

THE EFFECTS OF
SIXTH GRADE STUDENTS'
PROCESSES OF ACCESSING INFORMATION
(FOLLOWING THE NEURO-LINGUISTIC PROGRAMMING MODEL)
ON THEIR SPELLING ABILITIES

THESIS

Submitted to the Graduate Committee of the
Department of Education and Human Development
State University of New York
College at Brockport
in Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Education

by

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August, 1989

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ABSTRACT

This study was conducted to determine whether or not the process students use to access spelling information will predict their abilities to spell words correctly. The subjects involved in this study included 50 sixth grade students from low average, average, high average and gifted reading groups. Subjects were given an oral spelling test consisting of 12 words of mixed phonemic and visual complexity. Their eye movements were observed while they were completing the spelling task. Subjects' eye movements were then categorized as to their indication of processing in either the visual, auditory or kinesthetic mode. This analysis followed the Neuro-Linguistic Programming model. Results were analyzed using correlation regression technique. The coefficient of determination (r^2) was found to equal .11. This showed a very weak correlation between the process students used to spell (according to the Neuro-Linguistic Programming model) and their abilities to spell words correctly. The findings indicated that there is little support for the notion that it is possible to predict students'

abilities to spell words correctly based upon
their use of representational systems.

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Chapter I

Statement of the Problem

Purpose

The purpose of this study was to determine whether or not the process students use to access spelling information will predict their abilities to spell words correctly.

Need for the Study

Spelling ability is seen as an important skill in our world. Peters (1967) found that spelling disability can severely handicap a student. Inappropriately spelled words can become a barrier to communication. In addition, problems with spelling can hinder student ability to put forth ideas in written material.

Some students, despite having seemingly average abilities and intelligence, are unable to spell correctly and consistently the words to which they have been exposed. The great volume of research that has been conducted in the area of spelling suggests that difficulties in spelling do

exist, yet there is no consensus as to why these difficulties are present. Buckingham (1913, p.111) felt that "a powerful improvement in the teaching of spelling may be derived from a more critical knowledge and more accurate judgment on the part of teachers and supervisors of the material of the subject -i.e., of the words of the language." Hollingsworth (1918) asserted that spelling difficulties are often the result of people's non observation of small differences in words. The variety of explanations for spelling disability lead one to conclude that more research in this area must be pursued. "Cases of disability or serious difficulty in reading and spelling among children otherwise competent and without discoverable physical defects have been reported from time to time by teachers, physicians, neurologists, ophthalmologists and psychologists. The radical differences in diagnoses made by these several workers, although each has instruments and methods of value, betray the inadequacy of the technique for dealing with cases and the need for further study" (Gates, 1922, p.1).

Although studies dealing with spelling disabilities due to the difficulty of the words being spelled are plentiful, it is difficult to find recent studies in the area of spelling disability, especially studies dealing with the student's method of processing information. "Few cognitive psychologists have confessed an interest in spelling processes and only a handful in the last decade have suggested that this topic was worthy of serious investigation" (as cited in Frith, 1980, p.10). In addition, present research has not clearly defined how students who are good spellers are accessing this information. Bruck (1985) found that, although researchers have spent a great deal of time in the role of spelling-sound information and its role in reading, they have paid very little attention to the processes involved in spelling. Therefore, by following a course of study in the area of spelling processes, researchers will then be able to study methodologies designed to assist those with a spelling disability.

This study is aimed at attempting to discover if the way that people access spelling information

from an internal lexicon (visually, auditorially or kinesthetically) has any bearing on their abilities to spell words correctly. If, indeed, a significant correlation is found, and later causation determined, future research may provide ways to train students to access information dealing with spelling in a specific manner, thus improving the ability of students to correctly spell words.

The Neuro-Linguistic Programming model (N.L.P.) has been chosen as an assessment tool to conduct this research. Neuro-Linguistic Programming is a communications model developed by Richard Bandler (a mathematician) and John Grinder (a linguist). The model is based on the premise that by observing specific behaviors and listening to the predicates used in a person's speech, one can determine the primary mode (visual, auditory, kinesthetic) that the individual is using to internally process information. Further, when it has been determined how a person is processing information to complete a specific task (the meta-model), this process can be modeled by others to achieve excellence. (Grinder, 1989)

There are two reasons for the decision to use the Neuro-Linguistic Programming model in this study. First of all, it is a method which, with training, can be informally applied by the classroom teacher in assessing a student's method of accessing information by determining his/her lead system. Secondly, because people can be taught to use a particular lead system to produce generative change (Bandler & Grinder, 1979) future research may show that changing the use of a lead system when spelling may serve to make students more efficient spellers. The use of neuro-linguistic programming as a diagnostic device allows the teacher, with training, to gain accessing information on each student informally in a classroom setting.

Question

Is there a significant correlation between the process by which sixth grade students access information (as determined by the Neuro-Linguistic Programming model) and their abilities to correctly spell words?

Definitions

ACCESSING: process of getting internal information

ACCESSING CUES: non-verbal behaviors that show how information is brought to the representational system

EIDETIC IMAGERY: images recalled from past just as they were originally seen

GENERATIVE CHANGE: change in behavior

LEAD SYSTEM: favored internal process used to access information. Determined by habitual use of accessing cues.

LEXICON: store of language morphemes in a person's mind

LOOK AND SAY METHOD: learning to spell by looking at, and then saying the spelling of a word

META-MODEL: the sequence of representations a person is implementing when completing a specific task

NEURO-LINGUISTIC PROGRAMMING (N.L.P.): a communications model that utilizes eye movements, a student's use of predicates in speech, and other behaviors to gain skill in the processes of communication

ORTHOGRAPHIC PATTERN: the pattern of lines one sees in the spelling of a word

PHONIC METHOD: learning to spell through the use of phonics

REPRESENTATIONAL SYSTEM: the way that a person is internally representing an experience. Can be determined through use of process words (predicates) and eye movements.

Limitations of the Study

The findings of this study are limited in their application based on the following conditions:

1. The findings of this study are only valid if the use of eye movements as described in neuro-linguistic programming is found to be a valid method of determining internal processing.
2. The study was conducted in a middle school/high school library. Although partitions were used to isolate the participants of the study, some noise did filter through to the participating

students. This may have caused some confusion in the students' efforts to spell these words.

3. Although the researcher received some training in the use of N:L.P., it is possible that some of the students' accessing cues were not picked up by the researcher. To combat this, a video-camera and recorder were used.
4. Only right handed students could be used in this study. N.L.P. has been shown to be successful only with right handed individuals.
5. Students may have told each other the words that were to be used in this procedure. This would have allowed them to "study" the words in preparation for the spelling test.
6. The words selected for this study may not have been familiar to all of the students participating in the study.

Summary

A volume of research has clearly shown that spelling disabilities do exist among people. Furthermore, it has been proven that spelling disabilities can handicap an individual in our informational society. Although there is agreement on this, it is difficult to ascertain from the research where these disabilities come from and why some people have disabilities in spelling, while others do not.

Neuro-Linguistic Programming offers an opportunity to determine peoples' methods of processing information while they are spelling. Whether students are processing visually, auditorially, or kinesthetically can be determined by observing the movements of their eyes as information is being accessed in the spelling process (Robbins, 1987).

Study in the area of the use of representational systems during the task of spelling may lead to advances in spelling methodology that will allow disabled spellers to improve their skills. If it is found that students' uses of specific representational

systems while accessing the spelling of words can predict their success in spelling, Neuro-Linguistic Programming, as a method created to further excellence, may be used to allow poor spellers to model the process used by good spellers.

Chapter II

Review of the Literature

Research has shown that a number of people with seemingly average intelligence and abilities are beset with spelling disabilities. Seymour and Porpodas (as cited in Frith, 1980, p.496) stated that "...there are such people who have not a trace of reading difficulties, but are seriously handicapped by their inability to spell. For this inability, neither lack of intelligence, nor lack of education can be blamed." Further, there is a lack of research based explanation for these spelling problems. There has not been enough research aimed at helping disabled spellers by learning from those who do not suffer from spelling disabilities. This study was conducted to determine whether or not the process students use to access spelling information will predict their abilities to spell words correctly. To determine students' processes of accessing information, the Neuro-Linguistic Programming model was implemented.

Definiton of Spelling Disability

According to Russell, "spelling 'disability' applies to those children who are so incapable of handling the common or special words, used by their peers and needed by themselves, that they are definitely hindered in the fluent expression of their ideas." He further states, "Disability, as here used, does not imply that children are incapable of learning to spell, but means that they are, at the time, far below the norms for their respective grades and ages" (Russell, 1937, p.3). Research has shown that several children fall into the above mentioned category of disabled speller.

Causes of Spelling Disabilities

Several researchers have offered theories as to the causes of spelling disabilities. Historically, the cause of spelling disability was assumed to be associated with the visual memory of words that were filed in various areas of the cerebral cortex. It was felt that the difficulties were present when the cortical regions of the brain were defective, provided that

no intelligence or organic defects were apparent.
(Gates, 1922)

Cahen, Craun and Johnson (1971) found that word length and the amount of frequency with which words appeared in print affected the spelling difficulty of a number of words. These findings may lend insight into spelling disabilities in general, but they don't address the problems that individual spellers may experience.

Fischer, Shankweiler and Liberman (1985, p.423) asserted that, "The reason most often given for spelling failures is the supposed irregularity of English orthography." They found this over-emphasis on the irregularity of our language to be an oversimplification of the problem of spelling disability. To prove this assertion they tested 38 undergraduate college students from a class of 88 psychology students. The subjects were classified in one to two groups: good spellers, poor spellers. They were tested in small groups. Their tasks consisted of spelling production (print dictated words) spelling recognition (choose previously used words from a group of possible spellings) and a spelling

subtest of the Wide Range Achievement Task. Their spelling errors were categorized as word errors, segment errors, substitution errors, omission errors and insertion errors. Their results suggested that, "If there are differences between the groups in their ability to recall visual images of word patterns, these differences are of lesser importance than those relating to the understanding of how the orthography maps word structure", Fischer, et al. (1985, p.432). Therefore, it appears from these findings that linguistic factors are important to spelling successfully. This type of finding lends credence to the notion that more research must be done to observe the process that students use to spell words correctly.

Gates (1922) offered five practices that he found hindered student spelling abilities. Students that spell letter by letter, spell by phonetic units, use unsystematic divisions of words into various units or spell words by wholes will have difficulties in spelling. Additionally, he asserted that students with habitual mispronunciations may be poor spellers.

The Spelling Process

In order to understand individual spelling disabilities, one must investigate the process of spelling itself. It is believed that spelling is not related to a general ability to learn. It is, rather, the reactions that a person has depending upon the association one has had with previous words. (Carroll, 1930) These words are stored in an internal lexicon of spelling information, along with generalizations about spelling. The generalizations can be internalized several ways. Information can be processed visually by the observation of the configuration of the word. The learner may use motor skills, such as using rhythm when practicing writing or using pronunciation units, such as those provided by syllabication. Lastly, information may be generalized using the phonetic qualities of a word where the learner translates sounds into letters (Carroll, 1930). Jorm (1983) also felt that a mental lexicon is used for spelling, although he asserts that this lexicon is used for the storage of irregularly spelled words rather than generalizations.

For the learning of spelling to take place, "Most authorities agree that an adequate perceptual word attack and a memory for visual and auditory stimuli are fundamental aspects of the spelling process" (Russell, 1937, p.3). It was felt that the spelling process can be influenced by a number of variables, both universal and individual. Russell (1937) cited the following 6 influences:

1. The nature of the stimulus pattern
(configuration)
2. The nature of the individual's receptors
(condition of sensory organs)
3. The nature of the individual's perceptual abilities
4. The ease with which one establishes meaningful relationship between letters and sounds with the application of specific generalizations
5. The student's motor abilities, especially in writing
6. The student initiative and desire to perform effectively.

Several studies have shown that research in spelling disability can be divided into five

arbitrary categories. These include studies of constitutional factors, related scholastic abilities, specific techniques used in learning to spell, factors such as attitudes and personality difficulties and other miscellaneous areas that don't readily fall into one of the previously mentioned categories (Russell, 1937).

Constitutional factors include areas such as intelligence, sensory apparatus, and imagery. Russell (1937) and Hollingsworth (1918) found that poor spelling is not necessarily a function of a student's quality of general intelligence. Russell (1937) found that sensory organic disabilities were highly implicated in spelling disability. (Interestingly, he found deafness, resulting from organic dysfunction less detrimental with respect to spelling than was a visual, speech, or kinesthetic problem.) A review of several studies led Russell to conclude that visual perception is extremely important in the area of spelling. Gates found perception to be important, but that other processes must be included for success in spelling. He states that:

...for effective spelling, the bonds between perception (visual or auditory) of the word

and the motor reactions of producing the letters in serial order must in the first place be established by specific practice. That is, no matter how helpful a favorable type of word perception may be, it is not sufficient in and of itself to establish correct recall of exact spelling (Gates, 1922, p.71).

Scholastic abilities include the areas of reading, handwriting, and speech. Frith (1980) felt that students with disability in the area of spelling, but not reading, are having problems due to a lack of knowledge in orthographic patterns. This is due to a holistic pattern of processing information, rather than the use of letter-based analysis. This does not have the same effect in the area of reading. Consequently, reading ability does not appear to be the determining factor in students' success in spelling.

Authorities agree that both handwriting and proper pronunciation in speech are important to the spelling process (Russell, 1937).

In the area of attitude, studies have shown that a casual attitude and a poor self image in the area of spelling can have an effect on student success (Peters, 1967).

Research has also been conducted in the use of various techniques employed by efficient and

inefficient spellers. Waters, Bruck and Seidenberg (1985) studied the use of spelling-sound information in the processes of reading and spelling. In their study they chose three groups of students, good readers-good spellers, good readers-poor spellers and poor readers-poor spellers, each group being composed of 12 specially selected children. During seven sessions students were given a spelling task and a reading task. The reading task consisted of reading words, and non words, from a computer screen and recording their pronunciations into a microphone that was interfaced with the computer. Their responses were timed. Mispronunciations were recorded. Pronunciations were analyzed with the expectation that they must be totally correct. Credit was given for the pronunciation of a non word if it rhymed with any words from which it was derived. The spelling task involved a spelling test of 32 words, some real words, some nonsense words. Errors were categorized as phonetic or nonphonetic, orthographically legal or illegal. Their findings were that although students use similar processes in reading and spelling, in

spelling students must use knowledge of sound-to-print correspondence whereas in reading, students derive pronunciations from print-to-sound correspondence. This notion is supported by Jorm (1983), who also found that the print-to-sound rules used in reading differ from the sound-to-print rules used in spelling.

Some researchers find that the spelling of a word may come from a student's applying sound-to-print rules (auditory). Others find that the spelling of a word may come from a student reading the word out of his/her lexicon (visual). Tenney reasoned that good spellers must be relying upon more than sound-to-spelling rules. She questioned the possibility of a visual recognition process in the spelling of words (as cited in Frith, 1980). This notion appears to be supported by Dodd's statement that "...empirical studies as have been done, suggest that the spelling abilities of the deaf are not retarded" (as cited in Frith, 1980, p.424). It appears unlikely that deaf people are able to use sound-to-spelling rules when spelling, yet many deaf students are found to be successful spellers.

Gates (1922) asserted that poor spellers were experiencing disability due to an ineffective habit of word perception. He felt that these students were attacking words as a whole unit. In his opinion, it is more efficient to break the word into syllables to allow spelling to take place.

Riding and Tempest (1986) looked at spelling disability in terms of a student's preferred learning style. Seventy two 11 year old students (with an equal number of boys and girls) were administered the Junior Eysenck Personality Inventory, Raven's Standard Progressive Matrices and a researcher constructed spelling test of 32 words that included words of varying visual and phonemic complexity. A five-way analysis of variance was performed. Findings showed that students with extroverted personalities were superior in the area of spelling to students who were introverts. According to Riding and Tempest, extroverts probably use a verbal style of representing information in memory. Introverts appear to use a visual strategy. Furthermore, they state that successful spellers are likely to

use an analytic style of thinking whereas those with disabilities appear to use a holistic approach.

Techniques Used to Teach Spelling and Their Possible Relationships to Spelling Disability

The techniques used to teach spelling and their relationship to spelling have also been covered in several studies. Downing, DeStefano, Rich and Bell (1984) felt that techniques employing the over-emphasis on phoneme-grapheme relations taught before a student has reached a certain maturity in the area of linguistics may cause disabilities in spelling. Peters (1967) found that students taught by the Look and Say method and the Phonic method exhibited equal spelling attainment, though the types of errors they made were different. These, and other studies, illustrate that the results of various techniques are inconclusive. This may be due to individual differences among the students. The contradictions apparent in the previously existing research lead to the assertion that more research must be conducted to see if students' preferred styles of representing and accessing

information might lend insight into the problems of disabled spellers. A model for studying representational and accessing systems is readily available in Neuro-Linguistic Programming.

Explanation of Neuro-Linguistic Programming

Neuro-Linguistic Programming (N.L.P.) is a communications model developed in 1975 by Richard Bandler (a mathematician) and John Grinder (a linguist). This model is based upon the teachings of Virginia Satir, Fritz Perls, and Milton Erickson, to name a few (Cassiere, Minder, McGuire and Dunn, 1987). N.L.P. involves visual, auditory and kinesthetic modality preferences, but also examines a person's use of an access system and a representational system (McCabe, 1985). The sensory modalities attended to in N.L.P. are actually important variables in an individual's learning style (Childers, 1985). N.L.P. actually allows a trained observer to determine how a person is accessing and representing information (Cameron-Bandler, 1985) therefore, allowing one to determine the modality a student is implementing when completing a particular task. Therefore, it

can be determined whether the representational system a student uses while spelling is predominantly visual, auditory or kinesthetic.

According to Bandler and Grinder (1979), the observation of eye movements can show information as to the method by which one is accessing and representing information. These eye movements are known as accessing cues. If a person's eyes move up and to the left, they are using the eidetic imagery (visual) representational system. When the eyes are defocused in position the indicated representational system is visual imagery, which can be either eidetic or constructed. Eyes up and to the right indicate constructed imagery, also visual in nature. When the eyes move down and to the left, an auditory internal representational system is in use (often with internal dialogue occurring). When the eyes move to the left or right, but not up or down, it indicates an auditory representational system, and when the eyes go down and to the right, a kinesthetic mode of the representational system is shown (Cameron-Bandler, 1985).

In addition to accessing cues, the representaitonal system being used can be assessed by listening to the sensory based predicates that a student is using. A person using the auditory representational system may use terms such as "hear, listen, sound, tell, say and talk." Someone using the following terms: "see, look, focus, picture and image" is probably using a visual representational system. A kinesthetic representational system is shown by the predicates "feel, touch, grasp, warm and hold" (Childers, 1985).

Research in this area of N.L.P. has followed two premise. One is that individuals prefer a specific lead system. This lead system is known as the primary representational system (P.R.S.). The P.R.S. is determined by the pattern of eye movements and predicates most frequently used Cassiere, et al.(1987). The other is that people access through different modes, depending upon a particular situation (Knowles, 1983). The second premise is employed here. This study is designed to determine whether the use of a particular

accessing cue can predict one's success in the task of spelling.

Robbins has worked a great deal in the area of Neuro-Linguistic Programming. Although he has not published any formal research, he did state that, "Successful spelling may have more to do with the syntax of your thoughts - that is, how you organize, store, and retrieve information in a given context." Further, he finds that the best way to spell a difficult word is to "place the word up and to your left and form a clear visual image of it" (Robbins, 1986, pp.120-121). This is a technique used in Neuro-Linguistic Programming to process information visually. Research in the area of spelling may be done to determine whether or not a student is accessing in a particular mode when spelling a word correctly. In addition, further research may support or refute Robbins' assertion that success in spelling can be attained by using accessing cues that lead to the use of a visual representational system.

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Research on Neuro-Linguistic Programming

The N.L.P. model has been both supported and contradicted by research. Buckner and Meara (1987) found support for N.L.P. in the visual and auditory areas of the model, though they could not find support for the kinesthetic portion. They did this while observing the eye movements of forty-eight graduate students. The subjects were instructed to concentrate on a thought. Their eye movements were observed, after which they were asked to describe the thought. To add validity to their study, Buckner and Meara used two examiners trained in N.L.P.. In addition, they video-taped subject responses. One problem they did discover was that the results remained valid only when the subjects were right handed.

Elich, Thompson and Miller (1985) also endeavored to study the validity of both the observation of eye movements and the use of spoken predicates as a ways to determine sensory modalities. Their study involved the primary representational systems of their subjects, rather than the representational system being employed in a particular situation. Thirty-nine college

students were chosen for the experiment. The subjects were asked three questions judged by the researcher to evoke a visual image, three to evoke an auditory image and three to evoke a kinesthetic image. Both eye movements, as recorded with a video camera, and spoken predicates of the subjects as they answered questions were analyzed. With the exception of the visual modality, imaging did not occur exclusively in the modalities that were expected. Therefore, the study did not support the Neuro-Linguistic Programming model in terms of determining a primary representational system.

The observation of eye movements as a predictor of sensory modality use was also examined by Wertheim, Habib and Cumming (1986). Twenty-eight right handed college students volunteered to take part in this study. They memorized, then recalled visual, auditory and kinesthetic stimuli such as a picture of an apple, a taped siren, and the feel of a piece of fur, respectively. Recall was done in the minds of the subjects. The first eye position used by the students as they began the task (the lead system)

was analyzed. They found support for the positioning of the eyes when visual representation is occurring, some support for the kinesthetic representation, but no support for auditory representation. Interestingly, most of the student responses involved eye movements in the auditory positions. This differs from the findings of Elich, et al., (1985) who found that subject responses involved eye movements occurring most frequently in the visual positions.

Einspruch and Forman (1985) reviewed several studies which found the premise of N.L.P. faulty. They concluded that much of this research was faulty in either its design or in the researcher's understanding of the N.L.P. model. Therefore, the findings against N.L.P. are inconclusive.

Partridge (1985) states that, "Articles dealing with neuro-linguistic styles and the importance of neuro-linguistic programming continue to appear in reputable journals." As N.L.P. is a fairly recent methodology, research is continuing in its support and usage.

Much of the research that appears to refute the Neuro-Linguistic Programming model deals with

the premise that people have a preferred representational system. There is a limited amount of research dealing with the accessing of information for a specific task. Additionally, "predicate preference, to date, has been the subject of more research than has the eye movement technique of N.L.P", Cassiere, et al., (1987, p.3). The nature of research in N.L.P., as it applies to this study, is subsequently inconclusive.

Summary

Spelling disabilities have been shown by research to be a hinderance to students. Unfortunately, present research in the area of spelling disability is contradictory. In the early part of the twentieth century educators appeared to spend more time researching the difficulty of words than the individual difficulties students were having when attempting to spell words correctly. This direction was reinforced by the work of Buckingham (1913).

Eventually researchers began to examine the types of spelling errors that students made, although research in the influence of word

difficulty still continues. This led to postulation as to what was causing spelling disabilities in certain students that otherwise appeared successful in academic pursuits. Researchers have explored the possibility of physical limitations, an inability to utilize linguistic methodologies successfully, a reluctance to process words in syllables rather than as wholes and a myriad of other possible causes. Despite this research, causation of spelling disability has yet to be determined. Furthermore, it is difficult to find studies that explore what process a student that does not experience spelling disability follows. This information may lead to the development of specific techniques that disabled spellers may be able to employ to improve their spelling.

Neuro-Linguistic Programming is a communications model developed by Bandler and Grinder. The model follows the assertion that the modality that a person is using while processing information can be determined in two ways. One may either observe the eye movements of the subject and/or one may listen to the sensory

predicates that are used in the subject's speech. These two methods allow one to determine what sensory mode the subject is processing in, be it visual, auditory or kinesthetic. Learning the process that a good speller uses while completing a spelling task can give insight into ways to assist disabled spellers.

Although an amount of research has been conducted as to the validity of Neuro-Linguistic Programming, the results are inconclusive. Further research in this area will either support or refute the findings of this study.

Chapter III

Design of the Study

Purpose

This study was designed to determine whether or not the process students use to access spelling information will predict their abilities to correctly spell words.

The Hypothesis

The following experimental hypothesis was investigated in this study:

1. If knowing the mode of the representational system explains 50% of the variation in spelling scores, we will consider the time spent to identify the mode of the representational system as a worthwhile diagnostic tool for the improvement of spelling instruction. If less than 50%, it casts doubt as to the usefulness of Neuro-Linguistic Programming as a diagnostic tool in the area of spelling.

Methodology

Subjects

This study included 50 sixth grade students presently enrolled in accelerated, normally paced, and slow moving reading programs in a large suburban middle school (grades 6-8) located in Western New York. All subjects participating in this study were of varying academic ability levels with IQ's ranging from 85 to 141 (according to the Cognitive Abilities intelligence test). A random mix of male and female students was used. Students with known learning disabilities were not included. The socio-economic status of these students is mixed.

Only right-handed students with English as their first language were tested. The reason for this is two fold. Research involving left handed people and Neuro Linguistic Programming has not been shown to be successful. Students with English as their first language were used to be sure that inexperience with English spellings was not a variable in the results.

Instruments

The assessment material used in this study was limited to a spelling test constructed by Riding and Tempest (1986). The words chosen were expected to be in the normal experience of 11 year olds, yet were assumed to be at an appropriate level of difficulty. As Riding and Tempest were conducting a study involving learning styles and spelling, their testing instrument reflected words with phonemic complexity, phonemic simplicity, visual complexity and visual simplicity.

Phonemically complex words are those that contain more than one letter, or include silent letters, when representing a phoneme. Phonemically simple words are those that represent a phoneme with a single letter. Visually distinctive words contain both tall and short letters, while visually plain words are those that have letters that appear similar in height and width.

In their study Riding and Tempest (1986) chose four sets of eight words that were mixed in the following manner: phonemically simple, visually distinctive; phonemically simple, visually plain; phonemically complex, visually

distinctive and phonemically complex, visually plain. The researcher randomly selected three words from each of these categories that had been randomly matched for difficulty. Thus, the spelling test used in this study consisted of three phonemically simple, visually distinctive words (project, capital, artist); three phonemically simple, visually plain words (camera, minimum, examiner); three phonemically complex, visually distinctive words (healthy, whistle, accident); and three phonemically complex, visually plain words (measure, scarce, receive).

The order in which the words were presented to the students was randomly selected for each student. This was done in an attempt to discourage students from memorizing the test ahead of time should the students discuss the words on the test.

Students' representational systems were determined by observation of their eye movements, using the Neuro-Linguistic Programming model (N.L.P.), as they attempted to spell the words. Neuro-Linguistic Programming is a model of communication designed by Richard Bandler and John

Grinder. According to this model, students' modes of processing information (auditory, visual, kinesthetic) while completing various tasks may be observed in two ways. One is through the observation of students' eye movements. Movements to the upper right, upper left or straight ahead and defocused indicate visual representation. Eyes level and to the right, level and to the left or down and to the left indicate auditory representation. Eyes down and to the right indicate kinesthetic representation (Laborde, 1984).

The second method of determining students' representational systems using N.L.P. is through the use of sensory based speech predicates. People using visual predicates such as "see, look or picture" are using a visual representational system. The use of predicates such as hear, tell and say indicate the use of an auditory representational system. Kinesthetic representational systems are indicated by terms such as "feel, touch or grasp" (Childers, 1985).

In this study the students' representational systems were determined by observing their eye

movements. A video camera recorded students' eye movements during the spelling test. These tapes were viewed by the researcher to validate her observations of eye movements.

Procedures

Before meeting with students, the researcher was trained in the usage of Neuro-Linguistic Programming. This training consisted of work with a psychotherapist, Reverend James Hughes of the Chrysalis Foundation, and participation in a seminar on modeling N.L.P. conducted by John Grinder, co-founder of N.L.P.. This seminar included practice in the identification of representational systems, as well as modeling another person's use of representational systems on a particular task.

Students were tested individually by the researcher in the library of the middle school which they attend. The testing station was a partitioned off section of the library. Students reported to the testing station in pairs of two. While one student was being tested, the other student waited for his/her turn. This student was seated far enough away from the partition to

hinder his/her ability to hear the words and spellings being presented. In the testing station were two chairs and a tripod with a video camera attached.

Initially, the researcher conversed with the students while setting the camera lense to capture observable eye movements. This was done to relax students before the testing began. The 12 word spelling test was administered orally to each student. The students' task was to spell orally each of the words. A clipboard and pencil were provided for students to allow them to write down their responses before giving them orally. This was not a requirement of the task, but made many students more comfortable while completing the spelling test. Each word was pronounced, used in a sentence, then pronounced again before the student was asked to respond. There was no limit to the amount of time a student could think before responding.

Analysis of Data

The researcher determined the number of times students used visual, auditory, and kinesthetic

representational systems on each of the words that they were spelling. Using correlation regression technique, these results were then tabulated.

Summary

This study was designed to determine whether or not the process students use to access spelling information will predict their abilities to correctly spell words. Students involved in the study were given an orally administered spelling test consisting of 12 words with varying levels of visual and phonemic complexity. While students were spelling these words the researcher observed their eye movements and recorded student spellings. Using the Neuro-Linguistic Programming model, the researcher counted the number of times students relied on visual, auditory or kinesthetic representational systems while completing the spelling task.

Statistical analysis of the accumulated data was completed using correlation regression technique.

Chapter IV

Findings and Interpretations

Purpose

The purpose of this study was to determine whether or not the process students use to access spelling information will predict their abilities to spell words correctly.

Analyzing the Findings and Interpreting the Data

The following experimental hypothesis was investigated in this study.

1. If knowing the mode of the representational system explains 50% of the variation in spelling scores, it will be considered the time spent to identify the mode of representation as a worthwhile diagnostic tool for the improvement of spelling instruction. If less than 50%, it casts doubt as to the usefulness of Neuro-Linguistic Programming as a worthwhile diagnostic tool for the improvement of spelling instruction.

The question asked in this study is whether or not knowing the process that students use to access spelling information from an internal lexicon (using either the visual, auditory or kinesthetic mode) can be used to predict students' abilities to spell words correctly. To assess students' modes of accessing and representing information the researcher employed the Neuro-Linguistic Programming model.

For the purpose of this study each eye movement was determined to be one observation. As students were spelling the words from a 12 word spelling test the researcher counted observations (eye movements) and the number of times the observations indicated representation in either the visual, auditory or kinesthetic mode. The researcher worked with a psychotherapist that is versed in the area of N.L.P. and attended a conference on N.L.P to become familiar with the techniques that were employed in this study. A video camera was used to verify the number of observations in each modality.

The researcher tabulated the number of observations and the number of correctly spelled

words for each subject. Observations were then divided into three categories: auditory, visual/kinesthetic and mixed. These categories were defined as follows:

1. A set of observations was defined as primarily auditory when more than 60% of the observations occurred in the auditory mode.
2. A set of observations was defined as primarily visual/kinesthetic when more than 60% of the observations occurred in the visual and kinesthetic modes combined.
3. A set of observations was defined as mixed when less than 60% of the observations occurred in any one mode.

The results of this study were determined using correlation regression technique. The independent variable (X) was the set of primary observations for each student. The dependent variable (Y) was the number of words each subject spelled correctly. The value of X was said to be either 1 (primarily auditory), -1 (primarily

visual/kinesthetic) or 0 (mixed). Table 1 shows the values of X and Y for each of the 50 subjects involved in this study.

Table I
Values of X and Y

<u>Subject</u>	<u>X</u>	<u>Y</u>	<u>Subject</u>	<u>X</u>	<u>Y</u>
1	0	7	26	0	12
2	1	12	27	1	11
3	1	11	28	-1	12
4	0	9	29	1	7
5	-1	10	30	0	9
6	1	10	31	-1	9
7	1	7	32	-1	11
8	1	9	33	0	11
9	0	12	34	0	10
10	1	11	35	0	10
11	-1	11	36	0	9
12	-1	7	37	-1	12
13	1	7	38	-1	10
14	0	8	39	0	11
15	1	7	40	1	8
16	1	4	41	0	10
17	1	3	42	-1	9
18	0	5	43	1	11
19	1	8	44	1	10
20	0	7	45	1	9
21	0	8	46	1	11
22	-1	12	47	1	4
23	-1	10	48	0	8
24	-1	11	49	1	10
25	-1	12	50	-1	9
$r = -.34$			$r^2 = .11$		

The coefficient of determination (r^2) is equal to .11. When $r^2=.50$ it is commonly accepted as the minimum criterion for a predictive relationship between one independent and one dependent variable (Kerlinger, 1973). When $r^2=.11$, as in this study, the relationship between one independent and one dependent variable can be interpreted to be very weak. The relationship between students' use of representational systems (as determined by Neuro-Linguistic Programming) and their abilities to spell words correctly on the spelling test given in this study is very weak.

The researcher has made every effort to select the most valid and reliable spelling test as the criterion test in this study. The test was taken from a study conducted by Riding and Tempest (1986). Their study examined the relationship between learning styles and spelling. They chose 32 words that were expected to be in the normal experience of 11 year olds, yet were at mixed levels of difficulty, all within an appropriate range. They used 4 categories with 8 words in each. The categories were phonemically simple,

visually distinctive; phonemically simple, visually plain; phonemically complex, visually distinctive and phonemically complex, visually plain. The researcher for this study randomly selected three words from each of these categories. Thus, the spelling test used in this study consisted of three phonemically simple, visually distinctive words (project, capital, artist); three phonemically simple, visually plain words (camera, minimum, examiner); three phonemically complex, visually distinctive words (healthy, whistle, accident) and three phonemically complex, visually plain words (measure, scarce, receive). Given that this is a valid and reliable test, there is little support in this study for the notion that it is possible to predict students' abilities to spell words correctly based upon their use of representational systems. Therefore, knowing the modes of the representational systems students use while spelling (as determined by Neuro-Linguistic Programming) is not seen as a useful diagnostic tool for the improvement of spelling instruction.

Summary

The findings in this chapter suggest that there is not an important relationship between students' abilities to spell words correctly and their use of representational systems.

Chapter V

Conclusions and Implications

Purpose

The purpose of this study was to determine whether or not the process students use to access spelling information will predict their abilities to spell words correctly.

Conclusions

Analysis of the data indicates that there is a very weak relationship between students' use of representational systems (as determined by Neuro-Linguistic Programming) and their abilities to spell words correctly. Therefore, there is little support in this study for the notion that it is possible to predict students' abilities to spell words correctly based upon their use of representational systems.

Implications for Research

Further study in the area of the relationship between students' uses of representational systems and their abilities to spell words correctly might

be conducted using a different testing population. The testing population in this study was composed of students from high average, average, low average and gifted reading groups. None of the participants were classified as learning disabled. It might be interesting to conduct this study with a learning disabled population to determine whether or not a significant correlation can be found.

Implications for Classroom Use

In this study it was determined that knowing the mode of the representational system that a student is employing in spelling explains 11% of the variation in spelling scores. Since this explains less than 50% of the variation in spelling scores, it must be concluded that determining the mode of representation using the Neuro-Linguistic Programming model is not a worthwhile diagnostic tool. Therefore, this study does not lend itself to any implications for classroom use.

Summary

This study was conducted to determine whether or not the process students use to access spelling information will predict their abilities to spell words correctly. Analysis of data indicates that there is little support for the notion that it is possible to predict students' abilities to spell words correctly based upon their use of representational systems.

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