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The development of piano student learning style profiles and recommendations for adaptation to selected piano method books

Madved, Loretta Marie, Ph.D.
The Ohio State University, 1987

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THE DEVELOPMENT OF PIANO STUDENT LEARNING STYLE PROFILES AND RECOMMENDATIONS FOR ADAPTATION TO SELECTED PIANO METHOD BOOKS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Loretta M. Madved, B. M., M. A.

* * * * *

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This study is dedicated to Nick, my husband and friend
ACKNOWLEDGEMENTS

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CHAPTER I

Introduction

Research of current literature revealed that music educators need to be aware of three factors that may affect their students' future successes in the study of music, i.e., intelligence quotient (I.Q.), home environment, and learning styles. Teachers have little or no control over intelligence quotient (I.Q.) and home environment, which are pre-existing factors in the teaching-learning relationship.

The first factor, I.Q., is frequently related to musical ability in research in the area of creativity. McNemar (cited in Simonton, 1984) found relationship between creativity and intelligence in early intellectual development. Therefore, it appears that the I.Q. of students may only be of importance to teachers of younger children in that the relationship between creativity and I.Q. may help teachers choose appropriate teaching methods and materials.

The second pre-existing factor, home environment, has been indicated in a study by Bloom to be important to the success of concert pianists who were strongly influenced in their development by parental behavior, one of the elements of home environment.
The third factor deals with students' learning style preferences. In this case, a teacher's knowledge of the two types of learning styles and the proper application of appropriate teaching strategies can have an effect on the teaching-learning relationship. Because the teacher has little or no control of the first two factors, intelligence and home environment, the third factor, learning style preferences, will be explored in this document and suggestions will be provided for their application to teaching piano performance.

Teachers of piano performance may classify their students into two groups: (1) students who need minimal explanations in order to understand and (2) students who require the teacher to use many available teaching strategies in order for learning to take place. The present study focuses on the latter group, in which may be found two types of students, namely, the analytic type learner [ATL] and the global type learner [GTL]. These two types are described using learning style profiles which relate preferred learning style strategies to each type of learning style. The profiles developed in this study are based on the learning style variables formulated by the National Association of Secondary School Principals Task Force (NASSP). A multidisciplinary approach was used for this study. The research that supports the two types of learning styles is derived from many areas including biology, neurology, physiology, psychology, education, the arts, music and music education. Although the historical support for this study from the medical sciences is based on hemispheric lateralization, split-brain research, and lesions in either of
the hemispheres, the focus of this study is on the cognitive processes of the brain rather than exact locations in the brain.

This method of labeling cognitive processes rather than location of the process in the brain eliminates confusion concerning possible exceptions in the location of cognitive functions in some segments of the population. Some exceptions concerning location include mixed-dominant students and reversed-dominant students. Therefore, for the purposes of this study, right-hemisphere dominant students were labeled as global [G] style learners (whole to parts cognitive processing) and left-hemisphere dominant students referred to as analytic [A] style learners (parts to whole cognitive processing).

This use of cognitive processes rather than actual location in the brain has been used in other research. Although the terminology may differ throughout the literature, the two types of learning styles are evident. The terms used by Schweiger and Maltzman are "analytic" and "holistic". These terms are defined as operating on parts and operating on wholes, respectively.

Shannon also chooses to focus his laterality research on a process rather than content. He labels the two learning style types as complex analytic processing and simple gestalt processing rather than associating the left and right hemispheres with language and music respectively. Bogen (cited by Bruno, 1985) also prefers labeling processes rather than content.

The issue of handedness was also not dealt with in this study as it was considered an unreliable factor in the assessment of learning.
style due to the same exceptions stated previously, namely, mixed-dominance and reverse dominance. Although most right-handed learners may prefer analytic strategies and most left-handed learners may prefer global strategies, it is possible that some learners may have reverse dominance. In other words, their analytic and global strategies may be housed in the opposite hemispheres; analytic in the right and global in the left.

Another factor that may cause confusion in using handedness as an assessment for learning style is the possibility that learners may have, through their education, mastered strategies of the less-preferred learning style methods and may need no additional help from the piano teacher. For example, if a student is left-handed, a piano teacher must guard against labeling the student as one who has difficulty in organization and verbal processes. This would be a disservice to the student.

The relationship of handedness to musical ability may also be oversimplified. The most common relationship found in the literature associates left-handedness with music and creativity. The reason for this relationship is that the left hand is controlled by the right hemisphere which houses many creative cognitive strategies such as intuition, gestalt and simultaneous processing. In a study of handedness and musical ability conducted by Byrne, it was found that handedness was not consistent within the musical population. Byrne's results showed a marked distinction between vocal and instrumental musicians, including pianists, in terms of verbal performance versus a
non-verbal medium of performance. The results indicated that the instrumentalists contained more mixed-handed members and fewer right- and left-handed members. In contrast, the vocalists contained handedness proportions similar to the control group. He suggested that successful musicians have variables other than handedness that influence musical ability.\textsuperscript{11}

This writer believes that in order to develop piano performance, the student must use strategies from both global and analytic learning style domains. Because most students are assumed to prefer one learning style, is it necessary that each student master learning strategies of his less-preferred mode as well. It would appear that students who have difficulty learning piano performance are those students who depend on one cognitive function almost exclusively. Conversely, the students who learn more easily are those who can choose cognitive strategies according to the musical task to be mastered.

Zatorre supports this balance of cognitive strategies for music. He states that dominance of one hemisphere over the other does not exist in musical processing as it does for linguistic processing.\textsuperscript{12} Goodglass and Calderon also believe that the independence of the two separate cognitive functions does not interfere with the intercommunication between the hemispheres.\textsuperscript{13} Therefore, a balance, using both types of learning style strategies, is possible.

Musical skills can benefit from both global and analytic processing. Global processing allows for interpretation, emotional
expression, and holistic comparison between styles, periods, and forms. This right hemisphere process accounts for musicians' ability to read all necessary musical notation at once for a holistic or gestalt picture. Global processing is responsible for balance between parts, blend, timbre, harmony, texture, and allows for chunking, or grouping, small units into whole units for storage purposes.

The analytic processing of the left hemisphere balances the previously mentioned functions. Analytic processing deals with musical analysis, technique, classification, musical vocabulary, and component parts which are used to create music. Serafine states that "it is the act of analysis -breaking music down- that allows these components to be conceptualized separately for whatever purpose we desire." 

It appears that more lateralized students need guidance in the choice and use of appropriate cognitive strategies from the extreme ends of the learning style continuum. These students tend to use their preferred learning style almost exclusively even when the task demands a strategy related to the less-preferred learning style.

Students with a more balanced, less lateralized learning style, however, are capable of choosing learning style variables according to a specific task and are able to learn faster and more efficiently. This balanced style can be due to nature or environment. In support for the influence of nature, it is believed that females are less lateralized than males. Therefore, it may be assumed that females may need less instruction in their less-preferred mode. In support of the environment
issue, the education of the less-preferred strategies can achieve flexibility in learning style strategies.\textsuperscript{18}

The implications of a more lateralized learning style are familiar to music educators: an accurate mechanical performance (preferred left hemisphere, less-preferred right) or an inaccurate expressive performance (preferred right hemisphere, less-preferred left). Green describes these two types of musicians as "those who emphasize accuracy and discipline and those who find emotion and intuition more important than accuracy."\textsuperscript{19} LaBerge and Giles also divide musicians into two types. LaBerge states that the performance of a person who uses small groups of motor schemas will result in phrases that will be lumpy, while the use of larger groups of motor schemas will produce a smoother phrase.\textsuperscript{20} He also blames the failure of memory retrieval on the inability to flexibly alternate between small and large units (i.e. between global and analytic processing).\textsuperscript{21}

Giles also found that his analytic type piano student read slowly and painfully, one hand at a time, while his global type piano student actually enjoyed sight reading and read with hands together almost exclusively.\textsuperscript{22} These results do not suggest that an analytic student has no cognitive strategies that help in sight reading. The analytic type student would probably be able to single out incorrect pitches more accurately, while a global type student may be satisfied with a few wrong pitches. Similarly, Wolff also sees a balance based on the priorities of the two learning styles. In musical performance the
strengths of the two types of piano students are more commonly referred to as technique [A] and interpretative expression [G].

The imbalance of hemispheric processing seen in the two types of learning styles is apparent in the child prodigy who has an abundance of global strategies in his early years. Bamberger (cited by Gardner, 1983) believes a crisis occurs between the ages of 14 and 18 when analytic strategies are incorporated in cognition. During this period of development, the "figural approach" [G] to learning music must be balanced by the "formal approach" [A]. This crisis occurs after language is lateralized to the left hemisphere. Language is believed to be established in the left hemisphere by the age of 10.

Bamberger also states that "what we may be witnessing here is the powerful effect of seeking to understand, to look at, the very means that were previously used to see (and hear) with." He also supports an integration of both modes of perception in order to develop mature artistry and concludes that:

what may well characterize the expert listener-performer is the capacity to retain and play with the tension between formal understanding, where the focus is on the invariant particularity of pitch and time properties with respect to fixed reference structures, and figural ways of understanding, where the response is to the particularity of an event resulting from its contextually embedded function in a unique reference entity.

Dickson also speaks of the prodigy's crisis that progresses from relying on intuition [G] to analyzing while learning. The transition
begins with a child student responding spontaneously to his music and ends with a mature student studying music and solving problems using basic musical principles.28

According to Edwards, flexibility and balance between the two modes of learning and perception can be taught. She has applied imagery exercises to help switch modes for drawing.29 Ehrenwald uses the label "existential shift" to describe the ability to shift from one mode of perception to another. He states "the Existential Shift is a person's ability to switch his perceptual orientation, his motor and psychomotor responses, and his whole behavioral repertoire from one mode or level of existence to another." This description is used to understand Beethoven's extraordinary ability to shift from his overdeveloped right hemisphere, as suggested by Ehrenwald, to the analytic style of learning forced on him by his father.30

It may be assumed that successful musicians, through the aforementioned training, possess the capacity to shift modes of learning and perception at will according to the task to be mastered. The study by Aiello supports this theory. The results revealed that both child and adult musicians showed no ear or hemisphere preference in perception of arpeggiated triads, but non-musicians of all ages showed a right hemisphere and left ear preference associated with global strategies.31

Before any method of learning style education can be applied to piano performance, accurate measurements that are simple to administer must be made available to piano teachers. These measurements would help them identify their students' learning style.
preferences. Seven possible choices of these measurements are:
(1) Myers-Briggs Type Indicator, (2) Price, Dunn, & Dunn Learning Styles Inventory, (3) Kolb Learning Style Inventory,32
(4) Left/Right Brain Orientation Inventory, (5) Julian Jaynes' Two Faces Test, (6) The Brain Game, and (7) Marcel Kinsbourne's Finger Rod-Balance Test.33

While any of these measurements may be used, some may not be practical for use by piano teachers who have only 30 minutes each week with each student. Most of these standardized tests would take at least the entire 30-minute lesson period to administer. In addition, the teacher would need professional training to learn how to administer the test and properly interpret the scores.

A more practical way of assessment would be for the piano teacher to learn the strategies associated with the two learning styles and to diagnose a student's style by observing the piano performance skills related to each learning style. In this study, selected piano performance skills were defined and related to a learning style variable. The piano performance skills paired with learning style variables generated learning style profiles for both a global type and an analytic type piano student. Appropriate teaching strategies found in commercial piano method books and other piano pedagogy approaches were suggested.
Need for the Study

After examining literature on learning styles in the areas of biology, neurology, physiology, psychology, education, the arts, music, and music education, a large amount of research was located to support the theory of learning styles. Unfortunately, little information was available to describe how to apply learning styles to teaching music education and piano performance. A few studies relate learning styles to the arts. In one example, Bruno offers performer/teacher observations and suggestions in a very general way for the purpose of contemplation and consideration but offers no structured application. His recommendations are based on a solid foundation of hemispheric specialization research.34

A large amount of the information on learning styles is available in the form of studies without reference to how the results can be used by teachers. Because no one source provided a practical format to be used to assess and apply the theory of learning styles in piano performance, the writer believed that the development of such a method for use by piano teachers was an important contribution of this study.

An example of a similar study by Kirby on the application of learning styles to practical teaching strategies was found outside the field of music education. Her study explored the application of learning styles and transfer skill acquisition in the area of vocational education, providing not only a solid foundation for the use of learning styles in education but also offering a method of applying the theory in teaching.
She used Messick and Associates' learning style matches and mismatches as a guideline for teachers in order to apply more easily the theory of learning styles.35

In order to present logical structure and appropriate guidelines to this study, reference was made to the work of both Messick and Associates and to the learning style variables of the National Association of Secondary School Principals. These two sources supplied the vehicles necessary to apply more systematically learning styles to piano performance. Teachers can evaluate learning styles using the variables presented by the NASSP as a reference, subsequently applying appropriate strategies guided by Messick and Associates' matches and mismatches.

Statement of the Problem

Galin (cited by Edwards, 1979) offers three main objectives for teachers in using learning style education methods. Teachers should: (1) develop strategies to teach both types of cognitive functions, (2) train students to use the cognitive style best suited for the task, and (3) educate students to use both styles in an integrated manner.36 There is evidence that these objectives are valid. Loper, Hallahan, and McKinney found that both analytic and global learners are able to use either type of learning strategy if given appropriate reinforcement and encouragement.37
While it is important for teachers to realize that students favor a particular learning style, it also important that teachers communicate through the use of global and analytic teaching strategies. Hepler found a difference in the interaction between student and teacher in relation to teaching styles in private music lessons. He found that analytic teachers were more verbal, organized, and controlled through a lecture-type approach. Global teachers allowed for more student input and expression. It is apparent that students with learning styles that match the teaching style can learn more easily. For example, a student who learns best by discovery and doing will be at a disadvantage if his teacher favors a lecture approach that stresses details and rules. Therefore, it is important for teachers to be aware of their own teaching styles as well as their students' learning styles. Teachers who are aware of the different styles of perception and communication can subsequently match and mismatch styles according to the task to be learned.

Unfortunately, most piano teachers do not consciously and systematically teach using learning style theory although some may use the concepts without labeling them as suggested in this study. Instead, many teachers instruct all students using the same strategies without consideration of the students' individual learning styles.

If piano teachers want to consider the tasks offered by Galin, they need the two learning styles to be defined, preferably in terms of musical skills exhibited overtly by each of the two types of learners. In this way, piano teachers can informally assess students' learning styles.
without actually administering and interpreting standard learning style measurements not conceived specifically for musical skills. Huang concluded from his study that although the standardized test, the Group Embedded Figures Test (GEFT), used for his study does not provide useful information to the teacher, he does believe that the GEFT score may help teachers choose appropriate materials and methods for the student. It is therefore possible that a student profile using observable piano performance skills, as developed in this study, is not only more convenient and easier for a piano teacher to use, but it may also provide results more useful than those determined from standardized learning style measurements.

Once learning styles are diagnosed, teachers need a set of teaching strategies that could either match the students' styles for fast and efficient comprehension or mismatch the style for future cognitive growth and skill transfer. Bruno believes that "since people process information in different and multiple ways which may interact to facilitate or inhibit learning, preferred learning styles must never be underestimated, as a consistently relied upon style may interfere with processing information adequately." This writer supports a curriculum that stresses mismatched strategies as an ultimate goal for piano students. If students are equipped with both learning style strategies, they will be more flexible in using cognitive processes and thus better able to learn independently.
Bryan concluded from the results of her study that high levels of logic, reasoning, and the ability to analyze as well as analogical reasoning and the ability to synthesize are related to a high level of achievement in college. Therefore, the integration of both types of learning style strategies through learning the less-preferred strategies is not only beneficial in music learning, but integration of both types of strategies may also be necessary in overall achievement.

**Purposes of the Study**

The primary purpose of this study was to apply learning styles to teaching piano performance skills. The four secondary purposes were to:

1. Present a multidisciplinary basis for the theory of learning styles, drawn from research in the areas of biology, neurology, physiology, psychology, education, the arts, music, and music education, as a means of understanding the theory of learning styles as they apply to music learning;

2. Relate learning style strategies to piano performance in terms of learning style strategies that are best suited to selected piano performance skills;
3. Develop profiles of both an analytic type piano student and a global type piano student to be used as an assessment tool for piano teachers. These Piano Student Learning Styles Profiles may be used alone or in addition to standard learning styles measurements; and

4. Suggest available piano teaching materials, methods, and approaches that can be used to match and mismatch piano students' learning styles, depending upon the goals of the piano teacher.

Questions
The following questions were explored in this study.

1. What are the two types of learning styles that are based on hemispheric specialization research?

2. What National Association of Secondary School Principals (NASSP) learning style variables are associated with each learning style type?

3. How do these variables relate to selected skills necessary for developing piano performance?
4. Can these learning styles and their variables be defined in terms of observable piano performance skills?

5. Can a profile to be used for assessing learning styles be developed using observable piano performance skills for analytic piano students and global piano students?

6. How can inconsistencies between the two learning styles and two types of music students be explained? For example, most global students play better by ear even though visual perception is associated with the global learning style.

7. Are there specific teaching strategies that can be used to match and mismatch students' learning styles?

Limitations of the Study

There are a number of factors which piano teachers must consider before devising effective plans for instructing students. Factors to be considered by the teacher include such broad categories as the skills necessary in piano performance, the appropriate piano method books, and the learning style strategies which are most
effective in music learning. In addition, the teacher must consider the individual differences of each of the piano students. Due to this broad range of factors, this study was limited to:

1. piano performance skills that can be taught to beginning and intermediate piano students with the realization that these skills may also need to be taught to some advanced students,

2. piano students of average intelligence and who have no learning disabilities that would require special attention in the public school system. For the purposes of this proposed approach to learning styles in piano performance, average intelligence can be determined through the initial interview with piano students' parents. It was assumed that if a prospective piano student required special learning methods in school, the parents would inform the piano teacher when asked during the interview. Special learners would require additional strategies beyond the scope of this study,

3. selected learning styles variables,

4. selected piano performances skills, and

5. the first level of selected commercial piano method books.
Assumptions of the Study

1. All piano students would have a preferred learning style, that these learning styles would be on a continuum, and that most students would not be at the end of either extreme learning style on the continuum. Rather, the students would be mixtures of both styles while still maintaining a learning style preference.

2. Students who will find success in piano study are either global students whose analytic strategies have been trained through traditional public or private school educational systems or analytic students who have found opportunities to develop global strategies outside the traditionally analytic oriented educational system. The opportunities may be in the form of formal piano or music lessons.

3. Piano students who are able to be assessed by using the piano student learning style profiles possess mental abilities at the educable level and have normal academic experiences.

Technical Data

This document was prepared using an Apple Macintosh Plus computer. Microsoft Word was used for word processing and the tables were produced on SuperPaint by Silicon Beach Software. An Imagewriter II was used for all rough drafts while a commercially available Laserprinter Plus produced the final draft.
Definitions

The following terms are defined for the purpose of this study:

Affective styles - motivational processes (attention, expectancy, incentive) viewed as the learners' typical modes of arousing, directing, and sustaining behavior" [Keefe].42

Amusia - "a disorder characterized by inability to recognize or reproduce musical sounds" [Webster].43

Analytic - linear, sequential, and convergent thought that focuses on details. Parts to whole cognitive processing.

Aphasia - "a total or partial loss of the power to use or understand words, usually caused by brain disease or injury" [Webster].44

Cognitive styles - "information processing habits...which represent a person's typical modes of perceiving, thinking, remembering, and problem solving" [Messick].45

Cognitive styles - "(1) they emphasize form rather than content (how rather than what we perceive or think); (2) they are pervasive dimensions in that they are features of personality as well as cognition; (3) they are generally stable in an individual, but can be changed over time; and (4) they are bipolar (each may be judged to be positive and to have adaptive value under specified circumstances)[Schmidt].46

Global - holistic, simultaneous, and divergent thought that creates relationships. Whole to parts cognitive processing.
Lateralization - describes cognitive function that resides in either, but not both, of the two hemispheres of the brain.

Learning style - "the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment. Learning style is demonstrated in that pattern of behavior and performance by which an individual approaches educational experiences. Its basis lies in the neural organization and personality which both molds and is molded by human development and the learning experiences of home, school, and society" [Keefe and Languis].

Physiological styles - "biologically based modes of response founded on sex related differences, personal nutrition and health, and accustomed reaction to the physical environment" [Keefe].

Split-brain research - research based on behaviors of patients who have had their corpus callosum severed.
References


21. Ibid., p. 192.


27. Ibid., p. 69.


32. P. Kirby (1979), *Cognitive style, learning style, and transfer skill acquisition* (Columbus, OH: The National Center for Research in Vocational Education at The Ohio State University) p.92.


34. Ibid., pp. 107-135.

35. P. Kirby, *op. cit.*


41. M. R. Bryan (1985), Interrelationships between learning styles, formal operations, achievement in specified content areas, age, and level of education, *Dissertation Abstracts International, 46*, p. 651A.


CHAPTER II

Review of the Literature

Introduction

This chapter contains a review of current literature related to the two hemispheres of the brain and the learning styles associated with each hemisphere. The literature contained in this review is derived from research in the fields of biology, neurology, physiology, psychology, education, the arts, music, and music education. The research explored in this present study includes experiments performed on subjects with brain damage caused by surgically disconnected hemispheres or unilateral lesions which resulted in aphasia and amusia; studies in which a single hemisphere of the subject is anesthetized by sodium amytobarbital; and studies involving subjects' responses to monaural and dichotic listening tasks as well as additional related theories and suggestions.
Hemispheric Specialization/Learning Style Research: Biology, Neurology, Physiology, and Psychology

Most current research on the different processing strategies of the right and left hemispheres of the brain has been derived from studies of individuals who do not typify the average learner. These people include the learning disabled, mentally retarded, split-brain patients, and patients with brain-damage. Conclusions made by researchers support a theory, put forth in this paper, that there is a distinct difference between the right and left hemisphere cognitive processes.

There is considerable interest in the processing strategies associated with the right and left hemispheres of the brain, due in part, behavioral differences evident in patients with brain damage. Much of the interest in this area began after Sperry conducted experiments exploring the cognitive strategies of split-brain patients. The patients had the corpus callosum, or connecting tissue between the two hemispheres, surgically severed for the purpose of reducing epileptic seizures. It was found that both hemispheres, not just the left as previously believed, seemed to be involved in higher cognitive functioning. The significant difference between the hemispheres appeared to be the mode, or learning style, in which each hemisphere functions. This concept that focuses on equal function differs from the theory that the left hemisphere serves as the dominant, or major processor and the right hemisphere serves as the minor processor.
The results from a study by Bogen and Gordon (cited by Bruno) also demonstrated a difference in cognitive function between the two hemispheres of the brain. When either hemisphere was anesthetized through an injection of sodium amylobarbitone, subjects would lose either their sense of melody [G] or their sense of lyrics [A] depending on which hemisphere was anesthetized.\(^3\)

Levy (cited by Edwards, 1979) noted that the two equal hemispheres interfered with each other preventing maximum use of cognitive abilities. She suggested that this was perhaps the reason for the development of asymmetry in the brain. Levy's theory supports a balance between the two learning styles which may be due to the capacity of the cognitive processes to work interdependently.\(^4\)

Levy-Agresti and Sperry describe the processes associated with each hemisphere:

The data indicate that the mute, minor hemisphere is specialized for Gestalt perception, being primarily a synthesist in dealing with information input. The speaking, major hemisphere, in contrast, seems to operate in a more logical, analytic computer-like fashion. Its language is inadequate for the rapid complex syntheses achieved by the minor hemisphere. The findings suggest that a possible reason for cerebral lateralization in man is basic incompatibility of language functions on the one hand and synthetic perceptual functions on the other.\(^5\)

Martin found that, although language is processed by the major, or left hemisphere in normal right-handed adults, the global learning style associated with the minor, or right hemisphere, does not appear to be lateralized.\(^6\) She concluded that the correlation between higher
levels of hemisphere advantage and the increase of task difficulty may be due to the element of time. More difficult tasks require more time which provides an opportunity for asymmetry to occur.7

Hemispheric lateralization is evident very early in a child's development, according to Best, Hoffman, and Glanville, who found a left hemisphere advantage for speech and a right hemisphere advantage for music in three- and four-month-old infants. A right hemisphere advantage for musical timbre, at two months, was apparent earlier than speech dominance.8

Learning style preferences are associated with this theory of a left hemisphere advantage for speech and a right hemisphere advantage for music. A preferred learning style is one which corresponds to the dominant hemisphere of the individual. According to Naour, learning style preferences may be related to gender.9 Geschwind and Behan (cited by Naour, 1985) have theorized that the testosterone produced by the fetal testes delays the development of the left hemisphere. This results in the common finding of male superiority in spatial functions and female superiority in verbal functions.10 Bradshaw and Nettleton (cited by Naour, 1985) found that females have a sequential preference in both hemispheres and, therefore, less hemispheric specialization.11 Research by deLacoste-Utamsing and Holloway (cited by Naour) supports this lack of hemispheric specialization in females. They found the posterior of the corpus callosum, which connects the two hemisphere, to be larger in females. This may account for the increased sharing between the hemispheres
and, therefore, less lateralization.\textsuperscript{12} Levy (cited by Naour) suggests that hemispheric specialization may be a biological adaptation from primitive humans. Males were needed to provide food and shelter, requiring spatial skills, whereas females were required to transmit social/cultural norms and instruct the young, utilizing verbal skills.\textsuperscript{13}

Kuziemski (cited by Schmidt & Sinor) also found a sex difference in learning style described in terms of the reflective/impulsive variable also used in the National Association of Secondary School Principals Model of Learning Style Variables applied to piano performance in Chapter III of this study. Generally, girls are more analytic [reflective] and boys more global [impulsive]. He found that reflective boys and impulsive girls tended to score higher on creative thinking. These more creative people balance their preferred learning styles with variables borrowed from the less-preferred style.\textsuperscript{14} Kemp adds that "musicians of both sexes may frequently need to cross the boundaries of sex-role stereotyping to operate successfully."\textsuperscript{15}

The terminology that describes the processes preferred by each hemisphere may differ depending on the source. Although the specific terms may differ, the dichotomies associated with the two hemispheres are a focus of much literature on hemisphere specialization and learning styles. Russell labels the dichotomies associated with each hemisphere as serial [left] and parallel [right]. He states that each hemisphere has its processing preference, but each hemisphere can also function in either mode. Through this specialization process, mental capacity is increased. Each side processes information in its
preferred way initially, then the information is integrated for a more sophisticated conclusion.\textsuperscript{16}

Bogen reviews the dichotomies found in the literature from 1864 - 1969 with his suggestions on lateralization (Table 1).\textsuperscript{17} Based on this and other research, Bogen believes that because an individual can function with one hemisphere it may be concluded that an unaltered brain has the capacity for two distinct "minds".\textsuperscript{18} This writer suggests that Bogen's two distinct minds are similar to the two types of learning styles explored in this study.

Many global strategies that are associated with the right hemisphere are often associated with creativity and music. Guilford's approach (cited by Sprinthall & Sprinthall, 1985) include three factors as responsible for creativity. All three; fluency, flexibility, and originality, involve divergent thinking which is a global process.\textsuperscript{19} Much literature that explores creativity also supports the addition of analytic strategies in the creative process. In Mednick's creativity measure, the \textit{Remote Associates Test} [RAT], the factor of utility is added to Guilford's three factors listed previously. This additional trait supports a balance in learning styles by adding the analytic strategies such as purpose, practicality, and logic.\textsuperscript{20}
TABLE 1
Bogen's review of the dichotomies found in the literature

<table>
<thead>
<tr>
<th>RESEARCH CITED</th>
<th>TYPE ONE [analytic]</th>
<th>TYPE TWO [global]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jackson (1864)</td>
<td>Expression</td>
<td>Perception</td>
</tr>
<tr>
<td>Jackson (1874)</td>
<td>Audito-articular</td>
<td>Retino-ocular</td>
</tr>
<tr>
<td>Jackson (1875)</td>
<td>Propositionizing</td>
<td>Visual imagery</td>
</tr>
<tr>
<td>Weisenberg &amp; McBride (1935)</td>
<td>Linguistic</td>
<td>Visual or kinesthetic</td>
</tr>
<tr>
<td>Anderson (1951)</td>
<td>Storage</td>
<td>Executive</td>
</tr>
<tr>
<td>Humphrey &amp; Zangwill (1951)</td>
<td>Symbolic or propositional</td>
<td>Visual or imaginative</td>
</tr>
<tr>
<td>McFie &amp; Piercy (1952)</td>
<td>Education of relations</td>
<td>Education of correlates</td>
</tr>
<tr>
<td>Milner (1958)</td>
<td>Verbal</td>
<td>Perceptual</td>
</tr>
<tr>
<td>Semmes, Weinstein, Ghent, Teuber (1960)</td>
<td>Discrete</td>
<td>Diffuse</td>
</tr>
<tr>
<td>Zangwill (1961)</td>
<td>Symbolic</td>
<td>Visuospatial</td>
</tr>
<tr>
<td>Heceen, Ajuriquerra, Angelerques (1963)</td>
<td>Linguistic</td>
<td>Pre-verbal</td>
</tr>
<tr>
<td>Bogen &amp; Gazzaniga (1965)</td>
<td>Verbal</td>
<td>Visuospatial</td>
</tr>
<tr>
<td>Levy-Agresti &amp; Sperry (1968)</td>
<td>Logical or analytic</td>
<td>Synthetic perceptual</td>
</tr>
<tr>
<td>Bogen (1969)</td>
<td>Propositional</td>
<td>Appositional</td>
</tr>
</tbody>
</table>

A balance of learning style strategies is also apparent in Wallas' theory of the creative process. Wallas describes four stages of creativity (Table 2) that include both analytic [convergent] and global [divergent thought).21
TABLE 2
Wallas' stages of creativity related to learning styles.

<table>
<thead>
<tr>
<th>STAGES</th>
<th>PROCESS</th>
<th>WRITER'S DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage One</td>
<td>Preparation</td>
<td>[Convergent thought]</td>
</tr>
<tr>
<td>Stage Two</td>
<td>Incubation</td>
<td>[Divergent thought]</td>
</tr>
<tr>
<td>Stage Three</td>
<td>Illumination</td>
<td>[Divergent thought]</td>
</tr>
<tr>
<td>Stage Four</td>
<td>Verification</td>
<td>[Convergent thought]</td>
</tr>
</tbody>
</table>

Campbell also offers components, or learning strategies, from both of the learning style types as they may be used in the process of creativity (Table 3). These relationships suggested by Campbell demonstrate the use of learning style strategies in creativity.22

The uniting of opposites, such as the two types of learning styles, is also evident in the literature on creativity. Maslow describes the ability of an artist to integrate dissonances.23 In addition, Rothenberg supports this concept of unifying opposites in his process of Janusian thinking. This process is defined as the capacity to utilize contradictory ideas simultaneously.24 Examples of opposite concepts in learning styles include the strategies defined as successive versus simultaneous, reflective versus impulsive, and narrow versus broad.25 Bogen and Bogen also believe that artistic creativity benefits from
TABLE 3
Campbell's relationships between learning style strategies and creativity

<table>
<thead>
<tr>
<th>CREATIVE METHODS</th>
<th>CREATIVE MARVELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot insure success</td>
<td>Are exciting and adventurous</td>
</tr>
<tr>
<td>Organize the experience</td>
<td>Flow with ideas</td>
</tr>
<tr>
<td>Teach the vocabulary</td>
<td>Experience, then develop the vocab.</td>
</tr>
<tr>
<td>Do one thing at a time</td>
<td>Allow everything to happen</td>
</tr>
<tr>
<td>Follow every safe rule</td>
<td>Risk what is known</td>
</tr>
<tr>
<td>Have winning goals</td>
<td>Be honest with inner feelings</td>
</tr>
<tr>
<td>Follow a time sequence</td>
<td>Forget time, be absorbed in now</td>
</tr>
<tr>
<td>Be assertive</td>
<td>Listen deeply</td>
</tr>
<tr>
<td>Co-operate with others</td>
<td>Work alone with ideas, then share</td>
</tr>
<tr>
<td>Be clear</td>
<td>Be whatever and start from there</td>
</tr>
<tr>
<td>Sit still and think</td>
<td>Move around until something happens</td>
</tr>
<tr>
<td>Be serious</td>
<td>Be funny</td>
</tr>
<tr>
<td>No non-sense</td>
<td>All and every sense</td>
</tr>
<tr>
<td>Repeat the last creative success</td>
<td>Be unusual</td>
</tr>
</tbody>
</table>

interhemispheric collaboration evident in a balance that includes strategies from both learning styles.26

There are two reviews of the literature on hemispheric specialization in the areas addressed in this section that provide information on research considered too extensive to address with the
limits of the present study. The first review by Gates and Bradshaw explores the impairment of function related to music; mental abilities common to music and language; and localization of musical function. They conclude that "one hemisphere should not be regarded as 'dominant' for music, but rather each interacts with the other, operating according to its own specialization." The second review by Zatorre also offers an extensive critical review of musical perception and cerebral function.

Hemispheric Specialization/Learning Styles Research: Education and the Arts

The research into hemispheric specialization and the characteristics of each hemisphere has been studied by a task force from the National Association of Secondary School Principals (NASSP). This task force produced a model of learning style variables. Educators can utilize this information in two ways: (1) teach by using the students' preferred learning style, or (2) help students to develop both cognitive strategies. Also included in the NASSP model are variables that are associated with perceptual preferences. Naour and Cremonini, DeRenzi, and Faglioni agree with associating a visual perception preference and long-term memory with the right hemisphere and connecting an auditory (verbal) perception preference and short-term memory with the left hemisphere.

Many other sources in the areas of education and the arts also offer descriptions and comparisons of the two learning style types.
Although some terminology may differ, the content is generally similar. Edwards compares the characteristics of the left hemisphere and the right hemisphere in order to clarify the learning style strategies associated with each hemisphere (Table 4). In her approach to art education, she instructs students to enhance their drawing abilities by learning to shift from the analytic (left hemisphere) learning style to the global [right hemisphere] learning style.

### TABLE 4
Edwards' characteristics of the right and left hemisphere.

<table>
<thead>
<tr>
<th>LEFT HEMISPHERE</th>
<th>RIGHT HEMISPHERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal</td>
<td>Nonverbal</td>
</tr>
<tr>
<td>Analytic</td>
<td>Synthetic</td>
</tr>
<tr>
<td>Symbolic</td>
<td>Concrete</td>
</tr>
<tr>
<td>Abstract</td>
<td>Analogic</td>
</tr>
<tr>
<td>Temporal</td>
<td>Nontemporal</td>
</tr>
<tr>
<td>Rational</td>
<td>Nonrational</td>
</tr>
<tr>
<td>Digital</td>
<td>Spatial</td>
</tr>
<tr>
<td>Logical</td>
<td>Intuitive</td>
</tr>
<tr>
<td>Linear</td>
<td>Holistic</td>
</tr>
</tbody>
</table>
Similarly, Bayuk uses the concept of shifting from analytic [A] to global [G] learning strategies in language instruction. The technique known as "suggestopedia", first developed by George Lozanov, is employed to enhance learning language skills. Learning barriers, associated with analytic strategies, are suspended through suggestion. This allows the students' cognitive processes such as intuition and freedom to be engaged, resulting in a shift from analytic learning strategies to global learning strategies. Suggestopedia is similar to the methods introduced by Ristad and Green that are discussed later in this chapter.

Hemispheric Specialization Learning Styles Research:

Music and Music Education

While research indicates evidence supporting the two types of learning styles, there is disagreement as to the source of musical intelligence and its relation to abilities in other fields. Is musical intelligence an exclusive process, or does music share the same learning style strategies employed by other disciplines? Both Deutsch (cited by Gardner, 1983) and Gardner support a separate storage area for musical intelligence. In addition, Deutsch believes that some musical function can be processed either by both hemispheres or by one hemisphere depending on the perceptual strategy of the listener.

Gardner goes as far as placing musical intelligence in the right anterior portions of the brain. Gardner's approach is divided into
six separate types: linguistic intelligence, musical intelligence, logical-mathematical intelligence, spatial intelligence, bodily-kinesthetic intelligence, and personal intelligence. He believes that musical intelligence, like linguistic intelligence, is a separate intelligence. Although Gardner considers musical intelligence as a separate entity, he also agrees that there is a relationship between musical intelligence and other realms of intelligence.38

Similarly, Scheid and Eccles place musical ability in the right hemisphere. They believe that musical ability is genetically inborn and is not attributed simply to experience and practice.39 Similarly, Shuter (cited by Pratt, 1977) believes that music ability is inborn. She concludes from her review of scientific evidence that "a musically stimulating home is certainly likely to help children to make the best use of whatever potential talent they may happen to possess. It would be over-optimistic, however, to hope that parents could substantially improve the ability, as opposed to the taste, with which their children have been endowed."40

Schleuter believes that a genetically inborn strong dominant hemisphere may have an effect on musical achievement, especially in early instruction.41 Learning style preference would most likely be more noticeable in young children because the less preferred style would gain a measure of processing balance through education in adulthood.

Similarly, Matson found that learning styles can be diagnosed in young children. He concluded, in his study of field
independence/dependence in children's responses to Piagetian type musical tasks, that children can be identified according to learning style as early as the subjects used in his study, namely kindergarten-age through third graders.\(^{42}\)

In addition, it appears that there may be a developmental process in acquiring musical skills that relates to learning styles. Hufstader's sequence of music listening skills relates to learning style development. He states that timbre skills tend to "develop by the preschool level... rhythm skills by the fifth grade, melodic pitch pattern skills between the fifth and seventh grades, and harmony skills by the seventh grade or later."\(^{43}\) Timbre, a global function, and rhythm, an analytic function, relate to these results.

Data from a study by Aiello indicate that learning styles themselves may be developmental. She concluded that the right hemisphere develops before the left hemisphere, but her research also showed that the left hemisphere strategies can be developed earlier through training.\(^{44}\) These data are in agreement with the research in Chapter I of this study concerning child prodigies and their highly developed global strategies.

Conversely, Cady states that a "musical mind" does not exist and the brain processes music just as it processes other disciplines. He states that everything is perceived the same way. The difference lies, instead, in memory retrieval.\(^{45}\)

According to research on hemispheric specialization, the answer to the question concerning the source of musical intelligence lies in the
processing differences associated with the two hemispheres of the brain. Bever and Chiarello brought this interest in hemispheric specialization directly into the discipline of music when they compared the strategies of physically unaltered musicians and non-musicians. They found that musicians and non-musicians process music differently. Non-musicians favored their left ears and used holistic processing whereas musicians favored their right ears and used analytic processing. Johnson extended his study, which produced similar results, to include dichotic rather than monaural listening tasks.

The medical sciences have also produced research relating musical abilities to learning styles. Bogen (cited by Gardner, 1983) quotes Hecaen on the role of lesion location and amusia. Hecaen concluded that "right-sided lesions cause defects in the 'recognition of musical sounds' whereas left hemispheric lesions cause a 'disorganization of musical understanding'." Bogen provides an example of aphasia in the musician, Ravel. He states that although "his [Ravel's] 'analytic recognition' of musical notation, and piano playing to sight were grossly disabled; on the other hand, melodic, rhythmic and stylistic sense were unimpaired, and playing or singing from memory was largely retained."

The two types of processing referred to in the previous example describing Ravel's affliction are referred to in this present study as analytic and global strategies. The literature on learning styles suggests a variety of similar terms and descriptions of the strategies.
Watkins and Dyson quote a two stage model of perception by Kroll and Hershenson. This model begins with global processing and fills in details as time permits. Navon (cited by Watkins and Dyson, 1985) adds that analytic processing may begin before global processing is complete. Therefore, an analytic learner, who would tend to focus on details, may need more time. The extra time would be used to construct a whole. Although slower, the analytic learner may be more accurate, due to the focus on the details.

Bamberger labels the two contrasting types of cognition available to musicians as figural and formal. He found that figural subjects group events according to relation and function within the figure, e.g., how a single pitch relates to a particular unique event. Formal subjects use "fixed reference structures" such as the musical scale, e.g., relating a single pitch to the scale, a fixed reference structure. They are therefore able to compare separate entities outside the particular event in time and space.

In his study, Bamberger found that the figural subjects used "felt paths" or "one-purpose machines" while formal subjects used an "all-purpose machine". The subjects were asked to construct or reconstruct a tune using Montessori bells. The global subjects using the "one-purpose machine" method chose a different bell for each pitch of the melody. Conversely, the analytic subjects who used the "all-purpose machine" played the same bell each time the same pitch was repeated. Bamberger describes the behavior of both figural and formal subjects as they may function in a musical setting such as the situation...
in his previously mentioned study. While a figural student may compare the same pitch that functions in two different ways and perceive them as different, a formal student would respond to the same pitch as exactly the same no matter how it related or how it functioned.54

Bamberger believes that his figure and formal strategies as being similar to Piaget's earlier and later developmental stages. He writes that

qualities that are associated with the behavior of young children seem to reappear in the figural strategies of older children and even adults when they are confronted with a specific problem in a domain that is new to them. In turn, Piaget's characterization of older children's behavior (concrete operations) seems similar to the strategies of adults with sufficient musical training to read standard music notation.55

Gordon chose to use the element of time to analyze the two types of learning styles. He says "according to the terminology of time, stimuli such as melodies may be analyzed either part-by-part favoring the left hemisphere or as a whole pattern favoring the right."56

Gordon found that time could be utilized to relate analytic strategies with rhythm as "time-dependent (sequential or temporal)" but the "time-independent" properties of pitch showed no preference. It can be assumed that pitch and pitch patterns can be equally shared by either or both analytic and global strategies.57

Williams defined two kinds of memory retrieval that relate to the two learning style strategies; recognition and retrieval. The least
difficult memory retrieval skill is recognition which can be accomplished using general contours or global strategies. A more difficult memory retrieval skill is recall which requires cognitive strategies using details and analytic strategies. Thomas emphasized memory in his report on the Manhattanville curriculum project. He stated that "the basic ingredient of all aural skills is memory."

Much of the research on these two types of learning styles related to music learning supports the premise that a high aptitude for musical achievement may be based on the brain's ability to use both sides with flexibility. In fact, Gaede, Parsons, and Bertera found that students with a low aptitude for music had a greater specialization between the hemispheres than students with a high aptitude for music. A study by Kaufman and Kaufman (cited by Naour, 1985) revealed that an elevated and nearly equal balance of sequential and simultaneous processing generally indicates some level of giftedness. Gates and Bradshaw (cited by Baumgarte & Franklin, 1981) believe both hemispheres are involved in music perception, each processing data according to its preference and the task involved. Wagner and Hannon describe faculty musicians as having a "functionally more integrated hemispheric approach."

Similarly, Gordon (cited by Fiske, 1984), states "basically we organize and conceptualize what we hear as musical sound in two ways, tonally and rhythmically." These two ways of listening to music relate to the two learning styles. The analytic learning style is associated with rhythm and the global learning style is associated with
tonality. Research supports rhythm as a left hemisphere function and tonality as a right hemisphere function.

In the premise for his book, *Introduction to the Musical Brain*, Campbell also supports the use of both learning style strategies. He states that "the more connections that can be made in the brain, the more integrated the experience is within memory."

Results of a study by Lang and Ryba also support the theory of a balance between the two types of learning styles. In research on perceptual modalities, it is stated that both artistic and musical personality types have heightened sensory modes. In order for all senses to be heightened, the aural sense associated with the analytic learning style and the visual and kinesthetic sense associated with the global learning style would need to be equal and balanced.

In addition, Werthheim supports the use of strategies from both learning styles. He believes that musical function cannot exist without "the rhythmic sense [A], the sense of sounds - pitch, duration, timbre, and intensity [G], and the aptitude to convert musical perception into emotional [G] or intellectual [A] content."

There also seems to be a balance between the two learning styles concerning pitch perception. In a study by Deutsch, it was found that right-handed subjects heard high tones in their right ears [analytic focus on the melody] and low tones in their left ears [global perception of the background harmony]. Left-handed subjects showed no ear preference.
Even though much research supports a balance between the two types of learning styles, is there an advantage to being right-hemisphere dominant even though the research cited previously suggests using both hemispheres for optimal results? The theory of a balance between analytic and global strategies contradicts another learning style theory. This contradictory theory suggests that the right hemisphere harbors music and creative processes. 75

Bruno helps clarify the theory concerning the ability of the right hemisphere to process the "whole" in global style rather than the "parts" in an analytic style. He writes "a significant point is sometimes overlooked in gestalt writings: the whole (in one sense) is not perceived at once, but what is perceived is perceived as a whole (at once)." 76

In a study by Fiske, global processes seemed to be favored by his subjects. He concluded from his experiment in serial and parallel processing of music listening that his subjects' strategies could be described by a "parallel self-terminating type of processing". 77 It is this writer's opinion that parallel self-terminating processing can be associated with global learning style strategies. The parallel aspect is similar to the simultaneous NASSP variable of global strategies while the self-terminating factor is related to the NASSP variables of impulsiveness and risk-taking. 78 Fiske's label is derived from Taylor's model of four types of processing. 79 The four types are:
1. Serial exhaustive (in which all elements of a stimulus presentation are examined prior to the initiation of a response; each element is examined whether or not it is known to contain information relevant to the task, or even if the solution is realized before the search is completed);

2. Serial self-terminating (in which the comparison process stops and response is initiated as soon as a task decision is reached even if some elements are left unexamined);

3. Parallel exhaustive; and


Deutsch also concentrates on global strategies in her research in the area of music perception. She uses the Gestalt principles of Proximity, Similarity, Good Continuation, and Common Fate in her studies in music perception. These principles relate to the global learning style in that they are based on finding simultaneous relationships between single elements.

Similarly, in a study by Day, results also support the use of global strategies. She describes musical talent as a special pattern of cognition that matches the specific tasks presented in music. Her study using a limited number of singers from the National Opera Company indicated that 43 percent were language-bound [A]. As she expected, the language-bound singers gained less from learning and short-term memory than the language-optional [G] singers. It may be assumed that the analytic learners had strengthened their global strategies which enabled them to attain the same level of ability and professional status as the level attained by the global learners.
It is evident in the previous studies exploring learning style strategies that there are various sources supporting the use of global strategies in the processing of music. Conversely, there appears to be disagreement in the literature about the function of this analytic left hemisphere in musicians and non-musicians. Peretz and Morais found that the left hemisphere can be involved in processing melodies in non-musicians, as well as in trained musicians.82 Similarly, Bever and Chiarello discovered that musicians hear a melody as a series of pitches, or more analytically, whereas non-musicians hear the melody in a more global fashion, namely, in terms of the overall contour.83

Application of Research on Learning Styles in Developing Piano Performance

From the research presented in this study, it may be concluded that there is an advantage to incorporating teaching and learning styles into piano performance study because students can learn cognitive strategies that are not preferred. Languis believes that students can indeed learn to change brain function and improve learning efficiency and independence.84 Gaede, Parsons, and Bertera also showed that a shift may occur through training and practice.85 A shift to analytic strategies was also found in a study by Perl and Haggard. This shift was accomplished through practice.86 Kaushansky reports that educators generally have accepted the teaching/learning style concept. His research shows that using the
attributes of both hemispheres usually improves learning.\textsuperscript{87} In addition, the results of Cafferty's study support these suggestions. She found that matching learning styles with teaching styles increased the grade point averages of her subjects.\textsuperscript{88} Heitland's study concluded that cognitive styles do relate to musical ability as one component for a general cognitive model of musical aptitude.\textsuperscript{89}

It may not be as essential to match learning styles of advanced musicians. Baumgarte and Franklin found that the curriculum musicians undertake makes it possible for them to be able to choose learning style strategies according to the task rather than on their own learning style preferences.\textsuperscript{90} Similarly, Murray found no ear differences in a musically educated group and a right ear/left hemisphere advantage in non-musicians.\textsuperscript{91} It may be possible that the musically educated group had a variety of learning style types and through music had learned the less-preferred strategies. In a study by Rainbow, it was also found that musicians used bi-lateral strategies to process both pitch and rhythm. He concluded that musical training does encourage bi-lateral processing.\textsuperscript{92}

The change to a teaching approach based on learning styles would be difficult to incorporate into our existing educational system, since our society and system of education measure success by analytic learning style accomplishments. Doctors, lawyers, and scientists are often perceived by society in general as having a higher status than musicians, artists, and actors. Russell states that our educational system actually damages cognitive abilities by stressing analytic
learning strategies and ignoring global learning strategies. In other words, the brain is systematically de-educated by allowing some abilities, namely global learning strategies, to lie dormant. Albert Einstein and Leonardo da Vinci are two examples of people who successfully used both sides of their brains.93 Levy (cited by Edwards, 1979) adds that American scientific training may entirely destroy the right hemisphere through its focus on left hemispheric processes.94

Our educational system may not be geared toward improvement of the left hemisphere simply to train students to achieve high social status. Essentially, it is easier to teach to the left hemisphere because evaluation is more precise and the processes fit well in a structured setting. In formal musical training even musicians are taught to use their left hemispheres and may disengage the right-hemisphere in the process. According to Green, many young music students lose their enthusiasm for music as their education begins to favor analytic processes over global and creative cognitive processes.95

Fortunately, interest has been heightened recently in the learning of divergent thinking and creativity in the classroom. Educators are beginning to use this strategy in analytic-type disciplines, such as science and math, that are not generally thought of as creative. Olympics of the Mind is one program that teaches divergent thinking in the classroom. Students compete using many of the the global strategies not usually taught in our educational system.96
It appears that language skills, a left hemisphere process, may also be enhanced by the addition of global learning style strategies. In a study by Bottari and Evans, music was added to verbal material to aid visual-spatial [G] students in performing language tasks. The music listening stimulus engaged the right hemisphere in order to allow the left hemisphere to process the language task. The visual-spatial group had the highest scores when verbal material was sung rather than spoken with or without musical accompaniment.97

Due to the addition of global strategies in these typically analytic disciplines, such as science, math, and language, it may be worthwhile to consider the incorporation of analytic strategies into global disciplines, such as music. The addition of analytic strategies to music learning would provide a balance between the learning styles. Based on the research previously presented, it appears that the processing of music is associated with this balance and interdependence between analytic and global cognitive functions. Music draws on the aural variable of analytic thought as well as the cognitive strategies of global processes. In addition, rhythm can be perceived through the two senses associated with global strategies - visual and kinesthetic.

In the area of the arts, Edwards, Ristad, and Green support the education of the less-preferred learning style to bring about this balance between the learning styles. They provide examples of practical applications and exercises that are aimed at achieving cognitive flexibility and balance.
The purpose of Edwards' exercises is to shift to the global learning style in order to enhance creativity and drawing ability. Her exercises intend to initiate the cognitive process that will achieve the task while inhibiting the other process. Her examples of comparisons of students' drawings before and after the shift from analytic to global are evidence of a change.98

Another approach aimed at practical exercises is Ristad's theory of judges [analytic and verbal] and global and intuitive skills. Similar to Edwards, she also uses the concept of shifting from one process to another.99 Most of her observations deal with educating global processes and take for granted that most learners have already been schooled excessively in analytic processes.

Green's approach differs slightly from both Edwards' and Ristad's approaches in that his two divisions are not to be interpreted as right and left hemispheres. Also, his goal is integration rather than inhibition. His divisions are described as Self 1 and Self 2. Self 1 is defined as any interference to Self 2. Therefore, Self 2 is defined as a student's musical potential and related to the integration of analytic and global cognitive processes.100

The study by Schweiger and Maltzman also supports the concept of a shift between the two modes of processing. Laterality effects were obtained only in musicians based on the complexity of the task. They concluded that "styles of information processing assumed by the hemispheres are the consequence of an interaction between the stimulus and the state of the organism at the moment, such that the
direction of laterality can change within a subject performing the same task depending upon its perceptual demand.\textsuperscript{101}

Two approaches for enhancing global abilities, such as shifting between learning style modes, have been proposed by Russell. His "meditation approach" increases integration between the two processes by reducing lateralization in brain activity. This is similar to Green's Self 1 and Self 2. Russell's "educational approach", aims at actually developing global cognitive strategies.\textsuperscript{102} This educational approach is similar to the method supported in this present study.

Although Camp supports the Gestalt \textit{G} philosophy especially for learning transfer, he also supports analytic strategies to help arrive at the whole. He suggests breaking the whole, the global unit, into a sequence of steps, each of which is small enough for the student to mentally perceive, aurally imagine, and physically produce. He begins with the whole \textit{G}, then focuses on the parts \textit{A}, and returns to the whole \textit{G}.\textsuperscript{103}

Duckworth also supports the position that the global learning style strategies should be used in music learning. Although Duckworth uses the term Discovery Learning, it is based on global learning style strategies. He defines Discovery Learning as being based on whole concepts and patterns using a less structured presentation focusing on meaning. Students learn first by using intuition, impulsivity, and without the stigmas of failure. Analytic strategies are then employed at the end of the process. Duckworth's form of analytic learning is called Receptive Learning. This form of analytic learning features a
structured lecture presentation which includes all facts and details and, therefore, focuses the student on accuracy and reflection. Duckworth believes that both types of learning are useful in education depending on the task to be accomplished. He writes that "Receptive Learning is for gaining information; Discovery Learning for conceptualizing."  

Discovery Learning is an essential factor in Duckworth's "Group Environment" process. The "Gestalt" group interaction and the more passive role of the teacher encourages Discovery Learning.

Finally, the number of successful experiences may be increased by matching students' learning styles with appropriate teaching strategies. These successful experiences can help foster another benefit of the learning style approach, namely, motivation. It is this writer's opinion that increased successful experiences may relate to increased motivation. For example, students taught using their preferred learning styles will achieve success much more easily than those being taught through the use of less preferred teaching strategies. Once students learn through their preferred styles and succeed in the tasks, they can be taught, when necessary, to use their less preferred strategies. They will succeed more often because they will have additional choices of strategies from which to choose. Through the addition of the less preferred strategies, they will acquire more motivation to continue studying piano performance.
Summary

The research presented in this chapter served as the foundation for this present study. The research was collected from many areas outside the fields of music and music education indicating that research in learning styles is a multidisciplinary topic.

While much as been written in other disciplines on the concept of learning styles, very little has been found in the area of piano performance. Research in the areas of biology, neurology, physiology, psychology, and education has provided background information on learning styles. Some of this information was useful in developing an approach that incorporates learning styles in the teaching of piano performance. Research relating the discipline of music and learning styles has helped apply the theory of learning styles directly to music and piano performance.

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CHAPTER III

The Application of Learning Style Teaching Strategies in Piano Pedagogy and Piano Performance

Introduction

In this chapter, the results of current research explored in Chapter II are applied to piano pedagogy and piano performance. The information is presented in five sections. Section I describes the Learning Style Variables formulated by the National Association of Secondary School Principals (NASSP) according to how musical skills and abilities are processed.

Section II introduces selected skills that are needed by the piano student in order to develop accurate and expressive piano performance. Based on current research and related literature, these skills are matched with either an analytic [A] learning style, a global [G] learning style, or a combination of both learning styles.

In Section III, the Piano Student Learning Style Profiles were developed based on conclusions drawn from Sections I and II. These profiles may be helpful to piano teachers in the determination of piano students' learning styles.
Section IV presents examples of teaching strategies appropriate for each of the two learning styles. Kirby's interpretation of Messick's matches and mismatches for transfer of skill acquisition is used as a guide for matching piano performance skills with the appropriate learning style variables.\(^1\)

In Section V, selected piano method books are examined for examples of teaching strategies that are related to learning styles. These materials are described under one of three categories: (1) those that include mostly analytic teaching strategies, (2) those that include mostly global teaching strategies, and (3) those that include a combination of both types of teaching strategies. Other pedagogical approaches relating to learning style theory are also suggested in this section.
Section I: The NASSP Learning Style Variables Model
Described in Terms of Piano Performance Skills

Introduction

Much of the literature discussed in this study shows evidence of
dichotomies that exist in personal attitudes and beliefs, individual
perceptions, and cognitive processes. Many examples of these
dichotomies can be related to the two types of learning styles explored
in this study. Some contributors (cited by Clifford, 1973) who support
this concept of dichotomies include Getzels and Jackson, Guilford,
Rogers, and Maslow. They describe the use of the two types of
learning styles as related to the creative process. In addition, an
example by Day associates the two types of learning styles with
success in vocal performance. In Table 5, these examples are
compared in terms of their association with either the analytic learning
style [left column] or the global learning style [right column].
Table 5.
The two types of learning styles as related to dichotomies evident in the literature.

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>INTELLIGENCE [analytic]</th>
<th>CREATIVITY [global]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getzels/Jackson</td>
<td>Remembrance of content</td>
<td>Production of novelty, of original ideas</td>
</tr>
<tr>
<td></td>
<td>Ability to remember</td>
<td>Ability to invent</td>
</tr>
<tr>
<td></td>
<td>Recall</td>
<td>Discovery</td>
</tr>
<tr>
<td></td>
<td>Retaining the known</td>
<td>Revising the known</td>
</tr>
<tr>
<td></td>
<td>Learning the predetermined</td>
<td>Exploring the undetermined</td>
</tr>
<tr>
<td></td>
<td>Conserving what is</td>
<td>Constructing what might be</td>
</tr>
<tr>
<td></td>
<td>Interest in the usual and</td>
<td>Concerned with the novel and the</td>
</tr>
<tr>
<td></td>
<td>expected</td>
<td>speculative</td>
</tr>
<tr>
<td></td>
<td>Favoring certainty</td>
<td>Unafraid of risk</td>
</tr>
<tr>
<td></td>
<td>Letting a conclusion or answer channel or control thought</td>
<td>Prone to search about, go off in diff. directions; less goal-bound</td>
</tr>
<tr>
<td>Guilford</td>
<td>Convergent thinking</td>
<td>Divergent thinking</td>
</tr>
<tr>
<td>Rogers</td>
<td>Defensiveness</td>
<td>Openness</td>
</tr>
<tr>
<td>Maslow</td>
<td>Safety</td>
<td>Growth</td>
</tr>
<tr>
<td>Day</td>
<td>Language-bound, perceive and remember in language terms</td>
<td>Language-optional. May choose to use language or not</td>
</tr>
</tbody>
</table>
The NASSP learning style variables (cited by Keefe, 1985) can also be compared using two divisions (Table 6). Some of these variables, selected from the NASSP Task Force Model, formed the basis for comparison of the two learning style types in this study. The labels "analytic learning style" and "global learning style," as well as the matches between the NASSP variables and each learning style, were the suggestions of this writer.

The NASSP task force model consists of 22 pairs of variables: 10 cognitive pairs, nine affective pairs, and three physiological pairs. This writer used only 12 pairs in this study: nine cognitive pairs as well as three affective pairs (risk taking/cautiousness, active/reflective, and thinking/feeling judgment). Definitions of each of the following learning style variables appear later in this study (See Appendix).

It is important to clarify the use of the NASSP variables to describe piano performance skills and piano students' learning styles in this study. First, this writer believed that there was a bias apparent in the NASSP definitions which favored analytic variables over global variables. It was determined that this bias conflicted with the premise of this study, namely, a flexible balance between both types of learning style strategies is necessary for the development of piano performance skills. This premise was supported by the review of the literature discussed previously in Chapter II. In this study the two learning styles are viewed as simply different ways of processing music, rather than favoring a single learning style, as neither learning style is superior in all situations. The superiority of one learning style would depend on
Table 6.
Selected NASSP variables used in this study.

<table>
<thead>
<tr>
<th>Type*</th>
<th>ANALYTIC</th>
<th>Type*</th>
<th>GLOBAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cog</td>
<td>Field-Independent</td>
<td>Cog</td>
<td>Field-Dependent</td>
</tr>
<tr>
<td>Cog</td>
<td>Successive</td>
<td>Cog</td>
<td>Simultaneous</td>
</tr>
<tr>
<td>Cog</td>
<td>Sharpening</td>
<td>Cog</td>
<td>Leveling</td>
</tr>
<tr>
<td>Cog</td>
<td>Focusing</td>
<td>Cog</td>
<td>Scanning</td>
</tr>
<tr>
<td>Cog</td>
<td>Complex</td>
<td>Cog</td>
<td>Simple</td>
</tr>
<tr>
<td>Cog</td>
<td>Narrow</td>
<td>Cog</td>
<td>Broad</td>
</tr>
<tr>
<td>Cog</td>
<td>Dependent Upon Structure</td>
<td>Cog</td>
<td>Independent of Structure</td>
</tr>
<tr>
<td>Cog</td>
<td>Reflective</td>
<td>Cog</td>
<td>Impulsive</td>
</tr>
<tr>
<td>Aff</td>
<td>Cautious</td>
<td>Aff</td>
<td>Risk-taking</td>
</tr>
<tr>
<td>Aff</td>
<td>Active</td>
<td>Aff</td>
<td>Reflective</td>
</tr>
<tr>
<td>Aff</td>
<td>Thinking Judgment</td>
<td>Aff</td>
<td>Feeling Judgment</td>
</tr>
</tbody>
</table>

* Cog = Cognitive
  Aff = Affective
completion of the task. This premise agrees with the research by Peretz and Morais who found that the task determines the choice of analytic or global processing. Because the melodic contours used in their study remained similar from trial to trial, the analytic strategy, which is necessary in the processing of details, was used instead of the global strategy.5

Second, it is the belief of this writer that these two learning style types should be viewed as representing the extreme ends of the learning style continuum. Zaidel (cited by Schweiger & Maltzman, 1985) supports the use of a continuum in hemispheric specialization in that each hemisphere is involved in most functions in differing degrees.6 It was assumed that although most piano students possess some degree of a preferred learning style, most are able to employ either processing style due to the training of the less-preferred strategies. Therefore, the students that piano teachers encounter may not need additional help in acquiring the cognitive strategies needed in the piano performance. As suggested in Chapter I, the students who have acquired less-preferred learning style strategies prior to the study of piano may be the students who require little or no explanation when presented with new music-related material to be learned.

In this section, each learning style variable selected from the NASSP model will be defined in terms of piano performance skills. Each variable will be matched with either an analytic type learner (ATL) or a global type learner (GTL). The definitions focus on the strengths rather than weaknesses of each style. Therefore, students
equipped with these learning style variables may be able to perform
the related piano performance skills with little or no explanation. This
comparison between the NASSP learning style variables and possible
strengths in musical skills of the ATL and the GTL is summarized in
Table 7.

The NASSP Learning Style Variable Model Described
In Terms of Piano Performance Skills

1. Field-Independent/Field-Dependent Variable. The Field-
Independence variable (parts to whole cognitive processing) allows the
ATL to focus on a single unit such as a single melodic line or the
location of an incorrect pitch. In contrast, the Field-Dependent
variable (whole to parts cognitive processing) makes it possible for the
GTL to fuse many parts into a whole in order to hear musical
harmony, blend, and timbre.

2. Successive/Simultaneous Variable. The ATL more easily
understands successive, time-ordered events such as rhythm. The
ATL learns using a linear step-by-step approach by adding single
layers to the one or more already mastered. For example, the
sequence may proceed as follows: rhythm with hands separate, then
rhythm with hands together; rhythm and pitches with hands separate,
then rhythm and pitches with hands together; add articulation; add
dynamics; and finally, bringing the piece up to the original tempo.
Table 7
The NASSP variables matched with the two learning styles using piano performance skills

<table>
<thead>
<tr>
<th>ANALYTIC LEARNING STYLE</th>
<th>PIANO PERF. SKILLS</th>
<th>GLOBAL LEARNING STYLE</th>
<th>PIANO PERF. SKILLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASSP VARIABLE</td>
<td></td>
<td>NASSP VARIABLE</td>
<td></td>
</tr>
<tr>
<td>Field - Independent</td>
<td>Error detection</td>
<td>Field - dependent</td>
<td>Harmony and timbre</td>
</tr>
<tr>
<td>Successive</td>
<td>Rhythm and Hands separate</td>
<td>Simultaneous</td>
<td>Thick textures, Hands together</td>
</tr>
<tr>
<td>Verbal-auditory, visual perception</td>
<td>Instructions and Notation</td>
<td>Non-verbal aud., Spatial, Tactile/Kinesthetic</td>
<td>Playing by ear</td>
</tr>
<tr>
<td>Sharpening</td>
<td>Discriminate variations</td>
<td>Leveling</td>
<td>Generalizes forms across styles</td>
</tr>
<tr>
<td>Focusing</td>
<td>Stay on task</td>
<td>Scanning</td>
<td>Discovers independently</td>
</tr>
<tr>
<td>Complex</td>
<td>Harmonic analysis</td>
<td>Simple</td>
<td>Chunks material into patterns</td>
</tr>
<tr>
<td>Narrow</td>
<td>Low error rate</td>
<td>Broad</td>
<td>Unique interpretations</td>
</tr>
<tr>
<td>Prefers structure</td>
<td>Follows instructions</td>
<td>Tolerant of confusion</td>
<td>Independent of teacher</td>
</tr>
<tr>
<td>Reflective</td>
<td>Accuracy</td>
<td>Impulsive</td>
<td>Fast decisions, Ensemble skill</td>
</tr>
<tr>
<td>Cautionousness</td>
<td>Standard interpretations</td>
<td>Risk-taking</td>
<td>Accepts challenges</td>
</tr>
<tr>
<td>Active [Extrovert]</td>
<td>Works well with others</td>
<td>Reflective [Introvert]</td>
<td>Works well alone</td>
</tr>
<tr>
<td>Thinking judgment</td>
<td>Objectivity</td>
<td>Feeling judgment</td>
<td>Subjectivity</td>
</tr>
</tbody>
</table>
A GTL perceives the "whole" in a spatial, non-time-ordered way by listening to many parts at once, learning many layers simultaneously. For example, a GTL may read through a piece for the first time with hands together incorporating markings such as dynamics and articulation.

3. Perceptual Modes Variable. The verbal-auditory and visual perceptual modes associated with the ATL enable this type of student to follow verbal instructions more accurately and make better use of the printed page as a resource. The perceptual modes associated with GTL are non-verbal auditory, spatial, and tactile/kinesthetic. Due to these perceptual modes, the GTL performs more easily by ear, finds patterns easily in the musical score, and makes frequent use of muscle memory.

4. Sharpening/Leveling Variable. The ATL (sharpening) is able to explain with accuracy and detail the specific differences between an original theme and its variations. The GTL (leveling) is able to recognize the same musical form as it exists in various style periods. This is due to the ability to generalize without interference from extraneous details.

5. Focusing/Scanning Variable. Due to the strategy of focusing, the ATL has the capacity to stay on task when practicing independently. The GTL (scanning), however, is free to discover
interesting areas of assigned or unaligned pieces that are not specifically addressed in practice instructions.

6. Complex /Simple Variable. The complex learning style variable associated with the ATL allows for the comprehension of complex data, such as harmonic analysis, by breaking it down into parts and organizing it into separate categories. The GTL (simple) is able to generalize harmonic function by recognizing familiar patterns.

7. Narrow /Broad Variable. The ability to perceive in a narrow strategy enables the ATL to locate mistakes easily and apply acceptable, standard answers. These learners achieve low error rates and excel in technique. The GTL uses the ability to perceive in a broad manner in order to generate creative answers to common problems. The GTL student is able to do this without limiting solutions to one correct answer. Broadness is also associated with being tolerant of confusion and "grey areas". Due to this broader range from which to choose, the GTL usually excels in interpretation and expression.

8. Dependent upon structure/Independent of structure Variable. The ATL learns easily with structured guidance and specific instructions from a teacher. In comparison, the GTL learns more easily when first presented with the goal to be reached and then
allowed unstructured time alone to discover the meaning and details independently.

9. Reflective/Impulsive Variable. The reflective learning style variable enables the ATL to slowly and accurately choose pitches and rhythms when reading music. The impulsive learning style variable associated with the GTL allows this type of student to maintain tempo in a music ensemble by lowering the standard of acceptable accuracy concerning pitch and rhythm.

10. Cautiousness/Risk-taking. ATL (Cautious) students respond consistently with accuracy and accepted interpretations at or below their own performance level and with familiar styles. GTL (Risk-taking) students accept challenges beyond their experience and familiarity. The results of the challenges may be inconsistent but having the opportunity to produce creative and accurate interpretations makes the challenge a worthwhile risk.

11. Active (Extrovert)/Reflective (Introvert) Variable. The ATL is usually an extrovert who is able to work well with others in an ensemble situation. The GTL, however, is more introverted and is able to work alone.
12. Thinking Judgment (Cognitive Domain)/Feeling Judgment (Affective Domain) Variable. The ATL employs logic and objectivity well in a judging or teaching situation. The GTL responds subjectively and emotionally using personal values and priorities. Due to the emotional nature of a musical experience, subjective judgments are very useful in interpretation and in the enjoyment of music.
Section II: The Relationships Between Selected Piano Performance Skills and Analytic or Global Learning Style Strategies

Introduction

In this section, selected piano performance skills are matched with the learning style type best suited to each skill. Both types of learning style, analytic [A] and global [G], are described according to the way a student of that style processes the selected piano performance skills. These skills were chosen on the basis of their regular appearance in this writer's review of piano performance skills included in commercial piano method books, piano pedagogy books, and various related materials concerning piano and piano performance. The choices for the matches between the skills and learning styles are based on the current literature dealing with learning style, music, and piano performance. Some examples of the research that support each match are also included. These matches between the two learning styles and selected piano performance skills are summarized in Table 8.
Table 8  
Piano performance skills matched with their respective learning styles

<table>
<thead>
<tr>
<th>ANALYTIC LEARNING STYLE</th>
<th>GLOBAL LEARNING STYLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhythm</td>
<td>Pitch/Tonality</td>
</tr>
<tr>
<td>Accuracy/Technique</td>
<td>Expression/Interpretation</td>
</tr>
<tr>
<td>Excellent Practice Abilities</td>
<td>Excellent Performance Abilities</td>
</tr>
<tr>
<td>Reading Music to Learn</td>
<td>Sightreading to Perform</td>
</tr>
<tr>
<td>Short-term Memory</td>
<td>Long-term Memory</td>
</tr>
<tr>
<td>Ability to focus on parts</td>
<td>Ability to focus on the whole</td>
</tr>
</tbody>
</table>

Additional Skills:
- Playing by Ear
- Improvisation
- Transposition
- Tactile/Kinesthetic Perception

**Rhythm versus Pitch/Tonality.** There is much evidence to support the relationship between rhythm and the analytic learning style. Cook found a tendency for right handedness and favoring the right ear/left hemisphere, tendencies which are normally associated with the analytic learning style, to be related to rhythmic accuracy. Similarly,
this relationship between the analytic learning style and rhythm is also supported by results of a study by Robinson and Solomon.8

Bamberger (cited by Gordon, 1978) uses the element of time to discriminate between the analytically processed rhythmic element of music and melodic [G] cognitive processing. He describes rhythm as a "time-dependent (sequential or temporal)" process performed by using analytic strategies while chords are a "time-independent" process best performed using global strategies.9 Studies by Calderon-Teran,10 Cook11, and Kimura12 also support the association between the global learning style and time-independent processes. They found a left-ear/right hemisphere [G] advantage for melodic and tonal patterns. Similarly, Zatorre's findings indicated that "melodies are processed by the right hemisphere regardless of specific training."13

Accuracy(pitches, rhythms)/Technique versus Expression
(phrasing, dynamics)/Interpretation. The relationship between the analytic learning style and the skills of accuracy and technique is supported by the NASSP variables of reflection, complexity, and narrowness. In addition, Taylor's serial exhaustive type of cognitive processing (cited by Fiske, 1984) is in agreement with this relationship. The serial exhaustive cognitive process enables the learner to find solutions to problems in a step-by-step manner in which all possibilities are considered prior to a final decision.14 This process allows the learner to check every detail for accuracy.
While Taylor compared the two learning styles using serial and parallel cognitive processing, Gordon chose to use the variable of time. He states that "according to the terminology of Time, stimuli such as melodies may be analyzed either part-by-part favoring the left hemisphere or as a whole pattern favoring the right." Therefore, Gordon's part-by-part analysis may be related to accuracy and technique while his whole pattern analysis may be related to expression and interpretation.

Bamberger also finds a relationship between the global strategies and expression/interpretation that is similar to Gordon's time-independent processing. Bamberger compares his "figural strategies" [G] with 'playing musically,' 'actively shaping a phrase,' or 'playing with feeling.' Similarly, Parker (cited by Hassler & Feil, 1986) believes that "a person's sensitivity can be measured by how well he can integrate the elements of music into a 'gestalt', . . ." Many other musical elements can be included in this discussion of accuracy/technique versus expression/interpretation. For example, the elements of pedalling, articulation, and fingering may be processed by using both types of learning style strategies. The analytic skills of accuracy and technique may be associated with the actual mechanics of executing proper pedalling, articulation and digital fingering. On the other hand, the skills of expression and interpretation may be associated with the rationale used for choosing specific pedalling, articulation, and fingering patterns.
Excellence in practice habits versus excellence in performance ability. Bruno believes that "the task of performing music in tempo often forces a shift from the left hemisphere to the right. . . . left-brained attention is for the practice room, and performance mistakes must be approached as unimportant to the overall musical effect—which only the right brain is capable of facilitating."\(^{18}\) Therefore, the analytic learner excels in good practice habits due to the ability to organize content and time, and the global learner excels in performance due to the ability to communicate through music.

Difficulties are often created when the wrong learning style is selected for the task. For example, Bruno suggests that in piano performance, stage fright, a task associated with global strategies, might be caused by "analysis-paralysis."\(^{19}\) He explains that in a performance situation, the use of time-consuming analytic processes are not appropriate. On the other hand, global processes are better suited for piano performance due to their relationship with the simultaneous learning style variable.

**Reading/Sight-reading.** Although sight-reading, a visual and symbolic type task, may be associated with analytic learning strategies, much research supports the use of global strategies in this skill. Navon believes visual perception leads first from global processing to more detailed analysis. The process involves decomposition rather than step-by-step construction.\(^{20}\) Wolf also associates global strategies with the ability to sight-read. He points out that the focus on single
notes, needed to achieve accuracy in practice sessions, is disastrous in sight-reading. Therefore, Wolf suggests that the analytic strategies of focusing and reflection are better suited for use in the practice room. In his study of sight-reading skills, a distinction was made between "reading to keep going" (ensemble-playing, a global process) and "reading to find out" (practicing alone, an analytic process).21

Wuellner also uses a global strategy, which he labels "skim-sight-reading," to improve sight-reading performance. The method proceeds from simple main ideas to complex details, a method which is similar to Navon's theory of visual perception that was previously discussed in this study.22

Bean (cited by Wolf, 1976) also agrees in the use of global strategies, such as patterning and grouping, in sight-reading. He believes that sight-reading should begin with the main parts of a patterns and then end with the pianist filling in the details. In the area of sight-reading, Bean's study shows evidence of two types of musicians. He describes the first type as accomplished performers who are inaccurate [G] and slow sight-readers. The second type is described as having the ability to sight-read anything at their level but not being as accomplished in performance [A] as the first type on their instrument. He states that there is only a slight correlation between proficiency at performance and those students with above average sight-reading ability.23

Conversely, Wolf found that students use analytic strategies as well as global strategies in the skill of sight-reading. He relates the
scanning of a new score prior to sight-reading to A. D. de Groot's "perceptive phase" of a chess player. According to Wolf, a good sight-reader's "perceptual set", used in the perceptive phase, contains many categories which can be related to the analytic learning style. He explains that the perceptual set is similar to a pilot's checklist that serves to highlight potential problems. Through interviews, he also found the use of labelling, another analytic strategy, by the gifted sight-readers used in his study. Wolf suggested that in sight-reading, pianists probably analyze [label] chord structures. Similarly, Segalowitz, Bebout and Lederman report a strong left hemisphere advantage for reading chords according to their study.

Based on the research on sight-reading previously discussed, the use of both types of learning style strategies appears to be essential in the development of this skill. Salis points out that the choice between using analytic or global strategies in music reading depends on the amount of time given for the task. She concluded that if a quick response is necessary to recognize a single chord, then the analytic strategies are used. If the goal is to read a continuous musical phrase, then Salis believes the global strategies are best.

Wolf's cognitive model also includes strategies used by both the ATL and the GTL. The seven steps from his model include [words in brackets added by this writer]:

...
1. The external input in its entirety is recorded in the sensory register. [Any or all of the perceptual modes related to both learning styles]

2. Visual, auditory, and kinesthetic components are registered in the appropriate sensory dimension. [Any or all of the perceptual modes related to both learning styles]

3. A subject-controlled scan of information in the sensory register seeks to match parts of this material with similar pieces of information stored in long-term memory. [Global learning style]

4. Matched information passes to a filter, where it is arranged in a digested, condensed form for short-term memory. [Analytic learning style]

5. Chunks of information pass to the seven slots of short-term memory, one chunk per slot. [Analytic learning style]

6. Short- and long-term memory systems continually feed messages to the effector systems. [Both learning styles]

7. When a match of messages is accomplished, the effectors send an "action" message to the muscles which may or may not be able to carry out the order in an automated, independent fashion.28

Another aspect of sight-reading concerns two types of memory; short-term memory and long-term memory. These two types of memory were explored by Simon and Barenfeld in their study (cited by
Wolf, 1976) that describes the cognitive processes of chess players. They make use of two fundamental principles that are based on memory theory, including Miller's "magic number" theory. These two principles, as suggested by Gregg and Simon, are, "(1) ... the number of chunks of information which the human mind can deal with at any one time is 7 [plus or minus] 2, and (2) ... these chunks of information can be transferred from short-term [A] to long-term [G] memory systems at the approximate rate of one chunk every 5 sec." Therefore, it may be possible that both types of memory, and their respective learning styles, are employed in the skill of sight-reading.

**Balance: focus on one part versus relating the parts as a whole.**

The ability to focus on a single part is associated with the analytic style learner. This ability allows the ATL to more easily extract small units from a whole composition in order to drill to achieve accuracy. Werner's theory of "differentiation" (cited by Funk & Whiteside, 1981) is similar to the analytic learning style variable of focusing. Therefore, differentiation, the ability to clearly distinguish parts from each other, also supports the relationship between focusing and the analytic learning style. 30

Sloboda combines both types of learning style strategies in the piano performance skill of balance. He describes the process of listening to a melody and harmony in terms of a figure [focus] or a ground [other parts fused become the background or a whole]. Figure perception is an analytic process while ground perception is a global
process. This description provides additional support to this writer's suggestion that piano teachers incorporate both types of learning style strategies in music learning.

**Additional skills related to global strategies.** It appears that many additional skills may also be associated with the global learning style; playing by ear, improvisation, transposition, memorization, and enhanced motor ability.

The skills of playing by ear, improvising, and transposing are all related to global learning styles due to their association with preferred aural perception and a focus on patterns. Schlesinger found that the global style is positively related to improvisation and the analytic style is negatively related to improvisation. In addition, the results of a study by Bash support the use of non-technical [A] methods to supplement the teaching of jazz improvisation.

The ability to memorize quickly and retain material for long periods of time may also be associated with the global learning style. This may be due to the use of global strategies which employ larger units, patterns and the whole as opposed to parts. Research also supports the relationship between the global learning style and long-term memory. Naour and Cremonini, DeRenzi, and Faglioni suggest that the right hemisphere [G] is related to long term memory.

According to Hermelin and O'Connor (cited by Kimura, 1973), a heightened tactile [and possibly, kinesthetic] sense may also be related to the global learning style. They state that "tactual perception of
Braille dot patterns by blind people is more rapid with the left hand than with the right. These heightened senses may enable the pianist to perform motor tasks without relying on the visual or aural senses, i.e., the ability to perform from a musical score without looking at the hands.
Section III: Piano Student Learning Style Profiles

Introduction

The Piano Student Learning Styles Profiles included in this chapter were developed by using the piano performance skills related to each type of learning style. These two profiles, a pure analytic type of piano student and a pure global type of piano student, were designed to describe the extreme ends of the learning style continuum, rather than the middle of the continuum where the majority of piano students may be located. One factor that may help to differentiate between the two pure types of piano students is the size of their perceptual unit. The extreme analytic student uses the smallest unit he is able to use in order to comprehend a task while an extreme global student uses the largest unit he is able to use in order to comprehend a task. The various points along the continuum then depend upon the varying sizes of units used for comprehension and the task to be accomplished. Based on the research, it would appear that most piano students would fall somewhere between the extreme analytic style and the extreme global style, while continuing to favor one of the learning style types.
There is much evidence in the literature on learning styles and music that describes the two types of musicians. Gordon believes that the two types of musicians:

would be qualitatively different in their musical attitudes. A left-hemisphere musician would be one who concentrated on technique, precision in melody, attention to detail of music directions, and sequential transition of passages to other passages. The right-hemisphere musician would be more concerned with the overall mesh of musical colors contributed by the special blends of instruments and melodic statements.37

Gordon also offers two suggestions concerning how the two learning styles should be employed in music processing. First, he compares the use of the the two hemispheres of the brain as an integrated process. Second, he describes the use of a single hemisphere that is appropriate for the task and the suppression of the other hemisphere. He explains:

Whereas subjective impression may justify the argument that the best musicians are those whose musical interpretations display a combination of both left- and right-hemisphere processing, present evidence implies just the opposite from a neuropsychological point of view. In theory, if there were competition of two cognitive processes working simultaneously in the same cortical areas, there would be a reduction in efficiency of performance of at least one of them (Levy, 1976). Similarly, in professions requiring specialized cognitive skills, natural or learned suppression of non-complimentary cognitive processes may well be necessary.38
Gordon's theory supports a main suggestion of this study, namely, that piano students should be educated to employ both types of learning style strategies. Therefore, when confronted with a specific task, the students can apply the strategy best suited for the task by suppressing the conflicting process.

In order to guide piano students in the use of learning styles appropriate to specific tasks, the teacher must first be able to assess the learning styles of his students. In this chapter, the two types of piano students, the analytic type learner (ATL) and the global type learner (GTL) are described according to how they may process selected piano performance skills. In parentheses, following each skill, is either the related NASSP learning style variable or another related theory that supports the match between the skill and learning style strategy. This writer suggests that by using a composite of the skills observed, a piano teacher can make an educated judgment in order to determine the learning styles of his students. Consequently, the teacher can apply appropriate teaching strategies according to the task to be accomplished.

**Sight-reading.** Initially, both types of students use global learning strategies in the performance of sight-reading. It appears that this is due to the unfamiliarity of the content to be perceived and processed. These global strategies which students employ to perceive the "whole" of new experiences may impede perception that requires labels and categories [A]. Therefore, one difference between the
methods that each type of learner employs may be the degree of interference from the analytic strategies which affects global processing. After subsequent trials, the analytic piano student switches to a more detailed approach that focuses on learning the composition rather than performing the composition. At this point, hesitations may occur due to the significance placed on the aspect of accuracy. In contrast, the global piano student continues to perform the composition as a whole during successive trials and might overlook details and inaccuracies. This global type of student continues to convey the meaning of the piece. In addition, he is able to maintain the pace within an ensemble situation because he is not practicing in order to perfect the composition, instead, he is performing. (Field-Independence/Dependence, Focusing/Scanning)

Memorization. The ATL is paired with short-term-memory while the GTL is paired with long-term-memory, according to theories associating learning style with types of memory. Some factors that determine differences in the memory process include how the information is stored, the size of the stored unit, and the length of time the material is retained.

The ATL learns a composition in smaller units, possibly in a linear manner, by taking all the parts and constructing the "whole". If the memorization process does not extend to include concepts and main ideas, then the performance of the composition by the ATL may be very accurate within a short period of time.
The global piano student usually begins memorizing at the onset of the learning process. The composition is learned and memorized as one whole unit with details, which are learned later, playing a secondary role. Even if the details fade and minor inaccuracies occur due to the function of short-term memory, the global student is able to retain and perform the general outline of the composition. (Naour, Cremoni, DeRenzi, and Faglioni)

**Practice versus performance.** Generally, an analytic piano student excels in practice and a global piano student excels in performance. An analytic student's strength lies in understanding and conveying accuracy, details, and technical facility. Conversely, a global student's strength is demonstrated by the ability to communicate meaning and emotion. (Bruno)

**Verbal analysis versus functional analysis.** Musical analysis is a good example of a skill that demonstrates how analytic and global piano students may perceive and understand the same material through the use of different cognitive processes. An analytic learner may quickly and easily label scales and chords but be unaware of their function. This may be due to the analytic variable of focusing which enables a student to understand a single chord without regard to adjacent chords. Usually the skill of labelling is processed by the ATL by using visual perception of musical notation. Conversely, a global learner may choose appropriate chords to harmonize a melody using
aural perception, but may not be able to attach labels to the chords being performed. Jazz, Folk, and Gospel musicians, who play by ear but cannot read a musical score, are good examples of the use of functional analysis without benefit of verbal analysis.

([Analytic/Synthetic], Symbolic/Concrete⁴²)

**Accuracy and speed.** The first response of an analytic piano student is usually accurate but may be slower because of the time needed to reflect on the proper choices. This strategy that favors accuracy instead of speed is similar to Taylor's serial exhaustive type of cognitive process. The global piano student reacts impulsively and emotionally to music in order to convey the meaning and mood of a composition. This enhanced speed may result in the GTL being less accurate than the ATL. This global strategy, impulsivity, is similar to Taylor's parallel self-terminating type of cognitive process (cited by Fiske, 1984).⁴³ (Reflective/Impulsive)

**Phrasing.** An analytic student uses smaller units in learning music due to part-by-part processing. Therefore, phrases may be shorter and less smooth. The global student is able to process larger units than the ATL. These larger units help the GTL to create longer lines that sustain motion. (Successive/Simultaneous, [digital/relational], and LaBerge⁴⁴)
Learning a new composition. An analytic student learns step-by-step in the process of building the structure. He may begin with one element, such as rhythm, and then add a new task once old tasks are mastered. Instead of using this additive approach, the global student is able to perceive many aspects simultaneously. Unfortunately, the GTL may ignore some details if he uses this global process exclusively when learning new compositions. In addition, these details may be more difficult for the GTL to correct unless they are implemented in the early stages of learning. This difficulty may be due to the use of larger units by the GTL which may overlook smaller units, such as details. (Successive/Simultaneous, Cautiousness/Risk)

Musical recreational activities. An analytic student is more apt to sight-read and react to written scores for recreation. On the other hand, a global student derives more pleasure from "creative" activities such as embellishing existing compositions, improvising, playing by ear, or composing. (Convergent/Divergent)

Amount of preparation needed to feel comfortable performing. An analytic student may feel more comfortable performing a composition before an audience once it has been perfected. A global student may be more willing to perform a composition before an audience even in one of its less-accurate stages. This willingness to perform may be related to a GTL's emphasis on meaning and emotion instead of factors such as technique and accuracy which are more
common to the ATL. (Cautiousness/Risk-taking, Thinking/Feeling, Reflective/Impulsive)

**Fingering.** Specific fingerings are usually performed correctly by an analytic student although he may not be able to easily generate his own fingering patterns. These specific fingerings may not be as important to global student. Instead, the entire fingering pattern may be considered essential in piano performance because it is a technique that enables the student to express the whole musical line. Individual finger numbers may not be as accurate as the fingerings performed by an ATL but the emphasis on the musical phrase is maintained. (Field-Independent/Dependent, [Digital/Relational])

**Ensemble abilities.** An analytic learner (Field-Independent) is able to focus on and sustain his own part while being unaffected by other parts. The global learner (Field-Dependent) performs his part in relation to the whole sound being produced but may have difficulty focusing on his single part when necessary. (Field-Independent/Dependent, Focusing/Scanning)

**Practicing styles.** The analytic student practices in sections and learns compositions part-by-part in order to create the "whole". A beginning tempo slower than the original one may be chosen, and musical elements are rehearsed separately until they are correct. A practice technique may begin by tapping the rhythm, followed by
adding the pitches, hands separately before combining hands. The
global student, conversely, is able to begin hands together and
incorporate expressive elements from the onset. The global student
feels most comfortable practicing at the original tempo and will go
back to the beginning when errors are made rather than choosing to
begin with a smaller section. Practicing, perceived by a global student,
is not unlike performing or playing through the composition. Therefore,
the unit used in perception and processing may essentially be the
entire piece which makes drilling repetition quite impossible.
(Analytic/Synthetic, Linear/Holistic\textsuperscript{45})

**Pitch and tonality.** An analytic learner is able to focus on
isolated pitches whereas a global learner is able to understand how the
pitches exist within the tonal framework. ([Digital/Spatial-Relational].
Bamberger\textsuperscript{46})

**Rhythm and counting.** The analytic student is able to attach the
proper numbers to the rhythm and verbalize them. The global student
views rhythm in larger groups or entire rhythmic figures without regard
to labels. According to the research, the GTL may have difficulty
with rhythm because it is a time-dependent, linear element related to
analytic learning style strategies. ([Verbal/Non-verbal],
Successive/Simultaneous)
Summary of the analytic type of piano student

A pure analytic type piano student prefers to learn by using a sequenced method that progresses from the parts to the whole. In learning a new piece, elements are mastered one at a time in a layered manner. For example, rhythms are tapped hands separately and then hands together. Pitches are first learned hands separately, then hands together. Once the fundamentals, such as rhythms and pitches, are learned at a slow tempo, other markings are added. These markings include articulations and dynamics, as well as other expressive elements. The final step, for the analytic type piano student, is to bring the piece up to tempo. Aside from the preference for a sequential method, the analytic learner also prefers visual stimuli, such as the musical score, as opposed to aural stimuli.

Labels and verbal instructions are also important to analytic learners. Labels, such as note names and counting patterns, aid the analytic student in learning music. This type of learner also follows verbal instructions well. In addition, written (visual) assignments recorded in notebooks and practicing schedules also work well for the analytic student.

Summary of the global type of piano student

The pure global type piano student learns best when material is presented in a "whole to parts" format which begins with the main idea and is followed by the relevant details. Instead of perceiving the score in a sequential way, a global student likes to hear the entire piece first,
without benefit of the printed page, in order to judge the work
according to his likes and dislikes. Then, by using an aural mode to
perceive the sound of the whole composition, the student can begin to
discover the appropriate mechanics needed to reproduce the sound he
has already heard.

Emotion is also important to the global learner. For example, if
a global learner enjoys popular music and dislikes classical literature, it
is the responsibility of the teacher to motivate the student by beginning
with what the student likes, gradually relating the initial successes
achieved with the popular style to various other styles of music.
Introduction

If a piano teacher chooses to incorporate learning style theory into his curriculum, then it is necessary to select his approach to teaching strategies. He can either match or mismatch students' learning style as related to the task to be accomplished. If the mismatch of students' learning styles is selected, the students may need to be trained to use a less-preferred learning style. Keefe writes that:

training and matching strategies can both be appropriate depending on the circumstances. The cognitive development theory of Jean Piaget sees human behavior as a process of adaptation through assimilation and accommodation. In assimilation, the learner incorporates new experiences without modifying cognitive structures. The individual interprets new situations in terms of old ones. In accommodation, the learner modifies existing cognitive structures to adapt to the new demands of the environment. Past responses are no longer adequate, so individuals accommodate.

Cognitive growth can result from matching the environment to the existing skills of the learner.
(assimilation) or helping the learner adapt to the new demands of the environment (accommodation).47

Once a decision is made concerning the use of matches or mismatches, appropriate materials and teaching strategies must be chosen. Teachers may be aided in these decisions by employing Kirby's interpretation of Messick's matches for transfer of skill acquisition. There are five types of matches which include; capitalization matches, compensatory matches, corrective (remedial) matches, combination matches, and challenge matches. Each type of match is defined below as they presented in Kirby's research.48 Also included are music learning examples by this writer.

**Capitalization matches.** - due to time constraints, to exploit or draw on student's strengths. Information is taught using learner's cognitive style, even if the appropriate strategy for the task is derived from the opposite style.

Example 1: A recital is to be performed, and the student still cannot read every note in the score accurately (an analytic task). The teacher would teach the piece by rote.

Example 2: An analytic student is matched with Mainstreams Piano Method by Noona and Noona. A global student is matched with the Suzuki Piano School.

**Compensatory matches.** - to teach the appropriate cognitive strategy for the task but the teacher supplies compensation along the way.
Example 1: A global student must read the notes on the page, but the teacher helps the student find the rote pattern on the keyboard.

Example 2: The teacher presents the aural rote pattern and asks the analytic student to find the same printed pattern in the score.

**Corrective (remedial) matches.** - to teach the student the cognitive strategy through use of simpler and possibly non-related trainable subject matter more slowly and with more repetitions.

Example 1: A piano teacher teaches an analytic student to take aural dictation (a global process) of the rhythmic patterns used in speech.

Example 2: A global piano student is asked to draw a picture (an analytic process) of the pitch contours in a speech pattern.

**Combination matches.** - to combine the first three as desired.

**Challenge matches.** - to mismatch deliberately to stimulate growth.

Example 1: An analytic student is assigned to notate the pitches and rhythms from a television commercial jingle.

Example 2: A global student is instructed to sight-sing melodies from written examples.
Section V: Examples of Analytic and Global Teaching Strategies
in Selected Piano Method Books

Introduction

The ability to communicate effectively is essential in the teaching-learning relationship. Most persons have experienced seeing "eye to eye" with new acquaintances. In addition, most musicians can agree with suggestions offered by an especially fine teacher. Were the opinions of these "fine teachers" shared by all of the teacher's students? Or was it possible that the teacher's style of teaching matched the student's own style of learning? If this was the case, then it also may have been possible that the teachers perceived as "poor teachers" were using teaching styles that matched the less-preferred learning style of the student. Although there are many factors involved in successful teaching, it would appear that effective communication can be related positively to learning and teaching styles.

Students' learning styles should be matched in the initial stages of the learning process in order to build a foundation of good communication. The reason for this approach is due to the element of
enhanced motivation in the teaching-learning process. Students may be naturally motivated to continue learning if they find success in what they attempt. If students are taught initially by matching their learning styles, then the resulting motivation can be used to encourage them to grow in strategies that they do not find as easy and natural. The development of these less-preferred strategies will eventually create a balance in their learning style repertoire.

These learning style strategies can be developed by piano students after exposure to appropriate teaching strategies. Some of these teaching strategies can be found in piano method books which are essential tools of most piano teachers. Method books could not be found which were written specifically for use in a piano curriculum based on matching and mismatching learning styles. Although no method book was associated directly with learning style theory, some existing method books did include teaching strategies related to the two learning styles. In fact, two of the traditional pedagogical approaches used to develop piano performance relate to the two extreme learning styles. The analytic [A] learning style may be associated with the traditional Middle C approach, whereas global [G] learning style strategies are evident in the aurally-based methods, such as the Suzuki Piano School. In addition, there are many method books that combine both learning styles. Such books provide material that can match as well as mismatch each style.

This section presents an analysis of some of these piano method books that incorporate teaching strategies that can be matched and
mismatched to both learning styles. By drawing from these resources, it is not implied that these method books use the related learning style strategies exclusively. Instead, these method books simply provide valuable examples of teaching strategies that match either the analytic learning style, the global learning style, or a combination of both styles. A summary of these matches appears in Table 9. The piano method books included in the analysis are:

*Alfred's Basic Piano Library* - Lesson Book (Level 1A)
  - W. A. Palmer, M. Manus, and A. V. Lethco
  - Will also be referred to as Palmer et al.

*The Bastien Piano Library* - Lesson Book (Primer Level)
  - J. Bastien
  - Will also be referred to as Bastien

*Creating Music at the Piano* (Book One)
  - W. A. Palmer and A. V. Lethco
  - Will also be referred to as Palmer-Lethco

Frances Clark Library - *The Music Tree* (Time to Begin)
  - F. Clark and L. Goss
  - Will also be referred to as Clark-Goss

*Gifted Pianist* (Conceptual Core)
  - W. Noona and C. Noona
  - Will also be referred to as Noona-Noona

*John W. Schaum Piano Course* (Pre-A Book)
  - J. W. Schaum
  - Will also be referred to as Schaum
John Thompson's Modern Course for the Piano
(*Teaching Little Fingers to Play*)
- J. Thompson
- Will also be referred to as Thompson

The Leila Fletcher Piano Course (Book One)
- L. Fletcher
- Will also be referred to as Fletcher

Mainstreams Piano Method (The Pianist 1)
- W. Noona and C. Noona
- Will also be referred to as Noona-Noona II

Music for Piano (Book 1)
- R. Pace
- Will also be referred to as Pace

Music Pathways - Piano Discoveries (A)
- L. F. Olson, L. Bianchi, and M. Blickenstaff
- Will also be referred to as Olson et al.

Oxford Piano Course (First Book)
- E. Schelling, G. M. Haake, C. J. Haake, and O. McConathy
- Will also be referred to as Schelling et al.

Step by Step (Book One)
- E. M. Burnam
- Will also be referred to as Burnam

Suzuki Piano School (Volume 1)
- Suzuki Method International
- Will also be referred to as Suzuki

The Young Explorer at the Piano
- R. Burrows and E. M. Ahearn
- Will also be referred to as Burrows-Ahearn
### Table 9
Selected piano method books matched with the learning styles

<table>
<thead>
<tr>
<th>ANALYTIC LEARNING STYLE</th>
<th>GLOBAL LEARNING STYLE</th>
<th>COMBINATION OF BOTH STYLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burnam</td>
<td>Burrows-Ahearn</td>
<td>Bastien</td>
</tr>
<tr>
<td>Fletcher</td>
<td>Suzuki</td>
<td>Clark-Goss</td>
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<tr>
<td>Noona-Noona II</td>
<td>Yamaha</td>
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<td>Schelling et al.</td>
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<td>Thompson</td>
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<td></td>
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<td>Palmer-Lethco</td>
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</tbody>
</table>

**Methods that match the analytic learning style**

Most older method books are based on the analytic learning style. These include the method books, based on the Middle C reading directed approach, were published and most widely used during the second and third quarters of this century. Traditionally, the most popular book using the Middle C approach is John Thompson's *Teaching Little Fingers to Play*. Some other methods in this group...
include the *John W. Schaum Piano Course, The Leila Fletcher Piano Course*, the *Mainstreams Piano Method*, the *Oxford Piano Course*, and *Step by Step*.

In general, these approaches begin with labels, details, and the printed page [A]. The students begin on the staff in one focused area of the keyboard. Two piano methods that match the analytic learning style, Thompson and Fletcher, do begin with some minimal rote learning [G]. This writer does not believe that this minimal amount of this global strategy would affect the analytic student for two reasons. First, because the rote strategy lasts for only the first few lessons, it cannot be described as the basis for the method book. Second, most teachers may choose to skim or skip these rote sections, rather than use them as beginning foundations to music learning.

One problem becomes apparent for most analytic learners using these methods. This problem concerns the simultaneous [G], rather than sequenced, format in which all the details are first introduced. Although, ATL may experience some confusion in the first few lessons, there appears to be a linear sequence for new material presented for the rest of the book.
Differences among the analytic style method books.

*John W. Schaum Piano Course* - The first few lessons use only finger numbers, meter, and bar lines [fewer details]. Then staff reading is completely introduced in one lesson. The beginning material is more sequenced [A] than in the Thompson method book.

*The Leila Fletcher Piano Course* - This method offers two pages of rote-playing [G] before presenting entire staff notation.

*Mainstreams Piano Method* - Performance begins with one page of creativity [G] on black keys and one page of reading by letter name and direction [Also more sequenced than Thompson]. Full staff reading follows. Limited extension beyond Middle C.

Step by Step - Staff notation is presented in a sequenced manner, but the first few lessons provide little performance opportunities. Instead, the method begins with intellectual memorization of facts and details [A] rather than on doing and meaning [G].

Teaching Little Fingers to Play - Performance of the first three lessons are instructed to be taught by rote [G]. Labels, details, and notation [A] are also included in the first three lessons. Pieces outside of the Middle C position are included.

Methods that match the global learning style

The Suzuki Piano School, the Yamaha Music Education System, and The Burrows-Ahearn method are three examples of methods that can be matched with the global learning style. The best example is the Suzuki Piano School and the Suzuki philosophy (cited by Maris, Landefeld, & Stacy, 1984). This approach begins students with a large amount of listening prior to the student actually learning to perform through imitation [rote-learning]. All performances are memorized [G] even when pieces are learned using the score.64

The Suzuki approach utilizes many learning strategies that come easily to global learners, such as the use of aural perception rather than visual perception. Pieces are first perceived from the beginning.
as a whole, stressing meaning, emotion, and quality of sound. Then, details are learned without focusing on labels and verbal analysis. Learning takes place in a simultaneous rather than linear or successive manner. Hands are performed together in unison by the second page in the book. Melody and accompaniment texture begins midway through the book. Students are presented with the full harmony they have experienced in their listening exercises and music listening in general rather than with the partial harmony that is sometimes used in "teaching pieces".

It should be noted that this method, which is geared toward the whole and the gestalt, uses the C major five-finger position for its hand position almost exclusively. The hand does extend and the G position is introduced, but it is far from the Multiple Key approach one might expect.

The Suzuki Piano School materials are readily available at most music stores for use by any teacher. Because this approach to developing piano performance involves an entire philosophy of education, the materials alone are not enough to properly teach using the Suzuki approach. Unlike piano teachers who use traditional method books, Suzuki teachers are specially trained to use the specific materials and the philosophy.

Training is also provided by the The Yamaha Music Education System (cited by Lancaster & Looney, 1984-85) for teachers interested in using the Yamaha method. The Yamaha method can be matched with global piano students because, similar to the Suzuki
method, aural perception is the basis for a student's introduction to music. Other global strategies are also employed. Patterns $[G]$, any unit larger than single pitches or rhythms, are stressed. Performance is learned through imitation and playing by ear $[G]$. Unlike the Suzuki materials, the Yamaha materials are not available at most music stores.

The Burrows-Ahearn also can be used with a global student. Similar to the Suzuki and Yamaha methods, it begins using only rote learning. Later a piece learned first by rote $[G]$ is observed in full $[G]$ musical notation $[A]$. These pieces are to be hand copied by the student in order to experience the piece as a whole in notation, rather than just naming single notes in a theory book. Guided reading, introduced next, presents musical notation first but also makes use of rote learning. Patterns used in the new piece are drawn from the literature already learned. The final step is independent reading. In this phase the student can return to previous material learned by rote and guidance in order to independently read the musical score.

The skill of musical reading is attained through the use of large units such as intervals, repetition, and phrases rather than individual notes. Although there are no printed pages to teach the names of the notes, the authors suggest naming all notes. Due to the lack of a sequence to learn note names, this writer assumes these are learned indirectly through performance rather than learned directly through memorization. Many keys and hand positions are used throughout the first book.
Methods that are a combination of both learning style strategies

As evident in the figural and formal modes of perception used by Bamberger's child prodigies presented in Chapter I of this study, there is a developmental element to music cognition. As previously stated, the figural mode relates to the global style and the formal mode relates to the analytic style. Goldstein and Blackman agree with the developmental aspect to learning styles. They state that the data indicate an increase of analytic learning strategies until the age of 17.66

There are method books that relate to this developmental approach to learning style theory. Some of the more recently published method books provide tasks that match and mismatch both learning styles. Global strategies are first used in these combination method books. The average age beginner would be about seven or eight years old. At this age the student feels more comfortable with his global strategies but has begun developing his analytic strategies. The student finds success quickly using his global strategies and, consequently, this success helps to motivate the student so he is able to accept the challenge of testing his newly found analytic strategies that will be used in music reading. Some method books that combine both learning style strategies include *Alfred's Basic Piano Library*, *The Bastien Piano Library*, *Creating Music at the Piano*, *Gifted Pianist*, *Music Pathways*, *The Music Tree* and *Music for Piano*.

There is one similarity among the method books which combine both types of learning styles. They are similar in that none of these
books begin with reading notation on the staff as do the Middle C method books related to the ATL. Also, these method books do not introduce music through rote learning as seen in the global approaches. The method books that combine teaching strategies related to both learning styles reflect a balance between these two extreme approaches. This balance between the two learning styles can be viewed either as an attempt to combine the best of both extremes or as an example of confused mediocrity!

The transition from global learning by rote and playing by ear (an aural experience) to analytic learning by notational reading (a visual experience) is done more gradually in the combination method books than in the method books related to the analytic learning style. Instead of introducing all symbols at once, each method gradually introduces the symbols at times where they are learned through meaning and function [G] rather than memorized [A]. The difference between these combination methods is the sequence in which the labels are introduced. The earlier the labels appear without adequate time to understand the concept, the more analytic the method.

The initial reading is done either by finger numbers [A], spatial direction [G] on the printed page, intervals [G], or any combination of these three methods. Notation may be presented on a partial or full staff once the student has experienced concepts such as high and low, direction, intervals, and finger numbers as well as other possible expressive concepts such as loud and soft. These method books that combine analytic and global learning styles are critiqued in this section.
according to various elements of music and selected piano performance skills. Table 10 provides a summary of the analytic and global teaching strategies found in these method books as they were used to teach 15 concepts of music.

1. **Finger numbers.** Finger numbers (A) are introduced very early in all methods except Clark-Goss, in which the alternation between one note in each hand [G] is used in order to introduce other concepts without concerning the student with digital problems [A].

2. **Direction.** Melodic direction [G] is introduced very early in all of the selected method books.

3. **Performance.** The pianist’s first performance is introduced with minimal details and facts [A] in Clark-Goss, Pace, and Olson et al. [G]. The other four methods, Palmer et al., Bastien, Palmer-Lethco, and Noona-Noona II, begin with many details to be memorized before any piano performance is experienced [A].

4. **Notated Rhythm.** Rhythmic notation is used in a variety of forms for the first piece in all methods. The concept of long and short is represented in pre-notation in Palmer-Lethco, Pace, and Olson et al. [G]. In Palmer-Lethco, finger numbers that are held longer are marked with a fermata [G]. In Pace and Olson et al., notational figures that indicate quarter notes are filled in and half note figures are left
Table 10
15 concepts of music related to global and analytic teaching strategies
found in each method

<table>
<thead>
<tr>
<th>BASTIEN</th>
<th>CLARK-GOSS</th>
<th>NOONANOOAN A</th>
<th>OLSON ET AL.</th>
<th>PACE</th>
<th>PALMER ET AL.</th>
<th>PALMERLETHCO</th>
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<tbody>
<tr>
<td>1.</td>
<td>A</td>
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<td>A</td>
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<td>2.</td>
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<tr>
<td>3.</td>
<td>A</td>
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<td>A</td>
<td>G</td>
<td>A</td>
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<tr>
<td>4.</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>G</td>
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<tr>
<td>5.</td>
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<td>G</td>
<td>G</td>
<td>A</td>
<td>A</td>
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<tr>
<td>6.</td>
<td>G</td>
<td>G/A</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>A</td>
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<td>7.</td>
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<td>10.</td>
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<td>11.</td>
<td>A</td>
<td>G</td>
<td>A/G</td>
<td>G/A</td>
<td>G/A</td>
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<td>12.</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A/G</td>
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<tr>
<td>13.</td>
<td>A</td>
<td>G</td>
<td>A</td>
<td>G</td>
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<td>14.</td>
<td>G</td>
<td>G</td>
<td>G</td>
<td>G</td>
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<td>15.</td>
<td>A/G</td>
<td>G/A</td>
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<th>5</th>
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<tbody>
<tr>
<td>G</td>
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<td>10</td>
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<td>9</td>
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<td>A/G</td>
<td>1</td>
<td>0</td>
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<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>G/A</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

A = MOSTLY ANALYTIC
G = MOSTLY GLOBAL
A/G = MORE ANALYTIC THAN GLOBAL
G/A = MORE GLOBAL THAN ANALYTIC
empty [G]. The remaining four methods use conventional rhythmic notation with labels in the first or second piece to be performed [A].

5. **Clef Signs.** Clef signs are introduced at many different points in each method. In the Noona-Noona I, clef signs are used meaningfully in pre-notation tunes in order to indicate which hand is to be used. Clef signs appear in partial staff notation in Palmer-Lethco. Both Palmer et al. and Clark-Goss present the clef signs separately in first full bass clef notation and then in full treble clef notation. In Bastien, Pace, and Olson et al., the clef signs are introduced when the full staff notation is presented. A clef sign, which is a written label, is an analytic component. By introducing it at different points throughout a method book rather than at the beginning, it has more meaning [G] than if it was a memorized detail [A] introduced in the first lesson.

6. **Letter names of keys.** The introduction of labels [A] for the seven different white keys on the keyboard is usually done after some tunes have been performed. This performance is usually mastered by finger numbers using pictures [G] of the keyboard to provide the correct position on the keys. Two method books vary from this approach to naming the keys. Palmer-Lethco has students memorize [A] all letter names before performing a tune. Clark-Goss introduces the key names in two groups (CDE and FGAB) eight pages apart. Unfortunately, this knowledge is not directly related to the literature that is being practiced at that time [A].
7. **Meter and barlines.** Meter is explored in conjunction with barlines in Palmer-Lethco, Clark-Goss, Pace, and Olson et al. Relating the two concepts seems to give more meaning to both [G]. Explanations concerning the concepts of barlines and meters in these methods were presented approximately at the same point as the concepts of full or partial staff. The barlines in Palmer et al., Bastien, and Noona-Noona II were introduced well before the concept of meter (analytic parts). This small unit of a measure with no meaning might tend to make a student hesitate between measures. The student may focus on each measure as a complete unit rather than using a phrase or entire piece as a complete unit.

8. **Grand staff and partial staff.** Palmer-Lethco, Clark-Goss, and Olson et al. introduce a partial staff. This is helpful in reinforcing direction and interval [G] without confusing the student with all the details [A] of the grand staff.

The full staff is introduced in approximately the same location in the sequence of each book. Exceptions include Pace which is much earlier [A] and Clark-Goss which comes near the end of the book [G]. The only method book that introduces the concept of reading notation as a whole is Olson et al.. Once the grand staff is introduced, the student also learns ledger lines in all directions.
9. **Intervallic, directional, and landmark reading.** All of the selected combination method books are based on global strategies for music reading. These include intervallic, directional, and landmark reading. These strategies stress relational units [G] larger than single pitches. All of the combination method books use intervallic and directional reading while the Noona-Noona I, Clark-Goss, and Olson et al. also use landmark reading.

10. **Performing hands together.** Most methods use the hands performing together [G] during the last portion of the book. Pace and the Noona-Noona I use hands together earliest. Olson et al. uses hands separately with the melody between the hands [A]. Although a single melody appears more analytic, partial harmony is not quiet global either. A global student might hear this partial harmony as dissonant and incorrect.

11. **Tonality.** Most of the method books use limited tonalities concentrating around the C major position, the G major position, and the Middle C position [A]. Clark-Goss and Pace offer the greatest amount of different keys, including minor [G]. Olson et al. uses various positions using a wide range of the keyboard. Noona and Pace also offer modes in addition to minor keys. The five-finger position is used as a basis for Palmer et al., Bastien, Palmer-Lethco, and Pace (analytic, global when transposed).
12. **Transposition.** Pace uses transposition [G] the most consistently. Except for Palmer et al. and Olson et al., the others introduce the concept only randomly.

13. **Creativity.** Creativity [G] in the form of improvisation and composing a song to be played by ear are widely evident in Clark-Goss, Pace and Olson et al. Palmer et al. inserts a very few and the others provide little or no space for creative activities.

14. **Expression.** Expression [G], including dynamics, articulation, and other markings, is present in all method books in this group. All seven method books add dynamics in the teaching pieces. Also, all books introduce legato and staccato except for Clark-Goss. The Noona-Noona I and Pace offer the greatest number of expression markings in the scores.


Olson et al. also provides a gradual transition from global meaning and performing to reading music. The use of pre-rhythm notation and gradual staff notation without labels help with the transition. The pre-meter notation helps students understand the concepts of meter and barlines rather than simply memorizing the definitions of the numbers.
Additional sources

In addition to the using the method books suggested as a source for matching and mismatching piano students' learning styles, teaching strategies found in five other available piano pedagogical approaches may be useful. These approaches were previously mentioned and discussed in this study. In the first approach, found in the book, *The Inner Game of Music*, Green describes his strategies that relate to learning styles as a combination of both styles. He gives examples of many techniques that can be used to combine the two styles. The second approach relates to the analytic learning style. In her proposed piano curriculum for use with the mentally handicapped, Michal provides a method of systematic instruction applied to piano performance. The final three approaches using more global style teaching strategies include:

1. *Developing Piano Performance* by Camp
2. *A Soprano on Her Head* by Ristad, and
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25. Ibid., p. 149.


29. Ibid., p. 155.


38. Ibid., pp. 525-526.


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43. H. E. Fiske, op. cit. p. 17.


55. J. Thompson, *Teaching Little Fingers to Play* (Cincinnati, OH: The Willis Music Co.)


70. E. Ristad (1982), *A soprano on her head* (Moab, Utah: Real People Press, Inc.).

CHAPTER IV
Analysis and Discussion of Questions

Introduction
The principal purpose of this study was to develop two distinct Piano Student Learning Style Profiles and to suggest strategies to teach most effectively students possessing these different learning styles. The two learning style profiles were developed, based on a review of the literature related to learning style theory, as well as on observations of this writer's piano students at the Ohio State University and private studio. The profiles describe both a "pure" analytic piano student and a "pure" global piano student. In order to apply the profiles to piano students, each learning style was matched with appropriate teaching strategies in order to enhance students' learning. Seven questions were considered in this study:
1. What are the two types of learning styles?

2. What learning style variables are associated with each type?

3. How do these variables relate to skills necessary in developing piano performance?

4. Can these learning styles and their variables be defined in terms of observable piano performance skills?

5. Can a piano student learning style profile be developed for the purpose of assessment using observable piano performance skills?

6. How can inconsistencies between the two learning styles and two types of music students be explained? For example, most global students play better by ear even though visual perception is associated with the global learning style.

7. Are there specific teaching strategies that can be used to match and mismatch students' learning styles?

Each of these questions will be analyzed and discussed in this chapter. Also included will be comments on the viability of incorporating learning styles and the NASSP learning style variables in the development of piano performance.
1. **What are the two types of learning styles?**

   Keefe and Languis describe learning styles as "the composite of characteristic cognitive, affective, and physiological factors that serve as relatively stable indicators of how a learner perceives, interacts with, and responds to the learning environment."\(^1\)

   The two specific types of learning styles used in this study have their roots in research on hemispheric specialization. It was found that each hemisphere excels in distinct cognitive processes. The left hemisphere functions best in a analytic mode while the right hemisphere functions best in a global mode.

   A variety of labels for these two types of cognitive functions can be found in the literature in the areas of learning styles. Levy-Agresti and Sperry describe the right hemisphere as "specialized for Gestalt perception, being primarily a synthesist" and the left hemisphere as operating "in a more logical, analytic computer-like fashion".\(^2\) Edwards associates "verbal, analytic, symbolic, abstract, temporal, rational, digital, logical, and linear" processes with the left hemisphere
while the "nonverbal, synthetic, concrete, analogic, nontemporal, nonrational, spatial, intuitive, and holistic" processes are related to the right hemisphere. The terms "analytic" [A] and "global" [G] are used to describe the left and right hemispheres, respectively, in this study.

2. What learning style variables are associated with each type?

The two learning styles have also been described by the National Association of Secondary School Principals (NASSP) Task Force using learning style variables. These variables are listed and defined in the Appendix of this study. Although these two-part variables developed by the NASSP have not been labeled as either analytic or global, each was associated with one of the two types of learning styles for their use in this study. The pairing of learning style variables with its associated learning style type can be found in Chapter III/Section II of this study.

3. How do the NASSP learning style variables relate to the skills necessary for developing piano performance?

The literature related to the theory of learning styles supports the use of cognitive strategies from one or both learning styles in order to
develop piano performance skills. Some of the learning style variables generated by the NASSP related well to the performance skills with little or no difficulty.

The NASSP variables that do not relate well to piano performance are addressed below. In addition, some positive points about global learning style strategies as well as some negative points about analytic learning style strategies have been included in the form of music learning examples. Each NASSP variable is judged by this writer on its use in accomplishing specific tasks. Therefore, one variable may be appropriate in one music learning experience and inappropriate in another experience.

1. Field independent/dependent

Musical texture. In a homophonic texture, a pianist wants the sound produced to be a blend in which the listener hears the melody supported by the harmony and any inner voices as a "whole". The field-dependent [G] student perceives all layers simultaneously to create this whole. The field-independent [A] student focuses on the melody which is the most important single part, and may not relate it to the whole.

Musical form. In musical form, a field-independent [A] student constructs the whole form part by part. The
field-independent [G] student first perceives the new composition as a whole and relates it to similar forms previously experienced, adding details that make it different from other compositions of the same type. The analytic type of perception may be explained as an example of "not being able to see the forest for the trees". A field-independent [A] student focuses on each part independently before developing the whole. A field-dependent [G] student finds the "whole" and the meaning of the form first and then supports the "whole" with the details [A].

2. Focusing/scanning
Sight-reading. In the skill of sight-reading, an analytic learner may use a focusing strategy in order to perceive every detail to be performed. This may result in hesitations in tempo and the inability to maintain his part in an ensemble situation. The scanner [G] attempts to understand the main ideas of the composition, much as a reader of words would do in literary scanning. The scanner does not focus on or play every note, but does provide overall rhythm, steady tempo, and harmony.
3. **Reflective/impulsive**

*Speed of decision-making.* Piano performance consists of many time limitations. For example, during a performance, a page turner may turn two pages instead of one and the pianist must make an instant decision concerning what is to be performed. The pianist does not have time to reflect on the perfect answer concerning what is to be performed. In this situation, complete accuracy may be less important than the ability to improvise an accompaniment that fits in the overall flavor of a composition. An analytic [reflective] student tries to remember the exact notes on the correct page whereas a global [impulsive] student thinks of what might come next based on the entire form. A global learner may believe that an improvised accompaniment based on a rhythmic motive of the main theme is an appropriate response until the page is turned correctly.

4. **Complex/simple**

*Technique.* An analytic [complex] student tends to focus on categorizing and defining every motion when flooded by the many details concerning technique. Each finger number, note, rhythmic pattern, and marking is included in this complex perception. Conversely, a global student may have a more simple perception because he groups the details into larger
units. Rather than single fingerings, notes, rhythmic patterns, and markings, a specific task may be perceived in larger concepts such as an ascending major scale in a long-short rhythmic pattern with a detached sound rather than smaller units such as a "G" quarter note played by the right-hand third finger.

5. Narrow/broad

Creativity, improvisation, embellishments. There is usually one correct answer when students categorize concepts in a narrow [A] way. By categorizing in a narrow way, a student can use only new experiences based on concrete past experiences. For example, if there were rule that a piece should end on its tonic chord in the proper mode, there would be no Picardy major thirds at the endings of music compositions in the minor mode. Therefore, an analytic [narrow] student may perform his second experience with the skill of harmonizing a tune according to the standard arrangement, i.e., melody played by the right hand and chords performed by the left hand. Conversely, a global [broad] student may understand that the function of the chord is to harmonize the melody but may not be as rigid in assigning the various duties to the right and left hands, i.e., melody played by the left hand and chords performed by the right hand.
6. Sharpening/leveling

Musical form. These variables may also be related to the concept of "not seeing the forest for the trees." There are times when details are not as important and should be dealt with later in the learning process. For example, in the analysis of the form of a specific composition, an analytic student may not label an ABA form properly because it has four extra measures in the second A section. A global student, however, would label the composition as an ABA form without concern for the minor details.

4. Can the two learning style types and their variables be defined in terms of observable piano performance skills?

Based on research and related literature, learning styles were able to be defined in this study using observable piano performance skills. In Chapter III/Section II selected piano performance skills were matched with the appropriate learning styles. The related literature that supported each match was also included.

If piano teachers choose to assess learning styles by observing piano performance skills, they should consider using the profiles included in this study as a general guide rather than as a more rigid
assessment. The profiles should be used as a general guide because there are very few, if any, "pure" analytic and "pure" global piano students. Instead, most students fall somewhere between the two learning style extremes. There are few students with "pure learning" styles because most students are educated in their less-preferred strategies. Therefore, the education and strengthening of these less-preferred learning style strategies creates the need for a learning style continuum that accounts for the varying degrees of learning styles.

Piano teachers must also be aware that they are observing and judging the results of students using the learning style strategies rather than judging the cognitive strategies themselves. In addition, during the determination of learning styles using piano performance skills, it is important that piano teachers make judgments by observing many skills rather than the performance of a single skill such as is necessary because the student may have performed the skill using a "learned" less-preferred strategy. Therefore, observable piano performance skills might provide a more realistic assessment of learning styles if a composite of many observed skills is used. Once a composite of skills is constructed, a student can then be judged according to which learning style strategies he prefers.

Students whose learning styles are determined through observable piano performance skills can be organized into two groups; (1) piano students who do not favor either learning style, and (2) piano students who favor one learning style over the other. These students
are described as follows according to their educational relationships with their piano teachers.

1. **Piano students who do not favor either learning style.**

According to the learning styles profiles developed in this study, it appeared that this type of student possesses a well-rounded education which strengthened his less-preferred learning style strategies. The vast majority of piano students fall into this category, especially older students. This is the type of student that piano teachers look forward to teaching because little or no lesson time is spent on matching and mismatching strategies to the student's learning style. Instead, the subject matter can be stressed rather than the strategies needed to achieve the piano performance skills. As a result of the flexible use of both types of learning style strategies, this type of piano student is more independent and in control of his learning experiences. This type of teaching-learning situation may be described as a more mature and advanced environment because the teacher becomes a resource for knowledge rather than a tutor who teaches cognitive strategies.

2. **Piano students who favor one learning style over the other.** A bias that favors one learning style over the other indicates to the teacher that matching and mismatching of strategies may enhance the student's study of the piano. The
teacher may begin by matching the student's style in order to provide the minimal foundations as well as motivation through successful experiences. Once the student finds success, the technique of mismatching learning style strategies may be used to teach the student's less-preferred learning strategies.

5. *Can piano student learning style profiles be developed for the purpose of assessment using observable piano performance skills?*

Profiles of each learning style, analytic and global, may be found in Chapter III of this study. These Piano Student Learning Style Profiles are similar in format and usage to the Swassing-Barbe Checklist of Observable Modality Strength Characteristics. The profiles developed in this study can be used as a guide in determining piano students' learning styles. An alternative to the use of the profiles in determining student's learning style is the use of standardized learning style measurements. At least four problems may result from the use of these standardized learning style measurements for assessment of piano students' learning styles:

1. They are not practical to administer during the half-hour time limit of most piano lessons.
2. The student load in most piano studios may prevent the luxury of additional time needed to administer formal tests.

3. Most standardized measurements require some formal training in order to administer and evaluate them correctly.

4. Most, if not all, learning style measurements are used to determine general learning styles without their relationships to specific disciplines. No learning style measurements that were related to either specific musical tasks or piano performance tasks were located.

Due to the problems with this formal method of assessing learning styles in piano students, this writer believes that the Piano Student Learning Style Profiles that use observable piano performance skills provide a more useful guide to learning style assessment until a formal measurement of musical learning styles is made available.

6. How can inconsistencies between the two learning styles and the two types of piano students be explained? For example, most global students play better by ear even though visual perception is associated with the global learning style.

According to the current literature, visual perceptual strength is related to the global learning style while aural perceptual strength is
related to the analytic learning style. This relationship suggests that global students should excel in music reading and analytic students should excel in playing by ear.

This association between aural perception/analytic learning style and visual perception/global learning style is in disagreement with what some piano teachers may actually observe. Piano teachers generally find that students possessing analytic learning style characteristics prefer reading the score to playing by ear. The characteristics related to this skill can include good organizational skills, ease in following instructions, good practice habits, and emphasis on details and technique. In contrast, the type of student who memorizes quickly and prefers to play by ear possesses global learning style characteristics such musical expression and creativeness.

It appears that the inconsistencies between the two learning styles and the two types of piano students may be due to the possible existence of two different types of aural and visual perception. The two types of aural perception may be aural-linguistic and aural-non-linguistic. The analytic type learner more easily perceives spoken language, whereas the global type learner best perceives musical sounds. Visual perception can also be separated into the analytic and global domains. Analytic visual perception is related to symbols and language. Global visual perception is related to spatial vision and mental imagery.

By using these more decisive definitions, the inconsistencies between the two learning styles and the two types of piano students
become clear. A global learner excels in non/linguistic aural sounds, spatial vision and mental imagery, which may account for the preference to play by ear. An analytic learner excels in linguistic aural sounds and symbolic vision which may explain the preferred reading skills.

7. Are there specific teaching strategies that can be used to match and mismatch piano students' learning styles?

There are no commercial piano method books or piano pedagogy approaches that are labeled as using either analytic or global learning style strategies. Instead, teaching strategies related to learning styles must be located in existing piano method books and pedagogical styles of teaching. Examples of teaching strategies are presented in Chapter III of this study.

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6. Ibid., pp. 392-394.

CHAPTER V
Summary, Conclusions, Implications and Recommendations

Summary

Introduction
This study offers both independent piano teachers and those teachers associated with schools, colleges, and universities a historical background of research and current literature on the theory of learning styles; an assessment guide in the form of Piano Student Learning Style Profiles; and suggestions on the application of learning styles presented in a practical format. Depending upon the requirements and experience of the teacher, the suggestions presented can be modified using either an empirical approach or a more formal scientific approach. The Piano Student Learning Style Profiles as well as the suggested teaching strategies, can be used in private piano instruction as well as in a group instruction environment.
The primary purpose of this study was to apply learning styles to teaching piano performance skills. The four secondary purposes were to:

1. Present a multidisciplinary basis for the theory of learning styles, drawn from research in the areas of biology, neurology, physiology, psychology, education, the arts, music, and music education, as a means of understanding the theory of learning styles as they apply to music learning;

2. Relate learning style strategies to piano performance in terms of learning style strategies that are best suited to selected piano performance skills;

3. Develop profiles of both an analytic type piano student and a global type piano student to be used as an assessment tool for piano teachers. These Piano Student Learning Styles Profiles may be used alone or in addition to standard learning styles measurements; and

4. Suggest available piano teaching materials, methods, and approaches that can be used to match and mismatch piano students' learning styles, depending upon the goals of the piano teacher.
The need for this study was based on a review of the current research and literature in the area of learning styles. It was found that very few sources provided a way to apply the theory of learning styles to piano performance. In addition, the suggestions and applications concerning learning styles that were located were presented in an unstructured format for the purposes of recommendations and contemplation by the teacher rather than presented as actual examples of how to incorporate learning styles strategies into the development of piano performance. It was suggested by this writer that, based on the evidence found in the literature and due to the lack of current teaching materials related to learning styles, piano teachers may find that the theory of learning styles may be a viable instructional method to incorporate into their piano curricula.

Chapter Summaries

Chapter I presented a general introduction of learning styles and their possible applications in the area of music learning. The need for the study was based on the lack of availability of instructional methods that apply learning styles to music learning. Explanations supporting the use of learning styles in developing piano performance were discussed and suggestions were made on what piano teachers need in order to incorporate learning style strategies in their curricula. The questions to be addressed in the study as well as the purposes were also stated.
In addition, the limitations, assumptions, and definitions were presented. To summarize, the study was limited to beginning and intermediate level students of average intelligence. Also, it was assumed that all learners had some degree of learning style.

Chapter II addressed the first purpose of this study which was to present a multidisciplinary foundation for understanding global and analytic learning styles. This chapter included a review of the literature related to learning style theory. The multidisciplinary approach of this study was evident in the wide variety of areas reviewed. Research was gathered from the areas of biology, neurology, physiology, psychology, education, the arts, music, and music education. With few exceptions, the research supported the theory of learning styles based on the two distinct cognitive functions inherent in the right and left hemispheres of the brain. The research explored included studies that were conducted using:

1. physically abnormal learners including patients with brain damage due to a severed corpus callosum or unilateral lesions, and genetic abnormalities;

2. subjects who through anesthetization were physically abnormal on a temporary basis; and

3. the reactions of subjects to monaural and dichotic listening tasks.
The literature from the areas of psychology and creative
cognitive processes were also related to learning style theory in
Chapter II. In addition, applications of the theory of learning style
were included from the area of education.

Much of the literature presented in Chapter II included the
areas of music and music education. The review of the literature in
these areas offered suggestions on the source of musical intelligence.
Various models using different ways of describing the two types of
learning were also explored. Research concerning which learning
style strategies are best suited for music learning was also presented in
the review of the literature. Finally, recommendations on how learning
style theory may be applied to developing piano performance were
presented.

Chapter III fulfilled the last three purposes of this study. (1) The
NASSP learning style variables were described in terms of various
piano performance skills. Selected piano performance skills were
related to either an analytic or a global learning style variable. These
relationships were based on either the learning style variables
developed by the NASSP or supported by research gathered from the
areas listed in Chapter II. (2) Profiles of both an analytic and a global
type piano student were also developed using descriptions based on
observable piano performance skills. In addition, (3) teaching
strategies were presented for the purposes of matching or mismatching
students' learning styles. Sources included commercial piano method
books as well as some other piano pedagogical approaches.
Chapter IV includes an analysis and a discussion of the questions presented in Chapter I of the study. Of the seven questions addressed in this study, Question 3 was analyzed and discussed most extensively due to the difficulty in relating some of the NASSP variable to the selected piano performance skills.

Conclusions

Based on the review of the literature and the applications of learning styles in teaching piano performance developed in this study, it appeared that it is viable for piano teachers to incorporate at least some learning style strategies into their curricula. It was concluded that:

1. Learning styles can be related to teaching piano performance skills;

2. The NASSP task force model can be used as a guide in the application of learning styles to teaching piano performance skills;

3. Piano Student Learning Style Profiles can be developed based on the research in Chapter II of this study;
4. Existing piano method books provide teaching strategies that match both learning styles; and

5. Piano teachers should utilize the conclusions reached in this study, namely, assess students' learning styles using the Profiles developed in this study and adapt available teaching materials accordingly.

As evident in Chapter III and discussed in Chapter IV, some of the NASSP learning style variables and their definitions do not enhance the piano teacher's understanding of students' learning styles. This limitation in the use of NASSP variables in teaching piano performance is due to a bias, apparent in the definitions, that favors the analytic learning style variables. This bias is also reflected in how the variables are arranged in pairs, creating a strong [A] variable versus a weak [G] variable.

It appears that the bias favoring the analytic learner also exists in the traditional definition of the "good student". This type of student may be described as one who is able to stay on task, follows instructions accurately, and values the correct answer. Conversely, the NASSP definitions of global strategies are set forth in such a way that they appear to be undesirable learning strategies. The bias against global cognitive strategies is also reflected in the status of music and the arts in all levels of education. In addition, this apparent bias favoring analytic learning strategies tends to de-emphasize the positive
aspects of global processes as well as the negative aspects of analytic processes.

While the NASSP learning style variables tend to favor the analytic strategies, there is, nevertheless, much support for the use of global strategies found in research and literature on creative cognitive processes. For example, the learning style variables such as impulsivity, broadness, feeling judgment, independence of structure, and risk-taking are considered positive attributes. These global variables are used in generative cognitive processes where analytic categorizing and focusing limit the creation of new ideas and new relationships between old ideas. In addition, Gestalt psychology, which stresses the "whole" rather than the "parts" in perception and learning, also supports the use of global cognitive strategies.

Therefore, it may be assumed that one type of learning style is not superior to the other in music learning. Instead, the two types of learning styles are simply different ways of perceiving and understanding music. In addition, it appears that the same piano performance results can be produced through the use of the two different cognitive strategies, i.e., students of both learning style types are able to read music. The analytic piano student may find the correct keys on the piano by reading the letter name of each note, while the global student may read the first note by letter name and the remaining notes by direction and interval. Therefore, the same correct answer can be achieved by using two different approaches to learning.
Conversely, there are instances where a strategy related to one type of learning style may be better suited to a certain task. In these situations, the learner with the style containing the variable appropriate for the task has the advantage. This type of student may master more easily the task with little or no guidance from the piano teacher. Conversely, if the process required for a task is not in the student's repertoire of learning strategies, he still may be able to apply this appropriate strategy if he has acquired the strategy prior to his study of piano performance. If the student has not previously acquired the appropriate strategy needed for the task, then he must depend on his piano teacher in order to learn the appropriate strategy.

The use of learning style strategies is evident in music pedagogical methods by Camp,1 Duckworth,2 Green,3 Michal,4 and Ristad5. These approaches relate the general cognitive strategies discussed in the fields of education and psychology directly to music learning. In addition, it would appear that this study also supported a positive relationship between learning style strategies and their application in developing piano performance.

Although some positive relationships between learning styles and piano performance were suggested, conclusions could not be made concerning the actual effectiveness of using the theory of learning styles in piano performance education. However, based on the success of the piano method books and pedagogical approaches related to each learning style in Chapter III of this study, it is logical to conclude that if these methods listed above were successful, the
speculations made on the applications of the learning styles associated with each method book or pedagogical approach, may also be successful. Only future research that scientifically measures the results of the application of learning styles to piano performance pedagogy can produce valid and reliable answers.

**Implications**

There are several implications which may be drawn from this study. Piano teachers should consider these suggestions as they attempt to match their teaching strategies with the learning styles of their students. Global students may learn more easily if:

1. The physical environment used for learning is free from extraneous noise. Due to the preference for field-dependent processing, the global student may be more easily distracted and therefore need a quiet environment in which to concentrate.

2. A newly-assigned composition is heard by the student prior to actually learning it. In this initial aural/non-verbal experience, the global student would be able to perceive the composition as a "whole" and respond in an emotional
manner.

3. Memorization is encouraged early in the learning process in order to take advantage of the global learner's preferred aural/non-verbal perception.

4. Rhythms are taught by imitating large rhythmic figures or patterns rather than verbally counting individual beats and subdivisions of beats.

5. Labels are used sparingly. Instead of using labels, concepts should be learned first and labeled later in the learning process. Therefore, the use of flashcards with single notes on the staff would not be as beneficial to global learners as the use of notes presented in patterns using landmark pitches and intervals as references.

6. Fingerings are presented as whole patterns "discovered" by the student, as opposed to the student reading finger numbers assigned to individual notes written in by the teacher.
Conversely, analytic piano students may learn more easily if:

1. The focus in lessons is placed on larger units and musical expression rather than on accuracy. The analytic learner will usually address inaccuracies without much guidance from the teacher. Therefore, unnecessary attention paid to accuracy may make it more difficult for the analytic student to attend to global tasks.

2. Less difficult compositions or simple outlines are used in teaching the skill of sight-reading in order to allow the analytic learner to focus on the individual element of continuous motion rather than the individual element of accuracy.

3. New compositions are assigned in small sections rather than by many pages or the entire piece. The comprehension of smaller learning units would be less difficult for the analytic learner than by initially attempting to understand the entire piece.

4. Musical expression, such as dynamics and phrasing, is taught by relating the aural/verbal patterns found in language to the aural/non-verbal patterns found in music because
language is more easily understood by analytic learners than by global learners.

5. Large dance-like movements and proper breathing patterns found in singing long melodic lines are used in order to demonstrate large units such metric stresses and phrasing. The attention focused on the physical sense may impede the preferred analytic strategies.

**Recommendations For Further Research**

The purposes of this study were to relate learning style theory to piano performance and generate possible ways of application rather than to substantiate actual results produced by testing the theory of learning styles. Therefore, much experimental research is needed in order to turn the speculations presented in this study into scientific evidence. This evidence that can be achieved through scientific procedures will be able to thoroughly support the use of the theory of learning styles in developing piano performance. In order to provide this scientific evidence, further research relating learning styles to piano performance is needed. Some suggestions for further research include:
1. A research study that would formally test students' piano performance abilities for possible correlations between each of the selected piano performance skills and the two types of learning styles. The format of the study could be based on the speculations presented in Chapter III/Sections I, II, and III.

2. A study that would compare piano performance abilities of students from three groups:

   A. Students who were taught by using any of the piano pedagogy methods without concern for the students' learning styles,

   B. Students who were taught using piano pedagogy methods matched to their preferred learning style,

   C. Students who were taught to use their less-preferred learning style strategies and then taught using any of the piano pedagogy methods.

   The study could be done most efficiently in any college piano preparatory program. The pedagogical method in existence in the school prior to the study would serve as the control Group A. The students included in Group B and Group C would need to be tested using standard learning style measurements. It would be most
beneficial if the testing procedure would include two or more learning style measurements rather than a single learning style measurement.

3. The development of a standardized learning style inventory using musical skills, instead of the basic cognitive skills that are used in the standard learning style measurements suggested in Chapter I, would also be beneficial to piano teachers in the determination of learning styles in piano students. If teachers could have available this type of formal evaluation which would also be easy to administer and interpret, more students may benefit from learning style research.

4. Finally, an investigation into the effect that learning styles have on the areas of music in which musicians choose to specialize would be valuable. A study of this type would be similar to Kemp's research that relates personality characteristics to singers and a variety of instrumentalists. Several questions should be asked in the study:

1. Would music teachers exhibit more analytic strategies based on the need for these processes in the skills of planning and communicating?

2. Would music historians also tend to favor the analytic processes due to the need for analytic strategies in the skills of categorizing musical periods, styles, and
composers?

3. Would composers and performers depend more on their global strategies in order to facilitate the creative processes associated with these global strategies?

4. Do professionals musicians choose specific areas of expertise because the necessary skills associated with these areas come more naturally to them, or did motivation and determination encourage the musicians to learn their less-preferred learning style strategies?

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APPENDIX

Learning Style Variables Derived From NASSP Model

Field Independent/Dependent - describes a way of experiencing the environment. Independents perceive things clearly against the background field, while dependents are influenced by the overall organization of the background and see parts of the field as fused. Independents are analytic and tend to differentiate among experiences; dependents tend to see them as integrated.

Successive/Simultaneous - describes representational elements of the information processing system. Simultaneous processing characterizes the representation of experience that integrates separate elements into groups without temporal ordering and without superordinate-subordinate relationships. Successive processing refers to the representation of experience in which the elements are serially or temporally ordered. Simultaneous processing is exemplified by spatial events and successive processing by verbal events.
Perceptual modality strengths/preferences - describe learner tendency to use the different sensory modes of understanding experience. Strengths reflect brain behavior, perceptual skill, and training. Preferences are learner attitudes toward these strengths. A perceptual bias develops according to one's values, interests, and expectations. A preference may not tap the greatest strength but may still represent the learner's predisposition to act and most successful approach. The conventional modes are auditory or verbal, visual or spatial, tactile and kinesthetic.

Sharpening/Leveling - describes individual variations in assimilation (memory) skills and measures the way a learner relates new data to previous memory. Sharpeners are able to recall prior images and separate them successfully from current information. They maintain elements in memory as distinct but associated, and are not inclined to confuse similar items. Levelers tend to merge perceived objects of events with similar but unidentical phenomena from previous experience. They blur similar memories.

Focusing/Scanning - describes the extent and intensity of attention a learner gives to a task. The focuser is capable of attending to a specific attribute of a task and disregarding irrelevant information. The scanner is subject to a high degree of distractability and is inclined to concentrate on irrelevant aspects of a task - those that are more appealing, familiar, or less complex.
Complex/Simple - defines differences in the tendency of learners to construe the world and particularly social behavior as multidimensional or unidimensional. The complex learner uses many and varied categories to organize new data whereas the simple learner tends to arrange knowledge in indiscriminate categories lacking specific details. The simple learner frequently lacks an available category to define new data and consequently does not know how to label or process it.

Narrow/Broad - marks a learner's consistent preference in establishing an acceptable range of conceptual categories. The narrow learner uses well-defined criteria to identify the essential problem, exclude doubtful items and lessen the probability of including something deviant. This high degree of discriminability reduces confusion about the actual task and any similarity to previously learned material, leading to low error rates. The broad learner tends to use vague and disorganized criteria for classification and to include many items for fear of omitting something. The broad learner is inclined to confuse similar experiences and to misclassify them.

Need for structure [Dependent Upon Structure/Independent of Structure] - describes the capacity of a learner for complexity, responsibility, and independence. Need for structure implies the degree and sources of structure that a learner requires to learn effectively.
Reflective/Impulsive - characterizes learner consistency in the speed and adequacy with which hypothesizes are formulated and information processed. Reflectives take sufficient time to examine a problem, consider alternative solutions, and select one that satisfies all the circumstances. Their first response is usually correct. Impulsives tend to make divisions based on a partial and unorganized analysis of the task. Their responses are rapid but often incorrect.

Cautiousness/Risk-taking - describes learner differences in the willingness to take chances to achieve some goal. Risk takers prefer low probability-high payoff alternatives; cautious persons seek certainty and prefer high probability-low payoff alternatives.

Active/Reflective - describes two basic orientations toward the world. Actives are outer oriented, drawn toward people and objects in the environment. They prefer to "do" things. Reflectives are inner oriented, more interested in conceptualization and contemplation; they favor their own inner environment to that of the world. Actives tend to be extroverted; reflectives, introverted.

Thinking Judgment/Feeling Judgment - is a cognitive/affective continuum that describes how different learners reach decisions. Thinking types use a logical decision-making process to arrive at judgments. They are concerned with impersonal
findings and deductive methods. Feeling types prefer a process of appreciation, making judgments in terms of subjective, personal values and priorities.

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