# LISTENING PERFORMANCE AND EFFECTS OF REWARDS: AN INVESTIGATION AT THE GRADE FOUR LEVEL

by

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## Abstract

The purpose of this study was to determine whether the offering of carefully chosen extrinsic rewards would enhance measurable listening performance of regular elementary school children at the grade four level. An information-processing model which identifies and shows the relationships of the fundamental elements of the listening process was discussed. A theoretical case was presented showing that there is a chain of events that occurs, beginning with the extrinsic reward being offered which leads to motivational and attentional factors being stimulated, resulting finally in enhanced listening ability.

Seventy-three grade four students enrolled in three classes in Greater Victoria School District #61 participated in the study. A listening pretest was given to all children. Subjects in the control group and the two treatment groups--both offered a different type of extrinsic reward--were posttested one week after the pretest.

Data were subjected to the analysis of covariance. Results revealed, essentially, that there were no significant differences between either of the two treatment groups and the control group. It was thought that the lack of significant differences lay in weak design of the study rather than in the theoretical premise on which the study was based.


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# CHAPTER I

## INTRODUCTION

Listening is an important and complicated ability which is acquired over a long period of time by the normal human being. Its importance lies in it being the basis of our learning to communicate one with another. If listening does not take place, speech does not develop in the normal child. Through listening, we learn more than just how to speak. Listening is one of the fundamental processes for acquiring general knowledge about our world.

Gigous (1967) says "The Commission on the English Curriculum of the National Council of Teachers emphasized that listening exerts a tremendous influence in life today" and "that children spend more time listening than in any other language arts activity" (p. 7). Duker (1966) states that "a major portion of the hours a child spends in school is occupied by activities demanding listening" (p. 49). In the 1920's Rankin (1966) conducted a study to determine the percentage of each day the average adult uses the listening process. He found that for the normal adult, approximately 30 per cent of the waking hours were engaged in listening (p. 51). It is thought that this figure would be a minimum for the amount of time a child in school would spend in the activity of listening. Wilt (1966) says that "children are expected to spend more time in listening than in any other single activity in the elementary school" (p. 66). She observed that children were expected to listen 57.5 per cent of the time during classroom activity (Wilt, 1966, p. 65). Lewis and Nichols (1965) mention that "even if listening is hard.... it is still the easiest way yet found to learn most of the things we shall need to

know in our lifetimes" (p. 25). Listening is the forerunner to all the other language arts. It is the "first language skill to appear" (Lundsteen, 1971, p. xi). Wilt (1966) comments that "the ability to listen intelligently and critically, may, like an iron mine, be a source of wealth if developed. If the skill is not cultivated, on the other hand, listening, like the unworked mine, produces nothing" (p. 71).

Gigous (1967, p. 7) states that children come to school with a wide range of listening ability and that pupils often listen without direction. Further, Gigous (1967) says,

> Some children may speak but never seem to understand what is going on; some have a highly developed listening sense and are able to follow directions, story sequence, and general information better than some adults. Other children tune in and out as fancy and whim dictate. (p. 7)

Statement of the Problem

Listening is a learned ability. Therefore it is possible that it can be learned extremely well by some and very poorly by others (Bois, 1966, p. 43). It seems that listening is on a continuum ranging from hearing speech with no understanding to comprehending speech with a great deal of understanding of what the speaker is saying. Most elementary school children are probably functioning somewhere in the middle of the continuum. Sewell (1973) in quoting Weaver says, "How well a person can listen and how well he does listen are not the same thing" (p. 1). Russell and Russell (1965) state,

> Perhaps because there is so much useless information , many children learn to ignore talk. Too many people are firing too many ideas at them, and so they take refuge in "non-listening". They "listen with half an ear" when the radio is playing, but also transfer this habit to other situations such as the class-

room when the teacher is giving directions. (p. 1)

Assuming that listening ability can shift along the continuum for any given individual, the introduction of motivation through extrinsic rewards should have a positive influence. It has been shown that the use of extrinsic rewards offered in a variety of ways and under a variety of conditions has enhanced performance on a number of occasions in educational settings (Forness, 1973; Loveland & Olley, 1979; Bussell, Huls & Long, 1975; McGraw & Mallory, 1981; Workman & Williams, 1980).

Listening ability is measurable (Harwood, 1966; Devine, 1978). Lundsteen (1971) states "listening ability is measurable; it can be reliably measured by logically valid tests that sample skills in recall and comprehension of the meaning of spoken language" (p. 82).

The purpose of this exploratory study is to determine whether the offering of carefully chosen extrinsic rewards will enhance measurable listening performance of regular elementary school children at the grade four level.

## Definitions

The following terms are used in this study:

1. Intrinsic Reward - a self originating reward, e.g., a feeling of satisfaction or pride.
2. Extrinsic Reward - a reward originating from an external agent, e.g., praise, money, tokens.
3. Listening Ability - comprehension of what is heard; that is, the ability to receive orally presented information through the auditory

channel, so that meaning takes place.

4. Algorithm - a procedure used to solve a problem in which the pathways to the solution are straightforward and well learned.
5. Aversive-Algorithmic Task - a task which is characterized by its unattractiveness to the student, yet the solving of which requires a familiar set of responses.
6. Attractive-Heuristic Task - a task which is characterized by its appealing nature to the subject, yet the solving of which requires an unfamiliar set of responses.

Limitations

Due to the necessity to use separate intact classes of children in each of the control and experimental groups, individual random sampling was not possible. Nor was random assignment of individuals into the three groups possible. Random assignment of the classes into the three groups did take place, however. The number of students in each group was relatively small, ranging from 20 to 29. In such cases where randomization of individuals cannot be achieved, caution must be taken when interpretting results. Internal validity may be threatened because of the variable known as "differential selection" (discussed in Borg & Gall, 1971, pp. 366-7). Differences between the three intact classes of subjects could not be controlled.

External validity may be threatened when attempting to generalize the results of this study to any group of children other than a regular grade four class outside the Victoria area. Another threat to extern-

al validity of this study could certainly arise from the fact that the writer was also the sole administrator of the tests. Further, because students were at least partially aware that they were participants in a research study (as outlined in the letter sent home to parents asking for permission for the child to take part), a phenomenon known as the Hawthorne Effect could conceivably take place (discussed in Borg, 1963, pp. 338-9). Finally, it was beyond the control of the researcher as to what happened in each classroom in the area of listening activities during the week's interval between the tests.

# CHAPTER II

## A LISTENING MODEL

### Listening: A Definition

Duker (1966) in the opening chapter of his book on listening, discusses the difference between hearing and listening. He says, "Seeing is an essential step in reading but is not synonymous with it. So also hearing is an essential step in listening but the two processes are not the same" (p. 19). Listening, then, is more than just the physical reception of sound. Fessenden (1966) says that "as a starting point let us assume that listening is an amalgamation of physical and mental events" (p. 28).

Defining listening adequately is a difficult task. Crowe (1982) says, "We can surround the concept with parameters, but a definition of that process by which an individual gains meaning from or gives meaning to sound will probably vary from individual to individual" (p. 11). While discussing Sara Lundsteen's definition, Devine (1978) writes, "Such a complex activity can be defined only inadequately in a sentence or paragraph" (p. 297). With respect to this study, however, it is useful to restrict the definition to spoken language only. It is thought by the writer that Lundsteen (1971) offers the most concise definition for the purposes of this study. She says that listening is "the process by which spoken language is converted to meaning in the mind" (p. 1). Cunningham (1982) agrees and says, "When listening, children have one primary task--identifying meaning" (p. 486). What is the process by which this "meaning" is identified? Some authors have written on this issue and a number of models have been presented in the literature (Fessenden, 1966; Lundsteen,

1971; Wolvin & Coakley, 1979; Kellogg, 1971). None of these models adequately shows how the process works. The recent work of Massaro (1975), however, provides us with an information-processing model which identifies and shows the relationships of the fundamental elements of the listening process.

Information Processing: the conversion of sound into meaning

Massaro has illustrated, in flow diagram form, his perception of how auditory (and visual) information is processed through its temporal course (see Figure 1). He outlines four processes, each with a functional

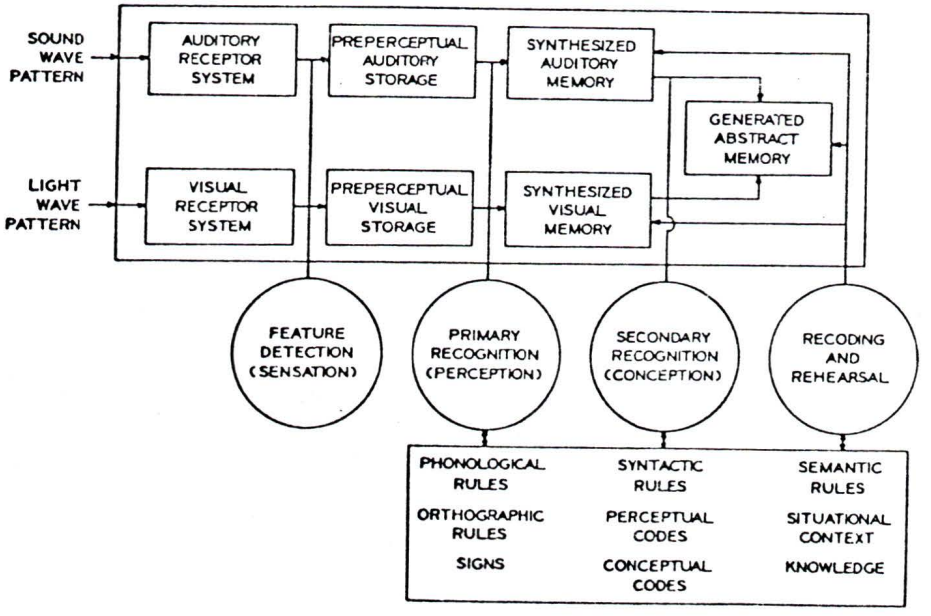


Figure 1
Massaro's Flow Diagram of the Temporal Course of Auditory (and Visual) Information Processing

component (circles) and its corresponding structural component (boxes). Each structural component represents the information or knowledge that is accessible to that particular stage of processing. From this point forward, since speech is the only acoustic signal that is pertinent to this study, further discussion of Massaro's model will be limited to this particular type of input.

The "auditory receptor system" consists of the physical pathway along which sound travels, beginning at the external ear and eventually arriving at the cerebral cortex of the brain, via the ear drum, ossicular bone chain, cochlea, and 8th Cranial Nerve. As a speech sound arrives at the cerebral cortex, according to Massaro's model, it is first analyzed by the "feature detection" system. It is this process that rapidly identifies which acoustic features are present or absent from a speech sound.

As the sound is being identified by its distinctive features, it passes through to the "preperceptual auditory storage" area. This is actually a mini-memory or storage system, which has the capability of retaining the existence or non-existence of the distinctive features of one or two speech sounds at a time. Massaro refers to studies which indicate that the system has an average storage time of 250 msec. This relatively short time span, however, appears to be sufficient time for the preperceptual auditory image to be held in storage long enough to allow for the image to be "perceived", at least at the "primary recognition" stage. The speech sounds during this stage are subjected to further transformation--this time being related to known or previously-learned phonological rules and "signs" from the listener's long term memory (rectangular box at bot-

tom of diagram). Massaro (1975) describes the transformation as follows:

> Perceptual units correspond to those sound patterns that are uniquely represented in long-term memory by a list of acoustic features. The information in the perceptual unit can therefore be defined by a set of acoustic features that corresponds to a list of features in long-term memory. The primary recognition process finds a representation in long-term memory that matches the acoustic features held in preperceptual storage.... This representation is a sign, which is a combination of a feature list and a synthesis program. The feature list contains a description of the acoustic features in the perceptual unit. The synthesis program is an algorithm for synthesizing (saying or hearing) that particular sign. (p. 10)

It is important to note that up to this point along the course of the auditory information processing system, there is no meaning attached to the perceptual units. Meaning begins to take place in the second "storage tank", namely, the "synthesized auditory memory". Like the first storage system, this memory system can retain information for only 250 msec., but unlike the preperceptual auditory storage, which stores only separate acoustic features, the synthesized auditory memory contains a synthesized unit or gestalt. Massaro (1975) states,

> Synthesized auditory memory is the storage of information responsible for the phenomenological experience of hearing. It is called synthesized auditory memory because it is at least partly under control of the listener and contains a synthesis rather than simply an analysis of the information represented in preperceptual auditory storage. (p. 128)

The next phase of the processing model involves "secondary recognition" or "conception" of the speech sound pattern. This process is necessary before the information proceeds to the "generated abstract memory"--more commonly known as short term memory. Massaro (1975) states,

> The secondary recognition process tries to find the best match between the sequence of perceptual units in synthesized auditory memory and a representation in long-term memory. The syntactic

> and semantic rules of the language and situational knowledge might also be utilized at this stage of information processing. (p. 13)

Consider the sentence The boy is climbing the larch tree. Assuming that the auditory information process has, up till now, performed its previous functions faithfully--i.e., analyzed for distinctive features, checked that correct phonological rules have not been broken, matched acoustic features with representations from long term memory, stored the information in proper sequential order--the secondary recognition process will attach further meaning to the many "chunks" making up the complete sound pattern of the sentence. Long term memory will once again be called upon for matching purposes. The sentence chunks will be analyzed for syntactic rules and perceptual and conceptual codes. The perceptual code of a word is its attributes, such as the sequence of sounds that make up the word, the configuration of the letters that spell the word, and the pictorial representation of the word. The conceptual code contains the various properties that give meaning to the word. If, therefore, our sentence was changed by the addition of a single /z/ sound so that, during the distinctive feature analysis, the sound pattern that makes up the word boy was heard (or analyzed) as boys, then the secondary recognition process would send out a reject signal on the basis that the phrase or chunk boys is is syntactically incorrect. Although it lacks clear meaning, the sentence would still be accepted into generated abstract memory. It would sound like this--The boys is climbing the larch tree--and would eventually be rejected as having ambiguous meaning. If, however, the additional /z/ sound was placed elsewhere, say at the end of tree, making the word trees,

then the sequential chunks of information that would come through the secondary recognition process would contain the sentence The boy is climbing the larch trees. This sentence has meaning--but a different meaning from the original sentence. Another slight variation of the sentence is given for clarification purposes. If the distinctive feature analysis heard a /dʒ/ (or j) sound at the end of the word larch instead of a /tʃ/ (or ch) sound, then again, a very different sentence would have been heard--The boy is climbing the large tree.

Although the changes in the acoustic features of these four sentences are minimal--in fact, not even heard as differences in some non-English languages--the visual representations that are conjured up in the listener's mind are significantly different one from another. It is the secondary recognition process at work that allows for these differences. It is the "matching" process between what is heard and stored in synthesized auditory memory and what is experientially represented in long term memory that gives the meaning. This conceptual meaningful form of the synthesized sound pattern is what is stored in generated abstract--or short term--memory.

Hellige (1975), in discussing short term memory (STM), mentions Miller's findings of almost three decades ago that it has the capacity to hold 7 ± 2 bits or chunks of information (p. 393). This notion is still under investigation. The STM is a much larger memory system than either the preperceptual auditory storage or the synthesized auditory memory. However, information accepted into this system will quickly decay as new information comes forth. Massaro (1975) mentions two assump-

tions that are made with respect to his model; (a) that there is a direct relationship between ability to hold an item in STM and the amount of time the listener has to recode and/or rehearse the item, and (b) that there is an inverse relationship between ability to hold an item in STM and the amount of time the listener spends in the processing of other items (p. 14).

Provided that new information is not forthcoming too rapidly, the listener, through the process of "recoding", can further clarify the deeper meaning of an entire sentence. As Massaro (1975) states, "the recoding process has access to the lexicon, syntactic rules, semantic meaning, and whatever other knowledge the system has available" (p. 16).

Finally, a method useful for holding a message longer in STM is one known as "rehearsal". This is merely the listener's ability to repeat or regenerate the speech pattern and re-enter it into generated abstract memory.

It should be pointed out that Massaro's model allows for information to be processed and placed into long term memory (rectangular box at bottom of diagram) after it has been briefly held in any of the three memory or storage areas (boxes). It is important that selected information be held within our minds beyond a few moments of time. The ability to store certain information for an indefinite period of time is essential for one's knowledge base to grow when confronted with new experiences. Eysenck (1982) says that "information that is stored in long-term store is not subject to decay and remains in store indefinitely" (p. 69). Long term memory (LTM), it seems, is a holding tank that has no

limit as to how much information it can retain. As one writer put it, "You can always store a little more; you can always memorize more facts and information" (Cermak, 1972, p. 11). It is the system of our human brain that permanently stores our well-rehearsed and completely processed lists of information pertaining to phonological rules, syntactic rules, semantic rules, signs, perceptual codes, conceptual codes, situational context, and finally, each individual's personal knowledge. These "lists of information" are being solicited or consulted constantly as new auditory information is passing into the system. The vehicles used in the consultative process are the functional components (circles) in Massaro's model--i.e., primary and secondary recognition systems and recoding and rehearsal systems. LTM is consulted so as to "match" the incoming information with previously learned information so that meaning can take place. Cermak (1972) says, "the subject seeks a link between the newly presented item and an item he already knows and can easily retrieve" (p. 168). He says that there is a constant interaction between STM and LTM. This interaction is actually cognition or thought processes at work. In discussing this issue Kintsch (1977) writes,

> The learner has a certain amount of control over the content of his working memory [STM]; in trying to organize a list for long-term retention he typically brings back into working memory earlier items from the list that he still remembers in order to check whether these items would fit into the encoding scheme that he is presently working on. (p. 257)

How well newly presented material is organized is a key factor as to its ability to be recalled or retrieved at some later date (Cermak, 1972; Kintsch, 1977; Klatzky, 1980). Evidence in the literature suggests

that items of newly presented material are organized, categorized, or labelled in some fashion at the time of presentation rather than at the time of retrieval (Cermak, 1972, p. 149 ff). According to Klatzky (1980), "when items are stored as organized units, retrieval from LTM is facilitated" (p. 229). There appears to be a strong interdependency between encoding operations and retrieval. She states further that "to best get at information stored in memory, the retrieval operation should have available the same information that was present at the time of encoding. That means that the encoding of the input should match the cues for retrieval" (Klatzky, 1980, p. 230). Kintsch (1977) says that the kind of organizing that takes place in STM "is a type of elaborate encoding, which is not directed at encoding features of a single item, but consists in encoding relations among items " (p. 256). Here the processing system is trying to attach meaning to items being encoded. Kintsch (1977) further states,

> It is very important that meaning-related stimulus attributes form part of a memory code.... We know that items encoded in terms of their meaning are better retained in memory than items encoded in terms of their physical attributes.... In many cases, especially when the learning material consists of sentences or text, very little encoding of physical features occurs. (pp. 236-7)

Rather, the processing concentrates on the meaning.

Attaching meaning to newly presented information being stored in long term memory is the basis of the learning of new knowledge, which is an ongoing process of adding new layers of information onto what is already known in one's experience. Smith (1978) says, "What we have in our heads [stored in long term memory] is a <u>theory</u> of what the world is

like" (p. 57).

Much of what we hear, however, never reaches our long term memory. There are many reasons for this, some of which have already been discussed--e.g., restrictions of time and capacity of the various memory processing systems, to mention two. There are other reasons why information, when heard, does not reach the listener's long term memory, and thus does not stay with him for more than a few moments of time. The next section deals with these variables.

## Factors Influencing Listening Ability

A number of factors influence the ability to listen. They include: sex of listener, listening habits (Sewell, 1973), maturity, intelligence, subject matter (Lundsteen, 1971), interest (Gigous, 1967; Lewis & Nichols, 1965; Lundsteen, 1971), command of language (Lundsteen, 1971; Petrie & Carrel, 1976), beliefs, feelings, intuitions (Barbara, 1966), attitudes (Barbara, 1966; Gigous, 1967), whether or not the speaker is liked (Gigous, 1967), experience of listener (Petrie & Carrel, 1976; Gigous, 1967), attention (Sewell, 1973; Gigous, 1967), and concentration (Lewis & Nichols, 1965), to mention the main ones. The last two, "attention" and "concentration" are of particular importance to the purpose of this study.

Of the dozen or so definitions of listening that this researcher uncovered in the literature, no fewer than eight included either one or both of these two words (Stein, 1979; Ross & Ross, 1972; Taylor, 1965; Schendel & Shields, 1979; Landry, 1974; Clark & Meredith, 1972; Wolvin & Coakley, 1979; Lundsteen, 1971).

Attention and Concentration

Sewell (1973) says, "the question of how well a person does listen is directly related to the role of attending in listening" (p. 1). Lewis and Nichols (1965) state that results from a survey of college students showed that the ability to concentrate was the students' greatest obstacle to learning. In their discussion of concentration the researchers state that "it is the most important of all listening factors influencing comprehension" (p. 36). Taylor (1965) makes a distinction between the two qualities. He says that "attention may be thought of as the directing of awareness; concentration, as a sustaining of attention" (p. 10). Nearly a century ago James (1890) wrote,

> Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others. (pp. 403-4)

Ross and Ross (1972) say that "accurate listening...requires both temporal and selective attention: the child must be able to attend [concentrate] for the duration of the stimulus input and select the relevant cues from it" (p. 137). If attention and concentration are of major importance to listening comprehension ability, then it follows that if these qualities were to be somehow elevated in the listener, comprehension of material should be enhanced. Assuming this to be so, the variable of motivation in the form of reinforcement should be a forceful tool to accomplish this enhancement of performance through the maximizing of attentional factors.

Motivation and Attention

The premise that attention is aroused by motivating factors, such as reinforcement, incentives, or the attraction of rewards has been discussed by some researchers (Ribot, 1890; Simon, 1967; Atkinson & Wickens, 1971; Eysenck, 1982). In his book entitled, Attention and Arousal: Cognition and Performance, Eysenck (1982) states that "It is one of the major contentions of this book that there is an intimate relationship between motivational and attentional processes. In general terms, motivational states...determine the contents of attention" (p. 2). Simon (1967) says "we can use the term motivation...simply to designate that which controls attention at any given time" (p. 34).

The key as to why motivation should influence attentional factors brings us back to Massaro's model. Eysenck (1982) states that "motivational forces affect the allocation of attentional resources within the information-processing system" (p. 2, emphasis mine).

Atkinson and Wickens (1971) claim that motivation in the form of reinforcement or reward "acts to direct the subject's attention to one aspect of the situation and not to others" and "more study may be given to the rewarded items and consequently they may be learned more rapidly" (p. 68). According to these authors, reinforcement can effect storage of information in two ways. First, if the subject is aware at the outset of the test of the value of the reward, it may become part of the information package that is stored in memory and may even have a bearing as to where in memory it is stored. Storage of information with a high payoff value will be different in some way than that with a low payoff value. Atkinson

and Wickens explain that "knowledge given at the time of test regarding the payoff value assigned to the item, therefore, can aid the subject by indicating where in memory to look and hence cause him to set up a more effective search" (p. 69). Secondly, reinforcement may influence the amount of time and effort spent in searching long term memory; i.e., "rehearsing". Eysenck (1982) suggests that the interaction of reinforcement upon information-processing

> increases the extensiveness or elaboration of encoding; in other words, low-incentive words were mainly processed in terms of the most obvious and readily accessible features, whereas high-incentive words were processed in terms of both readily accessible and less accessible features. It may well be that this increase in the number of encoded features or attributes under high-incentive conditions is produced by the disproportionate amount of the available processing time that subjects spend rehearsing high-incentive stimuli. (p. 72)

He further states that since "long-term storage depends on the amount of rehearsal activity in short-term store, it follows that high-incentive material will be better learned and remembered than low-incentive material" (Eysenck, 1982, p. 69).

## Summary

This chapter has presented a review of research dealing with (a) a workable definition of listening, (b) how verbal information is processed in the human brain, (c) factors that influence the ability to listen--specifically those of attention and concentration, (d) motivation in the form of incentives, reinforcement, or rewards, and, (e) how these factors influence the information-processing system.

The definition of listening best thought to describe this be-

haviour for the purposes of this study was taken from Lundsteen (1971); "the process by which spoken language is converted to meaning in the mind" (p. 1).

The "process" by which verbal language is converted to meaningful information in the human mind was described in detail using the model presented by Massaro (1975) and his colleagues, which identifies and shows the relationships of the fundamental elements of the listening process.

"Attention" and "concentration" were two of many factors that were identified as being crucial in influencing how well an individual can listen. Support was presented to show that attention and concentration were linked in some way to motivation in the form of reinforcement and rewards--the larger the reward, the greater the ability to store information in long term memory.

The link-up, it was related, is found in the individual's ability to "rehearse" the information heard. This rehearsal takes place when information is being transferred from short term memory to long term memory (the fourth circle in Massaro's model).

# CHAPTER III

## REVIEW OF THE LITERATURE

Not every teacher or school administrator is in favour of trying to manipulate a child's level of motivation. Green and Stachnick (1968) state, "unfortunately, classroom teachers typically regard motivation as something present or lacking inside the student" (p. 228). Critics of a system in which extrinsic rewards were offered to children for appropriate performance during school activities would, according to these authors,

> undoubtedly accuse schools of "bribing" the children. The charge is invalid. "To bribe", according to Webster's Seventh New Collegiate Dictionary, means "money or favour bestowed on or promised to a person in a position of trust to pervert his judgment or corrupt his conduct." That hardly describes what the schools would be doing. The goal would in fact be quite the opposite--the strengthening of behaviours which would one day make it possible for the child to become a productive member of society. (Green & Stachnick, 1968, p. 229)

Russell (1971) in his discussion with regard to motivation says that "natural motives of mastery and competence" are present in each child. Before these motives can be released, however, "some challenge must be evident, and there must be at least moderate expectancy of success" (p. 87). Russell realizes that motivation is an invisible force that can be present or absent in a listening situation. He states,

> Students have an ability they often put to use in school. This ability allows the head to be turned toward the source of a sound, the face to assume an expression suggesting some form of intelligence, and the ears to remain open to sound waves. But from this point on, strange things can happen--sounds fade into jumbled and garbled nonsense--visual inputs blur and dance in a psychodelic panorama--and internal meanderings of the mind play undisturbed. Magically, when the lecture ends, the organism returns from its trip, assumes a state of animation, and leaves the classroom relatively untouched. Pulling the shades and closing the doors do not occur so readily when more exciting

> forms of stimulation are used to carry the message. (Russell, 1971, p. 88)

Rewarding children for good listening performance may be one method of stimulating motivation during a presentation of oral material (Petrie & Carrel, 1976).

There has been concern expressed in the last decade that under certain conditions, extrinsic rewards can impair or destroy one's intrinsic motivation to explore or complete a task (Deci, 1971, 1972; Lepper, Greene & Nisbett, 1973; Greene & Lepper, 1974; Lepper & Greene, 1975). The findings of these researchers basically purport that, if a subject who has intrinsic motivation to carry out a certain task or to explore an unknown is presented with an extrinsic reward for doing so, the task or exploration will not be carried out as well as if the subject were presented nothing. Further, these authors claim that subsequent interest in the task will be thwarted. This is termed the "overjustification effect".

A different viewpoint is taken by many researchers who argue that these claims aren't justifiable (McGraw & Mallory, 1981; Workman & Williams, 1980; Beatty, Behnke & Froelich, 1980; McCaughan & McKinlay, 1981). These authors claim that there are many variables that have to be taken into consideration before one can make the general statement that extrinsic rewards are detrimental to intrinsic motivation. It can be argued, for example, that the type of reward offered, the nature of the task to be performed, and whether the reward is contingent or non-contingent upon performance are important variables that need to be considered before one can draw any conclusions as to possible outcomes when considering performance payoffs.

Surprisingly few studies have been conducted in the area of pairing extrinsic reward with listening performance. Petrie and Carrel (1976) state that "Motivation, in the form of anticipatory sets, extrinsic motivations, and interest aroused during the lecture, has usually (but not always) been found to facilitate aural comprehension and retention" (p. 187). While Sewell (1973) found no significant differences in listening achievement scores in his study using a minimal monetary incentive, he states that another researcher, Shellen, did observe significantly higher achievement scores on a listening task using better grades for the course as an incentive (p. 9). Sewell (1973) admits that perhaps his incentive was not powerful enough and states, "Perhaps the level of goal setting is the crucial factor" (p. 9).

Bussell, Huls and Long (1975) quoted Birnbrauer et al. who wrote, "Token reinforcement systems backed up by food, toys, money, and grades were demonstrated to be effective in improving academic behaviour of children in special education programs" (p. 40). In their own study Bussell et al. (1975) found a significant increase in proficiency in auditory skills "when utilization of token reinforcement and teacher enrichment are employed" (p. 42).

Goodyear (1973) states that "very few studies have attempted to manipulate extrinsic incentive factors to produce changes in listening comprehension behaviour" (p. 1). He further says, "additional research using greater incentives and different forms of incentives would be enlightening" (p. 9).

In discussing the use of reinforcement principles to facilitate learning in general (i.e., not related specifically to listening comprehension) Madsen and Forsythe (1973) say, "Of particular interest in previous investigations was the seemingly infinite variety of reinforcers employed in behavioural shaping" (p. 176). Perhaps carefully chosen or appropriate rewards would yield more consistent results in such studies.

McGraw (1978) found that extrinsic rewards generated best positive results if the task to be performed was of an aversive-algorithmic nature rather than an attractive-heuristic one. He says, "If a task is aversive to the subject, then reward cannot be expected to disrupt performance. To the contrary, it will improve it" (p. 56).

Dollinger and Thelen (1978) and Karniol and Ross (1977) found that rewards which are performance-relevant (contingent) generate better responses than those which are performance-irrelevant (non-contingent). Loveland and Olley (1979) discuss the possibility of being able to increase the quality of children's performance by using rewards, but state that "the reward must be contingent upon quality in order to do so" (p. 1209).

Although Thomson (1970) found ample evidence in the literature to support the beneficial application of reinforcement or rewards in special class settings, he found very little evidence of its use in the regular classroom (p. 4). Whelan and Haring (1966) state that its use in regular classes "has yet to be demonstrated" (p. 288).

Forness (1973) in an article entitled The Reinforcement Hierarchy suggests that there is a hierarchy of reinforcement that could be

taken into consideration, the level of which depends upon the population of recipients receiving the rewards (see Figure 2).

| | |
|---|---|
| Competence | (skill acquisition) |
| Being Correct | (feedback) |
| Social Approval | (praise) |

---

Contingent Activity (Premack Principle)
Tokens or Check marks (exchanged for other reinforcers)
Tangibles (toys, trinkets)
Edibles (food, M & M's)

Figure 2
Forness' Reinforcement Hierarchy

In this hierarchy the most powerful reinforcer is at the bottom, and the least powerful is at the top, with the others in between being on a continuum. Forness states that "the line in the middle separates what are considered to be those reinforcers that exist naturally in the world (the regular classroom) from those that exist in special settings (special classes, learning groups)" (p. 170). Forness' article cautions the reader concerning acceptance of the reinforcement hierarchy verbatim, and states, "there are some obvious difficulties with and exceptions to the hierarchy" (p. 170). He suggests it be used with caution. Forness states, "available research evidence suggests that many of the reinforcers are indeed 'floaters', that is, they position at various levels on the hier-

archy depending on myriad factors such as age, social class, preference and magnitude of incentive, to name but a few" (p. 175).

Three of the reinforcers from the Forness hierarchy have been chosen for this study--(a) Token Reinforcement, a more powerful (primitive) reinforcer not necessarily associated in conjunction with regular classroom learning; (b) Social Approval, and Being Correct, two less powerful (more mature) reinforcers which usually are associated with regular classroom learning (as discussed in Forness, 1973). The two were presented in conjunction one with another because "Being Correct" according to Forness, "usually is never completely...disassociated from social approval" (p. 170).

Summary

According to the review of literature discussed in this chapter, three variables are worth highlighting to allow for rewards to have maximum effect: first, material presented should be of an aversive-algorithmic nature; second, the granting of the reward should be contingent upon performance; third, the reward offered should be of sufficient strength. Assuming that all three conditions have been met, the following chain of events should take place: the rewards will influence the subject's motivation level to the extent that it will interact with, and elevate, the attentional and concentration abilities so as to finally result in increasing the accuracy of his listening processing. The details of how the reinforcers are applied are outlined in the next chapter.

# CHAPTER IV

# EXPERIMENTAL DESIGN AND PROCEDURE

## DESIGN

One of the more powerful designs used in modern day research is the Pretest-Posttest Control Group design (Campbell & Stanley, 1963). This study, because of the difficulty in obtaining a random sample, employed the use of a modified version of this design. The three groups of children selected for the study were randomly assigned to the control group and two experimental groups and received a pretest similar-to but not the-same-as the posttest. The posttest scores were subjected to the analysis of covariance so as to compensate for any differences found between the groups prior to treatment. The adjusted final mean scores were then compared to ascertain whether there were differences which were significant statistically. This procedure is discussed in the comprehensive text by Borg & Gall (1971, pp. 392-4) and is known as the Nonequivalent control-group design.

### Sample

Three intact grade four classes, involving 73 students--47 males and 26 females--selected from the Gordon Head area of the Greater Victoria School District #61 by the researcher in conjunction with the school district's administration, constituted the sample of subjects for this study. No two classes were in the same school. The three schools were judged by the schools' administrators to be of equivalent socioeconomic status (middle class to upper-middle class).

Any child from any of the three classes with a known hearing loss or auditory perceptual problem was excluded from the study. This was determined by consulting with the Public Health Nurse, the speech -language pathologist assigned to each school involved in the study, and with each of the three classroom teachers.

The first experimental group (hereafter called Group 1) was originally 26 students in number. However, one was dropped from the study because of an auditory perception problem, and one was dropped due to absenteeism. The remaining group of 24 subjects was comprised of 17 males and 7 females.

The second experimental group (hereafter called Group 2) was originally 31 students in number. Two were dropped from the study due to absenteeism. The remaining group of 29 students was comprised of 18 males and 11 females.

The control group (hereafter called Group 3) was originally 25 students in number. Five were dropped from the study due to absenteeism. The remaining group of 20 students was comprised of 12 males and 8 females.

The test used in this study was designed to be administered to students in grades 4, 5 and 6. Students at the grade 4 level were chosen for this study so as to minimize the ceiling effect that may occur. No subject obtained a perfect score, therefore no ceiling effect occured.

## The Test

The listening test used in this study was the S.T.E.P. Listening Test (STEP, 1957). After reviewing the commercially produced listening tests, it was thought by the writer that the STEP offered the measurement

of the best range of listening activities that would most naturally occur in the elementary classroom.

The test is comprised of thirteen separate selections which are read aloud to the students. Immediately after the selection has been read, questions and responses are read aloud by the examiner to which each student responds by circling one of four multiple choice answers on an answer sheet. The thirteen selections are comprised of short stories of a narrative, descriptive, explanatory and expository nature. Some stories also include argumentative, persuasive and aesthetic material. Some stories involve listening to step-by-step procedures of how to follow directions or how to build a certain object. Others are stories which require careful listening in order to remember detail or to make inferences.

A total of 75 questions are asked during the administration of the entire test. These questions have been categorized by the authors of the test into three main areas, requiring the student to apply certain skills in order to answer correctly any given question. The three skill categories are: (a) "plain-sense comprehension", which involves making judgments based on main ideas, significant details, sequence of ideas and denotative meanings, (b) "interpretation", which involves making judgments based on implications of ideas and details, interrelationships among ideas and connotative meanings, (c) "evaluation and application", which involves judging validity of ideas, judging sufficiency of details, criticizing organization, judging mood and effect, and recognizing intent.

The reliability of the S.T.E.P. Listening Test, Form A, has been

reported to be about .90 within a single grade (Lorge, 1959, p. 654). Although only Form A of the test has been analyzed for reliability, Siegel (1959, p. 74) said, "it is probably safe to assume that correlations between forms would be high."

Content validity, however, is somewhat in question. Jackson (1959, p. 63) reported that "no statistical evidence of validity was presented at the time the tests were released." Siegel (1959, p. 74), realizing that there were no validity coefficients available, stated that "the series [STEP] possesses obvious content validity resulting from the careful preliminary work involving the definition of objectives of the battery and the structure of items which preceded the actual item-writing process."

Procedure

In this study there were two experimental groups and one control group. Each class was randomly assigned to one of the three groups. To each group there was administered a pretest and a posttest--the S.T.E.P. Listening Test, Form 4B and Form 4A, respectively. Form A was given as the posttest rather than Form B mainly because only Form A has been reported as having been analyzed for reliability (Lorge, 1959, p. 654). Also, according to information given in the S.T.E.P. Teacher's Guide, the average student scores, used for normative data purposes, were higher for Form 4A than for Form 4B. It was thought that this advantage should be passed on to the subjects participating in this study.

Normal administration of the test requires that each student be

given a test booklet, upon which is supplied the four possible answers for each question of the test, and a separate answer sheet to record his responses. For the purposes of this study only the test booklets were given to the students. The students' answers were indicated by circling the letter of the answer thought to be correct.

There is a difficulty in giving Form 4A in its entirety to non-American children. In Part One, Selection III, the listening passage is completely concerned with pledging loyalty to the flag of the United States. It was felt by the researcher that the selection would be difficult to alter so that Canadian children would understand it. Therefore, this entire selection was excluded from the test. This deletion should not have effected the statistical data of this study as only raw scores were to be used in calculations. As this deletion, however, changed the total possible score from 80 to 75 in Form 4A, a similar selection--Part Two, Selection VII--was excluded from Form 4B. This selection was approximately the same length and consisted of the same number of questions as the deleted selection in Form 4A. Also, since it deals with a "student council meeting", it would have had little meaning to a group of grade four Canadian students.

Treatment in the form of extrinsic rewards offered was presented to the two experimental groups, using three (two in combination) types of rewards discussed in Forness' theoretical hierarchy (Forness, 1973). Students in the two experimental groups were offered the following extrinsic rewards:

Group 1 - Social Approval and Being Correct

Students in this group were encouraged to perform better on the posttest than they did on the pretest (being correct). They were told that the difference between the scores of both tests for all students would be displayed on the bulletin board outside their room in the main hallway (social approval).

Using the "difference" of scores allows students who scored low on the pretest to have a similar or equal chance of improvement on the posttest as those who scored higher on the pretest.

Group 2 - Token Reinforcement

Students in this group were encouraged to perform better on the posttest than they did on the pretest. Each student who received a better posttest score earned the choice of either a free skating pass or a free swim pass to the local recreation centre.

Testing

Pretesting was done on three consecutive days involving a Tuesday, Wednesday and Thursday in March, 1983. The S.T.E.P. Listening Test Form 4B constituted the pretest. Posttesting was done on the corresponding three days of the following week. The posttest consisted of Form 4A of the S.T.E.P. Listening Test. Each test is approximately 80 minutes in length.

All testing was administered personally by the researcher. No tape recording was used. The possibility of classroom teacher influence was therefore minimized.

Verbal instructions by the author followed the "Teacher's Script" as outlined in the S.T.E.P. test manual. Further verbal instructions to the students are outlined as follows:

Group 1 - Experimental - Social Approval and Being Correct

This group was given both tests as outlined in the test manuals with one main difference--the children were instructed at the outset of the second listening test (Form 4A) as follows: "After all the test booklets have been marked, the score of last week's test will be subtracted from the score of today's test, and the difference will be displayed on the bulletin board in the hallway outside this classroom. For example, if on last week's test you received a score of 41 and on today's test you receive a score of 53, the difference will be 12. That number, beside your name, will be displayed in the hallway. Let's see how many of you can get a better score on today's test as compared to the one you took last week." (Any child who received the same or worse score on the post-test received the number "0".)

Group 2 - Experimental - Token Reinforcement

This group was given both tests as outlined in the test manuals with one main difference--the children were instructed at the outset of the second listening test (Form 4A) as follows: "Those students who get a better score on this test as compared to last week's will receive a choice of either a free skating pass or a free swim pass to the Oak Bay Recreation Centre. Let's see how many of you can get a better score on today's test as compared to the one you took last week."

Group 3 - Control

This group was given both tests as outlined step-by-step in the test manuals. Instructions given to the students at the outset of both tests followed that outlined in the test manuals. The only word of encouragement to this group given at the outset of the posttest was, "Let's see how many of you can get a better score on today's test as compared to the one you took last week."

## Hypotheses

The study tested the following null hypotheses:

1. There will be no significant differences in mean S.T.E.P. Listening Test total scores between Experimental Group 1, Experimental Group 2, and the Control Group.
2. There will be no significant differences in mean S.T.E.P. Listening Test "Plain Sense Comprehension" subtest scores between Experimental Group 1, Experimental Group 2, and the Control Group.
3. There will be no significant differences in mean S.T.E.P. Listening Test "Interpretation" subtest scores between Experimental Group 1, Experimental Group 2, and the Control Group.
4. There will be no significant differences in mean S.T.E.P. Listening Test "Evaluation and Application" subtest scores between Experimental Group 1, Experimental Group 2, and the Control Group.

## Data Collection and Analysis

All test booklets of both pre- and posttests were collected and marked by the researcher. (See Appendix for lists of raw scores.) All

students were given a code number to ensure confidentiality for the purposes of marking and analysis.

Analysis of covariance was the chief statistical tool employed for the analysis of the raw scores obtained. ANCOVA was used to find F-ratios for the four hypotheses. The raw data were subjected to the Kuder-Richardson 20 analysis to obtain reliability coefficients for each subtest score and total scores of both pre- and posttests.

# CHAPTER V

## RESULTS

The analysis of covariance (ANCOVA) was used to test for differences in listening ability between the comparison groups. This statistical tool allows for control of differences in mean scores between groups on the pretest. It adjusts the posttest mean scores between the groups to compensate for initial differences. Posttest mean scores are shown as footnotes below each table.

### Statistical Characteristics of the Tests

Table 1 shows the means, standard deviations, and KR-20 reliability coefficients of all subtest scores and total scores of the S.T.E.P. Listening Test. The Kuder-Richardson 20 reliabilities, considering the minimum standard of r = .50 for measuring group differences, are in general quite acceptable.

For interest purposes, the alternate form reliabilities are listed below:

| Subtest | Alternate Form Reliability |
|---|---|
| Plain-Sense Comprehension | 0.653 |
| Interpretation | 0.726 |
| Evaluation and Application | 0.468 |
| Total | 0.823 |

TABLE 1

Pre- and Posttest Statistical Data on the
S.T.E.P. Listening Test

| | FORM B (PRETEST) | | | | FORM A (POSTTEST) | | | |
|---|---|---|---|---|---|---|---|---|
| | Plain-Sense Comprehension | Interpretation | Evaluation & Application | Total | Plain-Sense Comprehension | Interpretation | Evaluation & Application | Total |
| | K=29 | K=33 | K=13 | K=75 | K=29 | K=29 | K=17 | K=75 |
| Group 1 (n=24) | | | | | | | | |
| Mean | 21.00 | 20.54 | 9.96 | 51.50 | 22.25 | 21.17 | 10.71 | 54.13 |
| S.D. | 3.39 | 4.26 | 1.86 | 8.29 | 3.60 | 3.32 | 2.54 | 8.32 |
| KR-20 | 0.68 | 0.71 | 0.49 | 0.84 | 0.72 | 0.65 | 0.54 | 0.85 |
| Group 2 (n=29) | | | | | | | | |
| Mean | 20.00 | 20.07 | 8.55 | 48.62 | 22.07 | 19.48 | 10.90 | 52.45 |
| S.D. | 4.12 | 4.08 | 2.24 | 9.43 | 4.08 | 3.94 | 2.22 | 8.68 |
| KR-20 | 0.76 | 0.64 | 0.57 | 0.86 | 0.77 | 0.74 | 0.34 | 0.85 |
| Group 3 (n=20) | | | | | | | | |
| Mean | 20.70 | 21.70 | 9.45 | 51.85 | 22.30 | 21.30 | 11.55 | 55.15 |
| S.D. | 2.59 | 3.89 | 1.94 | 7.24 | 2.83 | 3.20 | 2.64 | 7.53 |
| KR-20 | 0.41 | 0.64 | 0.49 | 0.78 | 0.55 | 0.61 | 0.56 | 0.81 |

Testing of Hypotheses

$HO^1$: There will be no significant differences in mean S.T.E.P. Listening Test "total" scores between Experimental Group 1, Experimental Group 2, and the Control Group.

Analysis of Hypothesis 1 is shown in Table 2. The differences between the three groups were not significant at the .05 level of confidence, hence, the hypothesis was not rejected.

TABLE 2

Analysis of Covariance on "Total" Adjusted Mean Scores of Listening Test Between Two Experimental Groups and Control Group

| Source of Variation | df | Mean Squares | F | P |
|---|---|---|---|---|
| Treatment | 2 | 3.85 | 0.17 | n.s. |
| Error | 69 | 22.17 | | |

Adjusted Mean Scores:

Exper. Group 1 - 53.28
Exper. Group 2 - 53.93
Control Group 3 - 54.02

$HO^2$: There will be no significant differences in mean S.T.E.P. Listening Test "Plain Sense Comprehension" subtest scores between Experimental Group 1, Experimental Group 2, and the Control Group.

Analysis of Hypothesis 2 is shown in Table 3. The differences between the three groups were not significant at the .05 level of confidence, hence, the hypothesis was not rejected.

TABLE 3

Analysis of Covariance on Subtest "Plain Sense Comprehension" Adjusted Mean Scores of Listening Test Between Two Experimental Groups and Control Group

| Source of Variation | df | Mean Squares | F | P |
|---|---|---|---|---|
| Treatment | 2 | 1.63 | 0.21 | n.s. |
| Error | 69 | 7.71 | | |

Adjusted Mean Scores:

Exper. Group 1 - 21.92
Exper. Group 2 - 22.42
Control Group 3 - 22.18

$HO^3$: There will be no significant differences in mean S.T.E.P. Listening Test "Interpretation" subtest scores between Experimental Group 1, Experimental Group 2, and the Control Group.

Analysis of Hypothesis 3 is shown in Table 4. The differences between the three groups were not significant at the .05 level of confidence, hence, the hypothesis was not rejected.

TABLE 4

Analysis of Covariance on Subtest "Interpretation" Adjusted Mean Scores of Listening Test Between Two Experimental Groups and Control Group

| Source of Variation | df | Mean Squares | F | P |
|---|---|---|---|---|
| Treatment | 2 | 12.64 | 2.07 | n.s. |
| Error | 69 | 6.10 | | |

Adjusted Mean Scores:

Exper. Group 1 - 21.25
Exper. Group 2 - 19.87
Control Group 3 - 20.64

$HO^4$: There will be no significant differences in mean S.T.E.P. Listening Test "Evaluation and Application" subtest scores between Experimental Group 1, Experimental Group 2, and the Control Group.

Analysis of Hypothesis 4 is shown in Table 5. The differences between the three groups were not significant at the .05 level of confidence, hence, the hypothesis was not rejected.

TABLE 5

Analysis of Covariance on Subtest "Evaluation and Application" Adjusted Mean Scores of Listening Test Between Two Experimental Groups and Control Group

| Source of Variation | df | Mean Squares | F | P |
|---|---|---|---|---|
| Treatment | 69 | 9.05 | 1.91 | n.s. |
| Error | 2 | 4.74 | | |

Adjusted Mean Scores:

Exper. Group 1 - 10.29
Exper. Group 2 - 11.32
Control Group 3 - 11.44

# CHAPTER VI

# CONCLUSIONS

## Discussion

Upon inspection of the results, it can be seen that there were no significant differences between the control group and either of the two experimental groups in favour of the experimental groups. The null hypotheses were all accepted.

Considering the nature of the general results and the theoretical basis of the study, it is important to examine possible reasons for the observed behavior. It is thought by the writer that the weaknesses of the study lie not in the theoretical aspects of how extrinsic rewards ultimately change listening ability through the vehicle of increased "rehearsal" activity, but in the constrcut or design of the study itself. Several major influences considered to contribute to the lack of significant differences in favour of the experimental groups are worth discussing.

Firstly, the Hawthorne Effect--i.e., the fact that the children had some knowledge that they were taking part in an "experiment"--might have been an influence. It would seem reasonable to assume that with the knowledge in mind that their parents had signed a note giving permission for their participation in a University research study, the children were in an attentive frame of mind during the pretest as well as the posttest.

Secondly, the possible effects of being tested by an unfamiliar teacher cannot be overlooked. As was mentioned earlier in Chapter IV, the variable due to bias on the part of individual classroom teachers was

controlled by having the researcher administer all of the tests to the subjects. However, the fact that the researcher was a new person on the scene for the express purpose of administering a test to the class, could have caused a reaction on the part of the students that would favour better-than-average scores for all groups on the pretest and the posttest.

Other possible variables that could have had an influence on the results of this study were (a) the age of the subjects, (b) the socioeconomic status of the subjects, (c) the nature of the test used, and (d) the appropriateness of the rewards that were chosen for this study. Perhaps if this study were aimed toward younger children from a lower-middle socioeconomic level, they may not have been as affected by the Hawthorne Effect and the unfamiliar teacher, but would have found the rewards more highly motivating. With respect to the test used, it is possible that it may not measure appropriate behavior changes. Finally, there is the possibility that the reward setting was not motivating enough for the groups of children involved in this study. Finding an appropriate reward is a complex task. As Sewell (1973) stated, "Perhaps the level of goal setting is the crucial factor" (p. 9).

The results of the study showed no evidence of the "overjustification effect" discussed in Chapter III. The reader will recall that this "effect" theoretically occurs when a subject has intrinsic motivation to explore or complete a task and then is presented with an extrinsic reward for doing so. The result is that the task is not carried out as well as if the subject were presented nothing. In this study, however, mean scores on the posttest of the two experimental groups were not sig-

nificantly lower than those of the control group. From this statistical fact, it can be presumed that the children viewed the test as an algorithmic-aversive activity.

It is to be concluded that it is not realistic to expect improved listening ability, as measured by the S.T.E.P. Listening Test, from regular grade four students when offered extrinsic rewards in the manner set forth in this study.

## Implications for Further Research

It is felt by the writer that extrinsic rewards offered to regular elementary school children could enhance listening ability. A study similar to the one just completed, but utilizing a standardized tape onto which the entire presentation is recorded, to be played by individual classroom teachers may alleviate the teacher variable, but still would not address the issue of the Hawthorne Effect. It seems, however, that to have its effect, any plan should include the classroom teacher as the implementer. The gathering of baseline data, or "pretesting", should be carried out in such a matter-of-fact manner so as not to arouse the suspicions of the children to the fact that they are being tested. This is fairly simple to do on informal listening activities but difficult to do with the more formalized listening tests.

One method of overcoming this problem might be to include three or more classes in a year-long study in which all classes would receive weekly listening tests--just as they receive weekly spelling tests--throughout the year. The weekly tests would be standardized for all classes taking part in the study. Once baseline data about the mean lis-

tening ability scores from all classes are established--perhaps after four months into the school year--intervention in the form of extrinsic rewards could be offered to all children on a number of subsequent tests with the exception of those in the control group.

Further study could include children in grades one, two and three, where minds may be more impressionable and extrinsic rewards may have more attraction. Also, it would be of interest to include children from lower-middle class to middle class socioeconomic status in such a study. More sensitive and comprehensive measures of listening comprehension should be used. Finally, stronger rewards could be investigated.

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# APPENDIX

## LISTS OF RAW SCORES

## FROM S.T.E.P. LISTENING TEST

## APPENDIX

### RAW SCORES FROM S.T.E.P. LISTENING TEST - GROUP 1

| SUBJECT | PRETEST | | | | POSTTEST | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Plain-Sense Comprehension | Interpretation | Evaluation & Application | Total | Plain-Sense Comprehension | Interpretation | Evaluation & Application |
| 101 | 68 | 25 | 30 | 13 | 66 | 26 | 26 | 14 |
| 102 | 66 | 25 | 29 | 12 | 64 | 25 | 27 | 12 |
| 103 | 60 | 22 | 28 | 10 | 65 | 25 | 25 | 15 |
| 104 | 59 | 25 | 23 | 11 | 57 | 25 | 20 | 12 |
| 105 | 59 | 24 | 24 | 11 | 56 | 23 | 23 | 10 |
| 106 | 58 | 23 | 24 | 11 | 51 | 20 | 22 | 9 |
| 107 | 57 | 25 | 22 | 10 | 63 | 23 | 26 | 14 |
| 108 | 55 | 23 | 22 | 10 | 58 | 26 | 21 | 11 |
| 109 | 54 | 26 | 19 | 9 | 57 | 27 | 20 | 10 |
| 110 | 54 | 22 | 20 | 12 | 60 | 26 | 22 | 12 |
| 111 | 53 | 22 | 20 | 11 | 64 | 26 | 25 | 13 |
| 112 | 53 | 22 | 21 | 10 | 60 | 24 | 22 | 14 |
| 113 | 52 | 22 | 22 | 8 | 57 | 22 | 23 | 12 |
| 114 | 52 | 19 | 21 | 12 | 60 | 23 | 24 | 13 |
| 115 | 52 | 20 | 20 | 12 | 52 | 21 | 22 | 9 |
| 116 | 47 | 18 | 20 | 9 | 58 | 26 | 20 | 12 |
| 117 | 47 | 20 | 17 | 10 | 42 | 16 | 18 | 8 |
| 118 | 46 | 20 | 17 | 9 | 47 | 18 | 21 | 8 |
| 119 | 46 | 17 | 18 | 11 | 46 | 21 | 19 | 6 |
| 120 | 45 | 20 | 15 | 10 | 45 | 18 | 18 | 9 |
| 121 | 43 | 20 | 15 | 8 | 41 | 17 | 16 | 8 |
| 122 | 38 | 12 | 17 | 9 | 50 | 23 | 15 | 12 |
| 123 | 36 | 16 | 14 | 6 | 43 | 19 | 16 | 8 |
| 124 | 36 | 16 | 15 | 5 | 37 | 14 | 17 | 6 |

APPENDIX Continued

RAW SCORES FROM S.T.E.P. LISTENING TEST - GROUP 2

| SUBJECT | PRETEST | | | | POSTTEST | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Plain-Sense Comprehension | Interpretation | Evaluation & Application | Total | Plain-Sense Comprehension | Interpretation | Evaluation & Application |
| 201 | 63 | 26 | 26 | 11 | 62 | 26 | 25 | 11 |
| 202 | 62 | 24 | 27 | 11 | 62 | 25 | 22 | 15 |
| 203 | 61 | 25 | 25 | 11 | 58 | 25 | 21 | 12 |
| 204 | 61 | 25 | 25 | 11 | 61 | 23 | 24 | 14 |
| 205 | 60 | 23 | 24 | 13 | 62 | 26 | 24 | 12 |
| 206 | 60 | 25 | 24 | 11 | 59 | 24 | 22 | 13 |
| 207 | 60 | 25 | 27 | 8 | 65 | 25 | 25 | 15 |
| 208 | 52 | 22 | 23 | 7 | 56 | 27 | 20 | 9 |
| 209 | 54 | 22 | 21 | 11 | 53 | 22 | 20 | 11 |
| 210 | 52 | 22 | 23 | 7 | 54 | 24 | 21 | 9 |
| 211 | 52 | 21 | 21 | 10 | 53 | 26 | 16 | 11 |
| 212 | 51 | 23 | 21 | 7 | 61 | 26 | 24 | 11 |
| 213 | 50 | 21 | 20 | 9 | 56 | 25 | 17 | 14 |
| 214 | 50 | 22 | 17 | 11 | 50 | 23 | 17 | 10 |
| 215 | 50 | 20 | 22 | 8 | 52 | 23 | 19 | 10 |
| 216 | 49 | 21 | 20 | 8 | 54 | 24 | 16 | 14 |
| 217 | 49 | 22 | 17 | 10 | 58 | 24 | 22 | 12 |
| 218 | 47 | 19 | 19 | 9 | 57 | 22 | 23 | 12 |
| 219 | 46 | 16 | 22 | 8 | 54 | 24 | 19 | 11 |
| 220 | 45 | 17 | 18 | 10 | 47 | 18 | 21 | 8 |
| 221 | 44 | 18 | 18 | 8 | 58 | 23 | 23 | 12 |
| 222 | 42 | 18 | 17 | 7 | 50 | 20 | 21 | 9 |
| 223 | 41 | 18 | 15 | 8 | 46 | 22 | 13 | 11 |
| 224 | 41 | 16 | 17 | 8 | 47 | 16 | 22 | 9 |
| 225 | 40 | 20 | 14 | 6 | 44 | 20 | 15 | 9 |
| 226 | 35 | 12 | 18 | 5 | 32 | 11 | 11 | 10 |
| 227 | 34 | 11 | 16 | 7 | 40 | 18 | 14 | 8 |
| 228 | 32 | 14 | 13 | 5 | 40 | 16 | 16 | 8 |
| 229 | 27 | 12 | 12 | 3 | 30 | 12 | 12 | 6 |

APPENDIX Continued

RAW SCORES FROM S.T.E.P. LISTENING TEST - GROUP 3

| SUBJECT | PRETEST | | | | POSTTEST | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Plain-Sense Comprehension | Interpretation | Evaluation & Application | Total | Plain-Sense Comprehension | Interpretation | Evaluation & Application |
| 301 | 67 | 25 | 29 | 13 | 70 | 27 | 29 | 14 |
| 302 | 62 | 23 | 27 | 12 | 59 | 24 | 21 | 14 |
| 303 | 60 | 22 | 27 | 11 | 55 | 19 | 23 | 13 |
| 304 | 59 | 23 | 24 | 12 | 62 | 23 | 24 | 15 |
| 305 | 59 | 24 | 24 | 11 | 67 | 28 | 25 | 14 |
| 306 | 57 | 23 | 24 | 10 | 59 | 23 | 23 | 13 |
| 307 | 55 | 23 | 24 | 8 | 65 | 26 | 25 | 14 |
| 308 | 54 | 20 | 25 | 9 | 63 | 22 | 25 | 16 |
| 309 | 53 | 20 | 22 | 11 | 56 | 22 | 22 | 12 |
| 310 | 51 | 22 | 20 | 9 | 59 | 25 | 22 | 12 |
| 311 | 51 | 15 | 25 | 11 | 47 | 20 | 19 | 8 |
| 312 | 50 | 19 | 22 | 9 | 51 | 19 | 19 | 13 |
| 313 | 50 | 21 | 19 | 10 | 51 | 24 | 18 | 9 |
| 314 | 48 | 21 | 18 | 9 | 48 | 19 | 19 | 10 |
| 315 | 49 | 22 | 18 | 9 | 43 | 19 | 18 | 6 |
| 316 | 46 | 20 | 19 | 7 | 47 | 18 | 19 | 10 |
| 317 | 44 | 19 | 18 | 7 | 53 | 21 | 21 | 11 |
| 318 | 42 | 19 | 15 | 8 | 44 | 20 | 15 | 9 |
| 319 | 40 | 16 | 16 | 8 | 54 | 24 | 20 | 10 |
| 320 | 40 | 17 | 18 | 5 | 50 | 23 | 19 | 8 |

# VITA

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Listening Performance and the Effects of Rewards: An Investigation at the Grade Four Level.

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