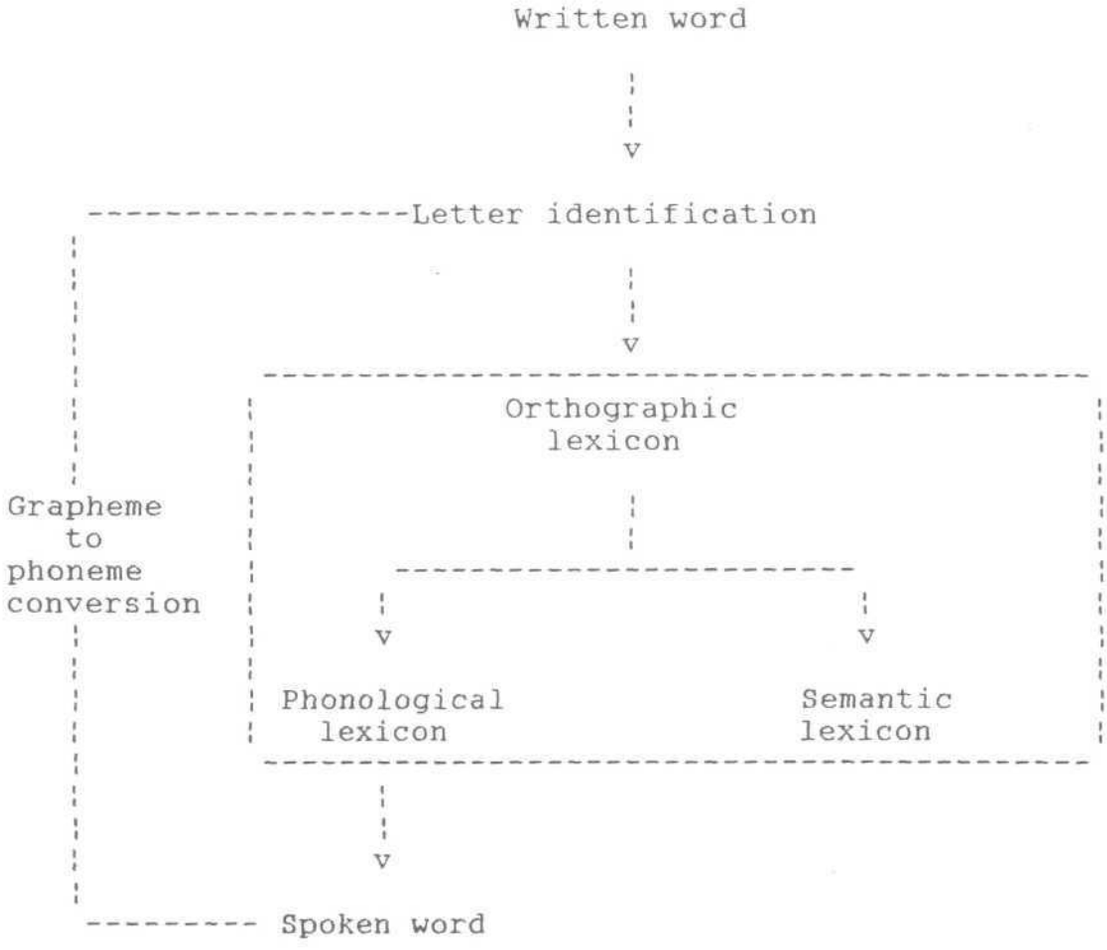
Frith (1985), posits three kinds of strategies that characterize three different phases in her developmental model. Phase 1 is also called as the logographic phase. In this phase, children learn words as visual forms, much as the children learn the characters of their logographic script. Phase I builds on metalinguistic awareness of instructional terms such as sentence and word. It is characterized by rapid growth in recognizing whole words. These words, usually represent concrete or 'picture- able' concepts and objects. Phase 2 - is described by Frith as the alphabetic phase. In this phase, children acquire and learn to use the grapheme-phoneme correspondence. Frith suggests that explicit phonological awareness might be a critical mechanism supporting the transition from the logographic phase to the alphabetic phase.

The third and final phase is described as the orthographic phase. In this phase, children can instantly analyse words into orthographic units (eg. frequently occuring letter clusters, such

as the suffixes-ed or-able or the syllable units sub and com) without phonological conversion. This ability is believed to be crucial if a reader is to achieve speed and fluency.

NON LEXICAL (RULES) MODEL:

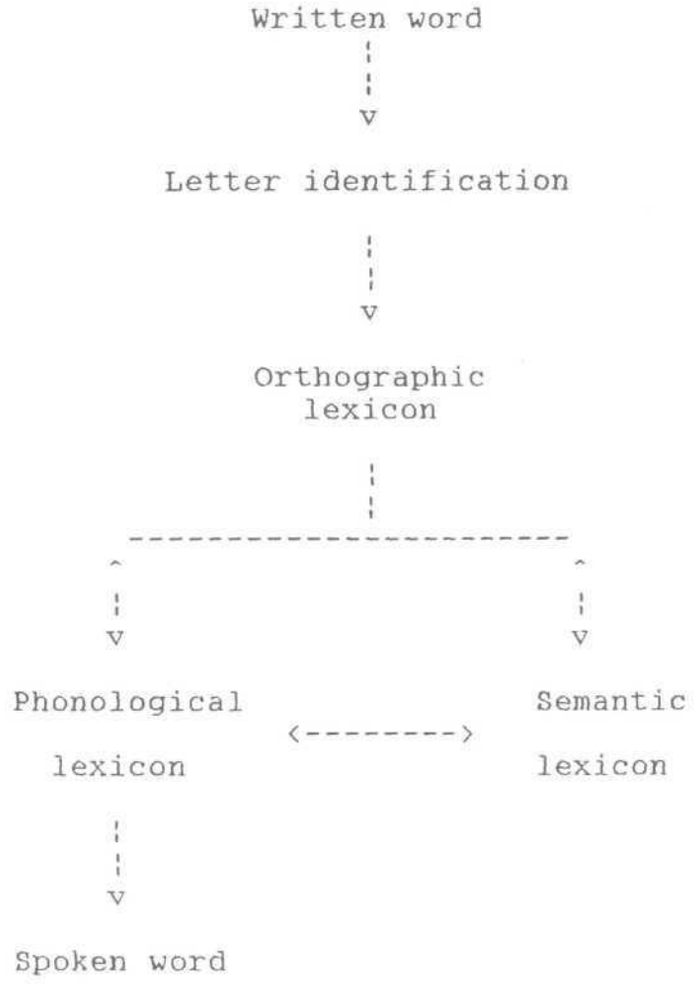
According to this model, depicted in figure 1, the pronunciation of a written word may be obtained by consulting the lexicon or it may be obtained non lexically, through the use of a system of orthography-to-phonology conversion rules (Caramazza et al; 1986 : Patterson and Shewell, 1987). Impaired access to the phonological lexicon would force reliance upon the non lexical leading route, and the quality of the resultant reading would depend upon the characteristics of this non lexical pathway.



Since this route is rule driven, one could expect oral reading errors on words whose pronunciations do not follow the rules of orthography to phonology conversion (ie, irregular words).

4. LEXICAL (NO RULES) MODEL:

According to this model, when a letter string is viewed, the corresponding entry in the orthographic lexicon is aroused. In addition, orthographically "Similar - neighbourhood" entries are aroused. The entry that is an exact match with the stimulus receives maximal activation : neighbourhood words receive only partial activation. If there is no exact match in the orthographic lexicon - either because the subject is unfamiliar with the word or because it is, infact, a pseudoword - then no one orthographic entry receives maximal activation. A pronunciation is derived from the initially activated neighbourhood words, in a process of 'analogy' (Glushko, 1979, 1981 : Kay and Marcel, 1981), although the exact procedure by which this occurs are unclear. For example, the pseudoword hin' might have activated the real words him, hit, pin and sin. These partially activated words combine to yield the composite pronunciation "hin' given in fig.2.



Most of the theoretical models of reading as also much of the empirical work carried out to verify these theories have been based on readers of alphabetical scripts such as English.

EXPERIMENTAL STUDIES ON FACTORS RELATED TO READING

Reading proficiency is rooted in language abilities. For more than 30 years, researchers have been investigating aspects of language knowledge as well as discrete language processing abilities that contribute to reading proficiency.

Literature reveals some variables which have an effect on naming speed and accuracy of reading. The frequency of occurrence of the word and length of the word in terms of number of letters and syllables have a well established effect. Other than this, the item type ie, whether it is a word or a nonword also has an affect on reading. In case of a word, the word class, concreteness - abstractness of the word and the complexity of the word in terms of presence of initial and final syllable clusters have an effect on reading. In case of a non word, its orthographic legality or the phonological lawfulness, pronunceability its structure and form in terms of being homophonous with a word have an effect on reading. Summarizing the above mentioned variables, the following list has been obtained.

1. Word frequency.
2. Word-length in terms of number of letters and syllables.
3. Concreteness vs Abstractness of the word.
4. Word class- Noun vs Verb.
5. Word complexity - presence of initial and final syllable clusters.
6. Word vs Nonword.
7. Non word characteristics.
    a) Orthographic legality.
    b) Pronounceability.
    c) Structure and form.

Studies on response time measures:

Rapid naming tasks have been proposed to reflect the ease with which the sound and meaning of a word is accessed. Psychologically, concreteness can be defined in terms of the ease with which the stimulus evokes an image of an object or objects or simply as the picturability of a stimulus. Objects or their pictorial representations obviously arouse images directly and pose no conceptual problem in this context. Concrete terms presumably derive their meaning through association with concrete contextual association with other words, and nonverbal images and verbal processes as associative reactions. Abstract terms, on the other hand, derive their meaning largely through intraverbal experiences and more effectively arouse verbal associative than imaginal processes, although the latter could also occur as reactions to some abstract terms. Concrete and abstract words are thus distinguished primarily on the basis of their differential capacity to evoke concrete images as associative reactions, not on their verbal associative meaning (the number of verbal associative responses evoked by a word).

The positive effect of concreteness extends to variation within words alone. Jampolsky (1950) found slightly better recognition and a much lower number of false recognitions for concrete words than for abstract words. Gorman (1961) having categorized nouns as concrete and abstract on the basis of judges ratings also found recognition memory to be much better for the concrete nouns.

Gorman had controlled for frequency in her study, but neither experiment took, associative meaning into account. In as much as associative meaning correlates substantially with noun concreteness and imagery, the effective attribute is indeterminate in both studies. Olver (1965) attempted to vary concreteness and associative meaning independently in memory experiments. She was able to achieve only limited control over the variables because the necessary normative data on word attributes were available for only a relatively small sample of nouns at the time. Therefore, imagery concreteness and associative meaning were somewhat confounded. Despite this, the result showed that concreteness had a slightly positive effect independent of meaning and frequency.

It can be concluded from the above studies that recognition memory is a direct function of stimulus concreteness. Recognition increases from abstract words, to concrete words, to pictures. These findings are generally consistent with the interpretation that concreteness is related somehow to distinctiveness.

Paivio (1969) found that information embedded in concrete words is easier to learn than information conveyed in abstract words. He suggested that imaging should facilitate recall of meaning by forming a "thema" (Paivio 1971) and that dual coding (verbal and imaginal) is superior to single coding. Kintish (1974) has offered a viable explanation of the role of mental imagery. He suggests that high imagery words are represented in a subjective lexicon by a few strong relations while low imagery

words enter into more relations with other words and these latter relations are more diffuse. When learning to associate a high imagery word with a printed form readers should have a smaller pool of strong cues to choose from making the correct response easier for them to encode and to retrieve.

One of the earliest studies on the effect of relative frequency of the occurrence of a word in English has been done by Howes and Solomon in 1951. Their study attempted to find experimentally the function relating duration threshold to the relative frequency with which a word appears in the English language. Two experiments were conducted wherein the subject was instructed to respond whenever he felt ready to respond as the duration of exposure and not the latency was measured.

In the first experiment 60 words were made use of, 30 were of high frequency occurrence,while 30 of them appeared with relative rarity. The low frequency words were similar to and preferably synonyms of the common ones of the same value category. Results demonstrated a strong inverse relation between relative word frequency and duration threshold.

In the second experiment, several uncontrolled factors were forced upon the previous (first) experiment. The words varied in length from 6 - 12 letters and were arranged in order of decreasing frequency. Results demonstrated the same relationship between duration threshold and long word frequency. It was also observed that practice trial decreased duration threshold.

Tainturier, Tremblay and Lecours (1992) examined the relationship between educational level and word frequency effect. It was postulated that individual exposure to words that are rated lower in frequency tables should be greater among subjects with higher education and therefore hypothesized that the magnitude of the frequency effect should not be as marked within such a population as among subjects with a lesser educational level. A total of 40 neurologically healthy adults, half with an average of 18years of formal education and the other half with an average of 11 years participated in a lexical decision experiment. Results confirmed the hypothesis, that is, significant frequency effects on reaction times were obtained in both groups but this effect was of greater magnitude for the less educated as opposed to the more educated subgroup.

Experiments were done by researchers where the lengths of the words were varied in terms of both syllables and letters. Forster and Chamber in 1973 made use of 30 words which were divided as follows:

1/3 of the words - monosyllables of 4 letters.

1/3 of the words - bisyllables of 4 letters.

1/3 of the words - bisyllables of 6 letters.

The subclassification of items according to the number of letters and syllables presented a number of potentially interesting results. Comparison of the four letter monosyllables and four letter bisyllables reveals the effect of number of

syllables, with number of letters controlled, while comparison of the four letter bisyllables with the six letter bisyllables reveals the effects of number of letters, with the number of syllables controlled. The number of syllables had no significant effect on naming time, while the number of letters had a significant effect, with long words taking longer to name.

Stanners et al, (1975) varied the length of the word in terms of syllables. They made use of words which contained 5 - 7 letter, which in turn were divided into monosyllabic and bisyllabic words of high and low frequency. Response latency was measured in a task which required the subjects to make a word nonword decision to a visually presented item (Stanners, Jastrzembski and West Frock, 1975). The items were of either high or low frequency in the language, words or well formed non words, and either presented with normal visual clarity or degraded by a random dot pattern. While both frequency and item quality produced substantial effects for both words and nonwords, there was no indication of an interaction effect. The superiority of relatively high frequency items was almost exactly the same under degraded as under nondegraded condition. Item quality and the type of item (word, nonword) did show an interaction in that the latency difference between words and non words was much larger under degraded as compared to nondegraded conditions.

Experiments on word - nonword classification have been done based on the hypothesis put forth by Rubenstein, Lewis and Rubenstein in 1971. To find evidence of phonemic recoding in

visual words recognition three hypotheses were put forth. They are as follows:

a) A word is recognized by phonemic recoding when presented visually.

b) Phonemic recoding occurs during the quantization process, that is, when the stimulus is segmented and the segments are assigned to letters, the letters are recoded into phonemes almost simultaneously.

c) It is the phonemic form of the stimulus lexicon that are compared to achieve the recognition of a word, even when the word is presented visually.

The task was to decide accurately and quickly whether the word was English by pressing the key 'yes' and 'no' for a word and nonsense word respectively.

Non words which have been constructed in the various experiments done on word-nonword classification, can be of a variable nature. The non-words were varied in terms of its length, structure and orthographic legality or phonological lawfulness.

Rubenstein et al , in 1971 made use of non-words whose length varied from 4 to 5 letters. They were of 2 kinds:

1. Those non-words which were homophonous with English words (eg. Slic, trate) and

2. Those non words which were non-homophonous with English words (eg. Melp, shert).

In another experiment by the same researchers, non-words used were of 3 types:

a) Orthographically and phonologically legal (eg. Strig, barp).

b) Illegal non words which had a formal consonant cluster which never occurs finally as letters or phonemes in the final position in English - (eg. lamg). Yet these non words were pronounceable.

c) Illegal non words which were unpronounceable (eg. tritv, likj).

This approach was presented for the support hypothesis that visual word recognition may involve recoding from graphemic to phonemic form prior to any search of the internal lexicon. The approach was to show that in the case of nonsense words which are graphemically and phonemically illegal, the latency for visual recognition is shorter for the less pronounceable words. This should occur even when the graphemic clues to their nonsense character are not more evident than for the more pronounceable words. The results showed that latency for legal nonsense words was longer than latency for illegal nonsense words of higher pronounceability which in turn was longer than latency for illegal nonsense word of lower pronounceability.

Whaley 1978 conducted a study designed to investigate thoroughly the relative influences of an extensive set of variables. Response time data were collected from 32 subjects from 100 words and 100 non words which were matched for word length, letter frequency, diagrams, meaningfulness and age of acquisition. The non words were created by selecting a second set of 100 words from the same norms and changing one letter per syllable in each. The resultant words were pronounceable and few, if any, contained rare or unusual letter or phoneme sequences. The non words were also rated for their proximity to English word likeness.

Results showed that while both word frequency and word length have been shown to affect correct response latencies in previous work (Stanners et al 1975, Forster and Chambers, 1973) it is now apparent that word frequency is by far the most powerful predictor.

Forster and Chamber in 1973 conducted an experiment to find out if there exists a correlation between naming time and lexical access. In the 60 items used, 30 were words, 30 were non words prepared by rearranging the letter of each of the words but preserving pronounceability. For example - over-vero, into-tino. Results indicated that words were named faster than non words. High frequency words were named faster than low frequency words. This strongly indicates that the naming process is not completed before the lexical status of the item has been established by a lexical search. Naming of words is accomplished by a dictionary

look - up ; the more rapidly the lexical entry for a word is located, the more rapidly naming can take place. A positive correlation exists between naming time and lexical decision time for words but not for non words.

In order to find out the effects of pronounceability on word non word encoding, Rubenstenin et al, (1975) designed experiments in which subjects performed both a word - non word categorization task and a recognition task. Reaction times in the categorization task increased with non word pronounceability and decreased with real word familiarity. Common words and low-pronounceability non - words were categorized with equal rate. Error propositions were related to pronounceability in the same way as was reaction time. Rare words and highly pronounceable non words were equally well recognized in terms of time taken which suggested that they were similarly encoded.

Summarizing the influence of various factors on naming latency, we can conclude that word frequency, structural attributes, meaningfulness, pronunceability, concreteness and emotional connotations, all influence the naming latency.

Numerous studies have shown that common words are easier to recognize than rare words. Although common and rare words differ on other characteristics besides frequency, the frequency effect seems to be generally independent of such correlates.

The effects of structural attributes such as length, pronounceability and phoneme structure are also important. Length may vary in terms of number of letter and / or number of

syllables. The structure of the respective language should be taken into consideration. Spoken words may be represented as a string of syllables of phonemes in different languages. Indian orthographic system is a mixture of syllabic and alphabetic principles (Fukuzawa and Prakash, 1993). The alphabetic segments are combined to form syllabic units which are spatially delimited and in principle, each syllable form can be analyzed into its consonant and vowel components. The syllabary system may initially pose problems in terms of the multiplicity of symbols, the mastery of which may take a longer time. But once all the symbols are learnt, the nearly perfect grapho-phoneme correspondence of Indian orthography should make oral reading easier to even a functionally poor reader.

The experiments cited have also shown that word concreteness and mental imagery also play a significant role in latency of word recall with the mental imagery and stronger relations assisting in quicker recall of concrete words when compared to abstract words.

Alphabetical scripts like English, make use of a letter by letter decoding process in reading. Reading takes place by linear decoding ie, the letters are grouped in a horizontal manner. Here, letters are grouped depending on their linear sequence.

Eg. Unremarkable.

In the above example un' forms one group of letters, 'remark' another and 'able' the third group. The grouping is in a horizontal manner.

A syllabic script like Kannada, (a South Indian Dravidian Language) contains a syllable as a vertically delineated visual unit as against the horizontal sequence in an alphabetical script. The decoding here takes place initially in a vertical manner where the grouping of letters in a syllable is already present in the written word. Here the units are syllables or syllable clusters which are grouped vertically.

Eg. 

Transcription : Agastya

will be as v/cv/cccv/

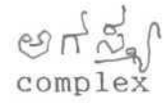
Thus, there is a difference in decoding alphabetical and syllabic scripts in terms of direction of decoding.

In alphabetical scripts, a reader, based on his knowledge of the word breaks up a word into syllables whereas in a syllabic script, the break up into syllables is present in the word. Thus a reader in Kannada can easily say how many syllables a word contains as compared to a reader of English, on the basis of the visual configuration alone, without access to word knowledge.

In the syllabic script a complex syllable such as a cluster eg. CCCV would be presented as one visually complex form for Eg. in the word /agastya/ the third syllable / stya is written as one unit .

Given below are 2 words in the same script while both are trisyllabic, one is orthographically simple, the other is complex.


simple


complex

If syllabic scripts are read syllabically, irrespective of simplicity or complexity of the syllable, then both these words should take the same time for reading, if they are matched for frequency. However, if it is the number of letters (phonemes) that determine the length of the word, then the latter should have a greater naming time than the former. The differences can be attributed to the orthographic difference between the two.

A study was done on the reading time for words and non words of varied length, but matched for frequency, word class and concrete-abstractness, to study the effect of the orthographic features of Kannada, if any on the contribution of established factors in rapid reading such as the relative role of whole word vs phonologically mediated route, the effect of length as measured in number of letters Vs syllables and orthographic complexity (Roopa 1994).

Results indicate a significant difference in rapid reading between words and non words, supporting the hypothesis that words are read by whole word route which is faster than PMR.

However, words are not read by the whole word route alone. PMR contribution to word reading is present since when word frequency and other such factors are controlled there are still

differences in reaction times for words of various length and complexity, with a linear relationship existing between word length (in terms of number) and reaction times. But this relationship is not seen at small word lengths, that is at bisyllabic level where it was seen that bisyllabic non words were read with equal speed as that required for bisyllabic real words.

Also given the same syllabic length, complexity makes a difference, with complex words taking longer to read possibly because the syllables are not processed as single units but are further decoded into the number of phonemes that they are comprised of. Therefore in languages like Kannada word length should be measured in terms of number of letters rather than number of syllables. But again this effect was seen at longer word lengths that is at the tetra syllabi level. At the bisyllabic and trisyllabic level there was no significant difference in reaction time between simple and complex words. However, little is as yet known about the effect of factors such as concrete as abstructners and word frequency in rapid reading of words written in syllabic scripts like Kannada.

METHODOLOGY

METHODOLOGY

The pronunciation of a visually presented word involves assigning to a sequence of letters, some kind of acoustic or articulatory, coding. The function of the time taken to apply the phoneme grapheme correspondence and then finding the word in the lexicon, is referred to as lexical access and naming time.

There are presumably two alternative ways as to how this coding takes place. First, the pronounication could be obtained by searching the long term memory for information as to how that familiar sequence of letters is pronounced, obtaining the information by a direct dictionary look up. The other approach involves a system of spelling to sound rules. This coding can be carried out independent of any consideration of the meaning or familiarity of the letter sequence as in the pronunciation of a previously unencountered sequence.

As already mentioned a number of variables have an effect on the speed with which this decoding is carried out and the accuracy with which the person is able to read.

Since from the previous Kannada study, (Roopa R. 1994) it is obvious that word length in terms of number of letters is a more significant factor than number of syllables, further effects of variables such as word frequency and abstractness vs concreteness is studied keeping length in terms of number of letters constant.

To study the effect of concreteness vs abstractness a list of concrete and abstract words were taken matched for their frequency, length and orthographic complexity.

In order to study the effect of word frequency word pairs matched for all other factors but belonging to two distinct frequency bands were formed.

Preparation of Materials:

List of concrete and abstract words were prepared controlling the following variables.

a) Word frequency: defined as the relative occurrence of the word in that language. (Ranganatha M.R. 1982) 2 frequency bands were obtained.

   1. Low frequency - Obtaining a score of less than 10.
   2. High frequency - Obtaining a score of 10 and above.

b) Word Length: in terms of number of letters. The words were matched in terms of the number of letters they contained. Most of the words selected were bisyllabic with a few trisyllabic words too.

c) Orthographic complexity: The orthographic complexity varied in terms of the presence or absence of a syllable cluster in the word and each pair of words were matched for orthographic complexity.

Controlling for the variables described above, word lists were prepared in the following manner.

Two major lists were prepared - one list of concrete words and one list of abstract words. A total of 90 items were prepared in which there were 45 concrete words and 45 abstract words.

The list of words were divided into three groups.

1) Group I - Contained 30 word pairs of concrete and abstract words matched for all other factors.

2) Group 2 - Contained 30 word pairs consisting of concrete words which were matched for all factors except for frequency of occurrence. One word of the pair belonged to the high frequency group the other to the low frequency group.

3) Group 3 - Contained 30 word pairs consisting of abstract words which were matched for all factors except for frequency of occurrence. One word of the pair belonged to the high frequency group the other to the low frequency group.

A practice list of 10 items was also prepared to be presented before the experiment. It consisted of 5 concrete words and 5 abstract words.

Word lists are given in the appendix.

SELECTION OF SUBJECTS:

Subjects for this study had to meet the following criteria.

1) should be normal, healthy adult.

2) should be in the age range of 15-45 years.

3) should have had atleast 10 years of formal education in Kannada.

20 subjects who met the above criteria were taken.

PROCEDURE

The lists were programmed into a Macintosh computer, where the application 'Psychology Lab' was used for the experiment. In brief, the experimenter specifies various parameters defining the events in the experiment, then chooses an input file containing the stimulus items and runs the experiment on line. Interstimulus intervals with response time and type can be specified. All timing is carried out in milli seconds. Means and standard deviations for different responses on each trial are computed.

Subjects were instructed to press any key as soon as they finished reading out a word that had appeared on the screen. They were also instructed to read the word as fast and as accurately as they could. The words in each list was randomized

before being presented to the subjects. All groups were first presented a practice trial of 10 items. A reinforcement was provided to the subjects after the practice trial regarding their performance. This helped the subjects improve their responses on the experimental trials. The incorrect responses were not considered. The reaction time measures recorded by the computer were then analyzed to obtain the results.

RESULTS AND DISCUSSION

RESULTS AND DISCUSSION

Naming time for concrete words and abstract words matched for frequency, word length and complexity was measured to study the effect of word type if any on the contribution of established factors in rapid reading in Kannada. Also the effect of word frequency was measured by comparing high frequency words and low frequency words of both concrete and abstract type. Table 1 (a) shows the average reaction time scores obtained by subjects for the concrete words and abstract words.

X_1 : Concrete words

MEAN	STD.DEV.	STD. ERROR	VARIANCE	COEF. VAR.	COUNT
658.579	206.471	46.168	42630.44	31.351	20

MINIMUM	MAXIMUM	RANGE	SUM	SUM OF SQR.	#MISSING
312.73	1033.8	721.07	13171.59	9484517.51	0

X_2: Abstract words

MEAN	STD. DEV.	STD. ERROR	VARIANCE	COEF. VAR.	COUNT
691.628	198.033	44.282	39217.2	28.633	20

MINIMUM	MAXIMUM	RANGE	SUM	SUM OF SQR.	#MISSING
344.53	1088.3	743.77	13832.55	1.031E7	0

Table No. 1 (a) : Average reaction time scores for concrete words and abstract words.

Statistical t-test was done for the above measure to find out the significance of the results. Table 2 (a) shows the 't' value and the probability score for the concrete and the abstract words. As indicated there was no significant difference in rapid reading between concrete words and abstract words.

DF	MEAN X - Y	PAIRED t VALUE	PROB. (2-tail)	SIGNIFICANCE
19	- 33.048	- 1.352	.1921	NO SIGNIFICANT DIFFERENCE

Table 2 (a) : 't' test scores for concrete words and abstract words.

Table 1 (b) shows the average reaction time scores obtained for low frequency and high frequency words of the concrete and abstract type. The mean frequency of occurence of the low frequency concrete words was 3.23 and high frequency concrete words was 25.73. The mean frequency of occurence of the low frequency abstract words was 3.63 and high frequency abstract words was 65.23.

WORD TYPE		CONCRETE	ABSTRACT	TOTALS
FREQUENCY	HIGH	20	20	40
		639.201	624.871	623.036
	LOW	20	20	40
		632.779	607.999	620.389
TOTALS		40	40	80
		635.99	616.435	626.213

Table 1 (b) : Average reaction time scores of high frequency and low frequency words of the concrete and abstract type.

Anova was done for the 2 factor analysis of variance for word frequency and word type. Table 2 (b) shows the F ratios and probability values for word frequency and word type (concreteness-abstractness). Results showed that there was no significant difference in reaction time between low frequency words and high frequency words, between concrete words and abstract words and between word frequency and word type as a whole.

SOURCE	df:	SUM OF SQUARES	MEAN SQUARE	F-test	P VALUE	SIGNIFICANCE
{Frequency (A)	1	2713.169	2713.169	0.069	.7929	NO SIGNIFICANT DIFFERENCE
Word Type (B)	1	7647.765	7647.765	0.196	.6596	NO SIGNIFICANT DIFFERENCE
AB	1	545.856	545.856	0.014	.9063	NO SIGNIFICANT DIFFERENCE
Error		2971772.718	39102.273			

Table 2 (b) : Anova table for a 2-factor analysis of variance on mean RT

This suggests that in semisyllabic scripts like Kannada which have a near perfect and more transparent grapheme to phoneme correspondence compared to the more complex alphabetic script of English, word length plays a major role in the rate of reading while word frequency and word type effects are not obvious.

This is further substantiated by the fact that in the previous study done by Roopa (1994) it was seen that the reaction time increased linearly with increase in word length. There was also a significant difference between words and non words and between simple words and complex words at the tri, tetra and pentasyllabic levels. It was also observed that at bisyllabic level there was no difference in reaction time between simple words and their nonword counterparts and between simple words and

complex words. However the complex non words clearly required a greater reaction time at all word lengths. This suggests that word length is the main overriding factor in rapid reading. Roopa suggested that the exception of the simple bisyllabic words was probably attributable to the relative infrequency of these words as compared to the trisyllabic words. In the current study there is no significant difference between high frequency words and low frequency words. In view of these results the explanation offered by Roopa (1994) for the longer time taken by bisyllabic words as compared to trisyllabic words is untenable and needs further investigation.

It is also possible that word type and word frequency effects may be more distinct at longer word lengths. Since this study included mainly bisyllabic words this possibility could not be verified and needs further investigation.

SUMMARY & CONCLUSION

SUMMARY AND CONCLUSION

Proficient reading is a skill developed through years of experience. Various factors influencing this ability like word type (concreteness and abstractness) word frequency, word length, meaningfulness of the word, orthographic complexity etc. were controlled and rapid reading tasks assigned to subjects in Kannada. Subjects had 10 years of formal education in Kannada. The experiment was carried out using a Macintosh computer. Results showed there was no significant difference in reading rates between concrete words and abstract words and between high frequency words and low frequency words. This suggests that in semisyllabic scripts like Kannada word length was the major factor contributing to rapid reading while word frequency and word concreteness and abstractness played a minor role. This is possibly accounted for by the fact that this script has a more transparent grapheme to phoneme correspondence which enabled reading of both concrete words and abstract words and high frequency words and low frequency words with equal rapidity.

The conclusion is in agreement with that of the previous study in Kannada done by Roopa R. (1994) where it was found that the reaction time for reading increased gradually with words of increasing length. It is possible that word type and word frequency effects would appear with words of increasing lengths. Since this study included mainly bisyllabic words this effect could not be verified.

Implications of this study:

1) Rapid reading in semisyllabaries like Kannada are not affected to the same extent by variables such as word type and frequency as in alphabetic scripts like English.

2) Studies such as these are required in investigating into the nature and type of reading and dyslexia in Kannada.

3) However further investigations need to be carried but with words of increasing length to see if word type and word frequency effects are noticeable at longer word lengths and with greater number of subjects.

BIBLIOGRAPHY

B I B L I O G R A P H Y

Engelkamp, J. Word meaning and word recognition. In T.B. Seiher, and W. Wannenmacher (Eds), Concept development and development of word meaning. Springer-Verlag, New York 1983.

Forster, K.I., and Chambers, S.M. (1973). Lexical access and Naming time, Journal of Verbal learning and Verbal behaviour, 12, P 627-635.

Fukuzawa, S., and Prakash, P.(1993). Does Orthography interact with instructional processes ?. Tsukuba Psychological Research, Vol 15, P 101-106.

Gorman. (1961). cited by Paivio, A. (1971). Imagery and Verbal Processes. Holt, Rinehart & Winston Inc.

Howes, D., and Solomon, R.L. (1951). Word duration threshold as a function of word probability. Journal of Experimental Psychology 41, P 401-410.

Harris, M., and Coltheart, M. Language processing in children and adults - An Introduction. Rout Ledge, Chapman and Hall Inc, 1989.

Jampolsky. (1950), cited by Paivio, A. (1971). Imagery and Verbal Processes. Holt, Rinchart & Winston Inc.

Kintsch (1974). cited by Downing, J., and Leong, C.K. (1982). Pyschology of Reading, New York, Macmillan Publishing Co Inc.

Olver. (1965). cited by Paivio, A. (1971). Imagery and Verbal Processes. Holt, Rinehart & Winston Inc.

Paivio (1969-71). cited by Downing, J., and Leong C.K. (1982). Pyschology of Reading, New York, Macmillan Publishing Co Inc.

Ranganatha, M.R. Morphephonemic anlaysis of the Kannada Language. Central Institute of Indian Languages. Mysore 1982.

Roopa, R. (1994). Orthographic effects on Naming Speed and Accuracy of Reading. Unpublished masters theses submitted to the university of Mysore, Mysore.

Rubenstein, H., Lewis, S.S., and Rubeusteing, M.A. (1971). Evidence for phonemic recoding in visual word recognition. **Journal of Verbal learning and Verbal behaviour, 10,** P645-657.

- Rubenstein, H., Richter, M.L., and Kay, E. J. (1975). Pronunceability and the visual recognition of nonsense words. **Journal of verbal learning and verbal behaviours, 14, P** 651-657.

Tainturier, M., Tremblay, M., **and** Lecours, A.R. (1992). Educational level and the word frequency effect: A Lexical decision investigaton. **Brain and Language, 43, P** 460-674.

Wilkinson, A. **The foundations of Language - Talking and reading in young children.** Oxford studies in Education, 1975.

Whaley, C. P. (1978). Word - nonword classification time. **Journal of Verbal learning and Verbal behaviour, 17,** P143-154.

APPENDIX

LIST OF WORDS

1. LIST ONE

CONCRETE		ABSTRACT		CONCRETE		ABSTRACT	
ಕೆಲಸ	-	ಬಡ	(12)	ಕೆಲ್ಲೆ	-	ಲೆಕ್ಕ	(10)
ಕಾಡು	-	ಕೊಗು	(10)	ಕಾಲಿ	-	ಬಾರ	(18)
ಬಟ್ಟೆ	-	ಮುಚ್ಚಿ	(10)	ನೀರು	-	ದೂರ	(32)
ಹಲ್ಲು	-	ಹುಟ್ಟಿ	(14)	ಕಣ್ಣು	-	ನಣ್ಣ	(64)
ಬಣ್ಣ	-	ಕಪ್ಪು	(10)	ಮಳೆ	-	ನೆಳ	(14)
ತಾಲು	-	ಬೆಗ	(24)	ಬಾಯಿ	-	ಕೊಡಿ	(30)
ಅಕ್ಕ	-	ಅಡಿ	(14)	ಪತ್ರ	-	ಮುಟ್ಟಿ	(4)
ಉಡುಪು	-	ಉದಯ	(1)	ಮೆದುಳು	-	ಜಟಿಲ	(1)
ಬಾಲ	-	ತಾಪ	(1)	ಚಾಕು	-	ಜೋರು	(1)
ಕಾನು	-	ಮೊನೆ	(14)	ಟೋಪಿ	-	ತಾಪ	(1)
ಹತ್ತಿ	-	ಸಿಕ್ಕ	(16)	ಕಾಗೆ	-	ಕಾದ	(3)
ಗಾಳಿ	-	ದಾಟಿ	(10)	ಕಾಲು	-	ಕಾರ	(1)
ಹಣ್ಣು	-	ಸಿದ್ಧ	(13)	ಕಲ್ಲು	-	ನಕ್ಕ	(17)
ತಾಲಿ	-	ತಾಗು	(24)	ಮೋಣ	-	ಜೋಡು	(1)
ಕೋಟೆ	-	ನಿಗ	(10)	ಕಪ	-	ತೆಗ	(1)

NOTE: The numbers in the brackets indicate the frequency of occurence of both the concrete words and abstract words.

2. LIST TWO : CONCRETE WORDS

HIGH FREQUENCY		LOW FREQUENCY		HIGH FREQUENCY		LOW FREQUENCY	
ಮನೆ	(72)	ಬಳೆ	(2)	ಮರ	(11)	ಡಸು	(3)
ಡಣ	(46)	ಗೆರೆ	(3)	ಡಾಸಿಗೆ	(12)	ಕಾಲಿನ	(3)
ಮೂರು	(57)	ಕೊಳಿ	(3)	ಊಟ	(33)	ಆಜ್ಞ	(6)
ತಲೆ	(67)	ಮಣೆ	(1)	ರೂಪಾಯಿ	(14)	ಕೊಡಲು	(2)
ಜನರು	(54)	ಕಡಲು	(1)	ನೆಲದ	(11)	ಕುದುರೆ	(8)
ಮುಖ	(48)	ತುಳಿ	(8)	ರಾಣಿ	(15)	ಚಿಲಿ	(5)
ಕಾಲು	(34)	ಮೆಜು	(1)	ಅಮ್ಮ	(12)	ಅಜ್ಜಿ	(6)
ಮದುವೆ	(33)	ಡಳಡಿ	(2)	ಅಕ್ಕ	(17)	ಅಣ್ಣ	(8)
ಹುಡುಗಿ	(16)	ಗಿಡದ	(4)	ಡುಡುಗ	(33)	ಮೊನೆಳೆ	(2)
ರಾಳೆಯ	(29)	ಚಾಲಿಗೆ	(1)	ತೋಟದ	(11)	ಕೋತಿಯ	(1)
ಬೆಳೆ	(29)	ಪೆಡೆ	(1)	ಪೋಲಿನ	(12)	ಬಾಲಕ	(2)
ನದಿಯ	(10)	ಕಟಕ	(1)	ಪುನ್ಕಕ	(10)	ಕೊಬ್ಬರಿ	(4)
ಕಾಗದ	(24)	ಪಾಯಸ	(1)	ಡಕ್ಕೆ	(11)	ಕಬ್ಬು	(4)
ಕಲ್ಲು	(15)	ಬೆಟ್ಟ	(6)	ಬೆಂಕಿ	(12)	ಲಂಗ	(5)
ಪಾತ್ರ	(14)	ನೂರ್ಯ	(2)	ಚಿನ್ನದ	(10)	ಅಗ್ನಿಯ	(1)

3. LIST THREE : ABSTRACT WORDS

HIGH FREQUENCY		LOW FREQUENCY		HIGH FREQUENCY		LOW FREQUENCY	
ಪ್ರೀತಿ	(202) –	ಬಾಕಿ	(4)	ಬಾರಿ	(35) –	ಜಾತಿ	(5)
ಹೇಳಿ	(188) –	ರೋಗ	(3)	ನೀರಿ	(38) –	ದಾನ	(8)
ಮಾಡಿ	(127) –	ಜಾರಿ	(7)	ನೀಡಿ	(24) –	ಬೀರಿ	(1)
ಮಾತು	(163) –	ಜಾಣ	(1)	ಬೇಡ	(28) –	ರಾಗ	(3)
ನೋಡಿ	(134) –	ಪೂಜೆ	(6)	ನೋವು	(22) –	ಚಿಂತೆ	(1)
ಪ್ರೀತಿ	(85) –	ಗತಿ	(10)	ದಾಗು	(24) –	ದಾಡ	(1)
ನೆರಿ	(93) –	ಕಳಿ	(4)	ರೂಪ	(15) –	ಚಿಹ್ನೆ	(4)
ಬೇಕು	(95) –	ಕೊಡು	(1)	ನೋವೆ	(17) –	ಮೂನ	(7)
ಕೇಳಿ	(94) –	ತೂಕ	(3)	ಕೆಟ್ಟ	(15) –	ಪೊಳ್ಳು	(1)
ಬಡಿಕ	(118) –	ನಮಿನಿ	(1)	ಬಿಡ್ಡ	(22) –	ತಲ್ಪಿ	(8)
ಮೊದಲು	(99) –	ನಿಜವು	(6)	ನಾಲ	(18) –	ಜಾಗ	(3)
ಕೊಟ್ಟ	(93) –	ಬಿಚ್ಚಿ	(2)	ತೆಗೆದು	(24) –	ಬಿರಿದ	(4)
ಮುತ್ತು	(78) –	ಕಿತ್ತು	(1)	ನೆನೆದು	(14) –	ಮೆದವಿ	(1)
ಗೊತ್ತು	(20) –	ಮೆಟ್ಟು	(3)	ಕಲೆ	(10) –	ತುಳಿ	(1)
ಯಾಕೆ	(51) –	ಯಾಸಿ	(3)	ಅಪ್ಪ	(11) –	ತೊಟ್ಟು	(6)