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Goodrick, Terry Suzanne

SENSITIVITY TO CHOREOGRAPHIC STYLES IN DANCE AS RELATED TO AGE, EXPERIENCE, AND COGNITIVE DIFFERENCES

The Ohio State University

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SENSITIVITY TO CHOREOGRAPHIC STYLES IN DANCE
AS RELATED TO
AGE, EXPERIENCE, AND COGNITIVE DIFFERENCES

DISSERTATION

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

By
Terry Suzanne Goodrick, B.A., M.A.

* * * * *

The Ohio State University
1986

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To the grace and style of
René LaFever
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>VITA</td>
<td>vi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xi</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xiv</td>
</tr>
<tr>
<td>CHAPTERS</td>
<td></td>
</tr>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>II. THEORETICAL CONSIDERATIONS</td>
<td>7</td>
</tr>
<tr>
<td>Piagetian Theory</td>
<td>8</td>
</tr>
<tr>
<td>Learning Theory</td>
<td>13</td>
</tr>
<tr>
<td>Concept Formation</td>
<td>14</td>
</tr>
<tr>
<td>Discrimination Learning</td>
<td>15</td>
</tr>
<tr>
<td>Perceptual Learning</td>
<td>17</td>
</tr>
<tr>
<td>Individual Differences</td>
<td>23</td>
</tr>
<tr>
<td>General Ability</td>
<td>23</td>
</tr>
<tr>
<td>Specific Ability</td>
<td>26</td>
</tr>
<tr>
<td>The Relationship Between Traits and Learning</td>
<td>28</td>
</tr>
<tr>
<td>III. REVIEW OF GARDNER'S EMPIRICAL WORK</td>
<td>34</td>
</tr>
<tr>
<td>Painting</td>
<td>35</td>
</tr>
<tr>
<td>Initial Findings</td>
<td>35</td>
</tr>
<tr>
<td>Studies Designed to Redirect Attention</td>
<td>37</td>
</tr>
<tr>
<td>The Effects of Learning versus Cognitive Development</td>
<td>41</td>
</tr>
<tr>
<td>Literature</td>
<td>45</td>
</tr>
<tr>
<td>Music</td>
<td>48</td>
</tr>
<tr>
<td>Summary</td>
<td>52</td>
</tr>
</tbody>
</table>
IV. STATEMENT OF THE PROBLEM

Age Differences in Choreographic Style Perception.................. 61
Style Development as Perceptual Learning.................................. 62
Cognitive Style Supporting Perceptual Learning.......................... 64
Style Sensitivity as an Individual Difference.............................. 69
Visual Spatial Skills Associated with Style Sensitivity................... 71
Verbal Skills Associated with Style Sensitivity.......................... 74
Style Sensitivity as a Complex Process.................................. 82

V. METHODOLOGY

Subjects........................................ 84
Measures....................................... 85
Style Measure.................................. 85
Matching Familiar Figures Test........................................... 87
Wechsler Scales..................................... 88
Movement Experience Checklist......................................... 88
Procedure....................................... 89
Statistical Analysis........................................ 90

VI. RESULTS

Preliminary Analyses........................................ 93
Analysis of Variance........................................ 94
Analysis of Covariance........................................ 99
Movement Experience Correlations..................................... 99
Adults........................................ 99
Sixth Graders..................................... 101
First Graders..................................... 102
Wechsler Scale Correlations........................................ 102
Adults........................................ 102
Sixth Graders..................................... 103
First Graders..................................... 107
Correlations for the Conceptual Tempo Measures.......................... 108
Adults........................................ 108
Sixth Graders..................................... 108
First Graders..................................... 112

viii
APPENDICES

A. Calculation of Salkind's Dimensions ....... 201
B. Movement Experience Checklist ............. 204
C. Directions to the Subject: Style Measure ... 213
D. Additional Tables ....................... 216
E. Laban's Theories as Related to
   Choreographic Style ................. 235
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ANOVA of Style Perception Scores by Age</td>
<td>95</td>
</tr>
<tr>
<td>2. Means and Standard Deviations of Style</td>
<td>96</td>
</tr>
<tr>
<td>Perception Scores by Age Level</td>
<td></td>
</tr>
<tr>
<td>3. ANCOVA of Style Perception by Age</td>
<td>97</td>
</tr>
<tr>
<td>4. Adjusted Means and Standard Errors</td>
<td>98</td>
</tr>
<tr>
<td>for Style Scores by Age</td>
<td></td>
</tr>
<tr>
<td>5. Correlations between Style Perception and</td>
<td>100</td>
</tr>
<tr>
<td>Subscores of the Movement Experience Checklist</td>
<td></td>
</tr>
<tr>
<td>6. Correlations and Partial Correlations</td>
<td>104</td>
</tr>
<tr>
<td>between Style Perception and the Wechsler</td>
<td></td>
</tr>
<tr>
<td>Subscales: Adults</td>
<td></td>
</tr>
<tr>
<td>7. Correlations and Partial Correlations</td>
<td>105</td>
</tr>
<tr>
<td>between Style Perception and the Wechsler</td>
<td></td>
</tr>
<tr>
<td>Subscales: 6th Graders</td>
<td></td>
</tr>
<tr>
<td>8. Correlations and Partial Correlations</td>
<td>106</td>
</tr>
<tr>
<td>between Style Perception and the Wechsler</td>
<td></td>
</tr>
<tr>
<td>Subscales: 1st Graders</td>
<td></td>
</tr>
<tr>
<td>9. Correlations and Partial Correlations</td>
<td>109</td>
</tr>
<tr>
<td>between Style Perception and Conceptual</td>
<td></td>
</tr>
<tr>
<td>Tempo Scores: Adults</td>
<td></td>
</tr>
<tr>
<td>10. Correlations and Partial Correlations</td>
<td>110</td>
</tr>
<tr>
<td>between Style Perception and Conceptual</td>
<td></td>
</tr>
<tr>
<td>Tempo Scores: 6th Graders</td>
<td></td>
</tr>
<tr>
<td>11. Correlations and Partial Correlations</td>
<td>111</td>
</tr>
<tr>
<td>between Style Perception and Conceptual</td>
<td></td>
</tr>
<tr>
<td>Tempo Scores: 1st Graders</td>
<td></td>
</tr>
</tbody>
</table>
12. Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, Object Assembly, and Other Experience .... 116
13. Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, Similarities, and Other Experience .... 117
14. Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, Similarities, and Object Assembly .... 118
15. Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, and Object Assembly ................. 120
16. Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, and Similarities .......... 121
17. Multiple Regression of 6th-grade Style Perception Scores Using Overall Dance Experience, Digit Span, and Impulsivity .... 123
18. Multiple Regression of 6th-grade Style Perception Scores Using Overall Dance Experience and Digit Span .... 124
19. Multiple Regression of 6th-grade Style Perception Scores Using Overall Dance Experience and Impulsivity .... 125
20. Correlation Matrix for Wechsler Subscales: Adults ............... 217
22. Correlation Matrix for Wechsler Subscales: 1st Graders .......... 221
23. Correlations of Age, Sex, and Salkind Dimensions with the Wechsler Subscales: Adults .................... 223
24. Correlations of Age, Sex, and Salkind Dimensions with the Wechsler Subscales: 6th Graders .................... 224
25. Correlations of Age, Sex, and Salkind Dimensions with the Wechsler Subscales: 1st Graders ................................ 225

26. Correlation Matrix for Movement Experience Checklist Subscores, Sex, and Age: Adults ....................... 226

27. Correlation Matrix for Movement Experience Checklist Subscores, Sex, and Age: 6th Graders .............. 228

28. Correlation Matrix for Movement Experience Checklist Subscores, Sex, and Age: 1st Graders ............. 230

29. Correlations between the Dance and Other Experience Scores and the Wechsler Subscales: Adults ............. 232

30. Correlations between the Dance and Other Experience Scores and the Wechsler Subscales: 6th Graders ........... 233

31. Correlations between the Dance and Other Experience Scores and the Wechsler Subscales: 1st Graders ........... 234
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dimensional Rays</td>
<td>247</td>
</tr>
<tr>
<td>2.</td>
<td>Diagonal Rays</td>
<td>248</td>
</tr>
<tr>
<td>3.</td>
<td>Diametral Rays</td>
<td>249</td>
</tr>
<tr>
<td>4.</td>
<td>Octohedron</td>
<td>250</td>
</tr>
<tr>
<td>5.</td>
<td>Icosahedron</td>
<td>251</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

The study of creativity has received considerable attention in psychology. Numerous writers have discussed theories of creativity, (Arieti, 1976; Barron, 1969; Rogers, 1959), and numerous researchers have studied the creative person--his or her personality characteristics, styles of problem solving, and educational background (Arieti, 1976; Anderson, 1959; Barron, 1969; Vernon, 1975). Psychologists have attempted to develop psychometric measures of creativity and have examined the cognitive traits associated with the creative process (Getzels and Jackson, 1963; Guilford, 1958; Wallach and Kogan, 1965).

Given the volume of work in psychology on creativity, it is ironic that psychologists know very little about the psychological processes underlying the aesthetic experience. What perceptual and cognitive processes are involved when we classify a painting by Rembrandt, note the harmonies in an opera by Mozart, or discover the meter of a poem by Robert Penn Warren--or even when
we recognize that the Golden Gate Bridge represents an
elegant solution to a difficult engineering problem?
Lindauer (1981) has called the aesthetic experience a
neglected topic in psychology. The reasons for this
neglect are many. O'Hare (1981) suggests that one of the
primary obstacles has been a tendency to create a
dichotomy between the arts and the sciences. "The arts
have then been regarded as the embodiment of intuition,
emotion and other inaccessible processes, whereas the
processes of scientific thinking are themselves held to
be more easily investigated by systematic, scientific
methods" (p. 11).

As psychology broke away from philosophy and
established itself as a science, the need for systematic,
scientific methods of investigation became extremely
important. This may provide another reason for the lack
of research on the psychological processes involved in
the aesthetic experience. The complexity of the stimuli
that would, of necessity, be involved in such studies is
very great. Not only is a painting, a piece of music, or
a work of literature a complex stimulus, it is also one
that does not lend itself to having its components
readily manipulated or simplified. If any one component
is changed or modified, the original integrity of the
work is destroyed, and it could be argued that the experience of that object is no longer an aesthetic one.

For many, the aesthetic experience involves questions of value and opinions about beauty—subjective notions that psychologists would rather leave for the philosophers. Interestingly enough, however, Lindauer (1981) observes that reference is continually made in the philosophy literature to the perceptual nature of the aesthetic experience. He says that this is not too surprising given the etymological root of aesthetics, the Greek aishesis, which means the perception of the senses (or sense perception) and the root aisthanomai, which also means to perceive. "Philosophers... in contrast to psychologists’ overwhelming emphasis on the hedonic nature of the response to art, accent the perceptual and cognitive." (pg. 43)

A very early attempt to study the perception of simple stimuli associated with the arts can be found in the history of perception. Fechner (1897), who pioneered the field of psychophysics, developed a reductionist approach called "experimental aesthetics" in which very simple stimuli, such as patches of color or single tones, were presented to the subject, who was asked to rate the stimuli in terms of preference.
The degree to which studies based on Fechner's techniques can be generalized to the perception of art is, for reasons stated earlier, questionable. Lindauer (1981) notes considerable criticism of these studies from artists and aestheticians, as well as psychologists—including the perceptual theorist Gibson, who suggests that studies based on simple stimuli in general should be abandoned. Gibson (1975) stresses that the perception of art should be treated like any other form of perception in which the perceiver extracts and represents information from the environment.

O'Hare (1981) reviews a series of more contemporary studies that do not employ simple stimuli, but rather, actual paintings and excerpts of musical compositions. By employing semantic-differential and multi-dimensional scaling techniques, these studies uncovered stylistic dimensions underlying judgments of art that included "clarity," "brightness," "realism," "linearity," "complexity," and "playfulness." O'Hare questions the validity of these studies, however, since the labeling of the dimensions relies largely on the "intuition of the experimenter." He also does not feel that these studies address the perception of artistic style per se nor does he feel that they uncover the formal properties of
The perception of artistic style is only one aspect of the aesthetic experience, but it is an important one, especially to the connoisseur of art. O'Hare (1984) comments that our ability to discriminate style contributes greatly to our enjoyment and understanding of the arts. O'Hare has studied children's ability to differentiate the formal properties of style, but with the exception of a few scattered studies, the only work on the discrimination of artistic style itself has been carried out by Howard Gardner. In a series of studies during the early 1970s, Gardner studied the development of an ability to perceive artistic style in painting, music, and literature. He discovered a similar developmental progression for each of these art forms—especially for painting and music.

The purpose of this dissertation is to extend Gardner's work to the performing art of modern dance and to explore the development of an ability to perceive choreographic style in terms of individual-difference dimensions, perceptual learning, and Gestalt psychology. The study will determine whether or not the development of an ability to perceive choreographic styles in dance follows the same developmental pattern as does the
development of style sensitivity in other art forms. Secondly, the study will examine, at each age level, the relationship between choreographic style sensitivity and past experience with sports and dance, as well as the relationship between style sensitivity and cognitive and perceptual skills. In doing so, it will provide more information about the nature of style sensitivity and its development.

We begin, in Chapter Two, with a brief discussion of style sensitivity followed by an exploration of theoretical perspectives from which to conceptualize its development. Chapter Three will be devoted to a review of Gardner's empirical work, and it will be followed by a statement of the problem in Chapter Four. Chapters Five, Six, and Seven will be devoted to description and discussion of a study of the development of an ability to perceive choreographic style.
In the early 1970s Howard Gardner published a series of papers on the development of a sensitivity to artistic styles. Specifically, Gardner was interested in an individual's ability to attribute an unfamiliar work of art, such as a painting, to a specific artist, such as Picasso, or a piece of music never heard before to a specific composer, such as Brahms.

Though most of Gardner's papers have dealt with style sensitivity in the arts, individuals can be sensitive to other sorts of styles as well. As Gardner (1971) notes, being able to identify a friend's handwriting or the character of his or her gait are two examples of style sensitivity in everyday life. There are others. When we walk into a room and note that the furniture is French provincial, or when we look at a computer program and know it was written by one colleague and not another, or when we can tell from our dinner partner's accent that he was raised in the Bronx, we are exercising a sensitivity to style.
In each of these cases, whether it is the recognition of a painting by Picasso or an accent from the Bronx, style sensitivity requires an ability to discern a complex set of characteristics that remain, more or less, the same across a wide number of cases. Secondly, it requires one to realize that these characteristics serve as the criteria for specific categories: paintings created by Monet, music of the Baroque era, cars manufactured by Ford.

This brings us to the question of what perceptual and cognitive processes underlie an ability to discern differences in artistic style, and secondly, how they affect its development. Before reviewing Gardner’s empirical work, it will be helpful to examine the various theories that might enable us to understand the development of style perception. Broadly speaking, these include Piagetian theory, learning theory, and theories of individual differences.

Piagetian Theory

If style sensitivity is influenced by cognitive processes, it might be useful to conceptualize it’s development within the cognitive-structuralist framework.
of Piagetian theory. From a Piagetian standpoint, style sensitivity would be a cognitive ability, like many others, that is dependent upon individuals having reached a certain level of neurological maturity coupled with their having interacted with their environment.

With which of Piaget’s cognitive-developmental levels would style sensitivity be associated? Gardner (1972a) mentions Machotka’s suggestion that individuals will not be sensitive to artistic style until they have reached formal operations. Machotka (1966) suggested that an ability to comprehend style rests on abstract and hypothetico-deductive thought:

The criteria of style and of composition appear to imply the hypothetical existence of several manners of representation, one of which (the style or composition that the observer is commenting on at the moment) seems the most satisfactory. The observer cannot judge style or composition if he knows only one; he can judge it only in comparison with others which, at the time of the judgment, are imagined or hypothetical. The child who has not reached the hypothetico-deductive level of thought should have difficulty in using these two criteria. (pg. 883-4)

That abstract thought might be necessary for style perception makes sense if artistic styles are conceptualized in terms of characteristics that are divorced from any specific, concrete content: van Gogh’s "Sunflowers" and his "Starry Night" are two paintings with very different subjects, but both are done in an
extremely similar style. As Gardner (1970) put it, when focusing on style, one must look beyond what is being represented to the manner in which it is represented.

Indeed, young children are distracted often by the concrete aspects of the situation. This tendency in preoperational children is illustrated by Piaget's classic conservation problems, and it is demonstrated in young, concrete-operational children by Elkind's interesting observation that when shown a human figure composed of fruit—an apple for the head, bananas for the legs, and grapes for the shoulders and arms—that most adults, but few six-year olds can discern the human figure (Elkind, Koegler, & Go, 1964). The children focus on the fruit as fruit, not as symbols of something else. This inability to shift attention, to focus on some aspects of the situation and ignore others, Piaget called an inability to "decenter." In terms of a sensitivity to various styles in literature, Gardner and Gardner (1971) suggest that the use of rules and propositional thinking may be important, and therefore formal operational thinking would be required.

However, if style sensitivity is framed solely as an act of classification based on the perception of concrete, physical characteristics, then abstract thought, and therefore formal operations, may not be
necessary. Rather, the most important underlying cognitive structure would be concrete operations. The ability to classify objects in an hierarchical manner emerges in this cognitive-developmental level.

Artistic style could be conceptualized in terms of hierarchical categories. Each artist or musician exhibits a specific set of characteristics that are evident across all instances of his or her work and form the basis of a category: this particular artist's style. When confronted with an example of this artist's work, one perceives the characteristics that define the style and use them to classify the work correctly. Though the artist may paint landscapes as well as portraits, or the musician may compose sonatas as well as symphonies, these classes would be seen as subsets of a larger category of works in the style of one individual.

Fretchling and Davidson (1970) suggest that style sensitivity will develop, however, only after the development of concrete operations is complete. These authors conducted a free classification study in which they asked subjects ranging in age from five years to adulthood to sort a set of oil paintings into groups of their own choice. Though the 6, 7, and 12 year old children were able to classify the paintings in a consistent and logical manner, they sorted them almost
exclusively on the basis of subject matter. Style emerged as a significant basis for classification only for the adult groupings.

The authors conclude that children may not be able to sort the paintings on the basis of style because style must be characterized in terms of several concrete features--such as subject matter, color, texture, and composition--that are related to one another in a specific way. Children may not be able to attend to more than one or two features at a time, let alone to how these features are interrelated. Indeed, the conservation of volume, which depends upon an understanding of how the physical dimensions of height, width, and depth are interrelated, is not fully realized until 11 years of age--at the very end of the concrete-operational period (Hetherington & Parke, 1979).

It is possible that a higher level of cognitive development, such as formal operations, may be necessary for an understanding of the concept of style. Even so, young children may still be able to discern the components of a specific artistic style and, with training, learn to distinguish one style from another. This brings us to the second theoretical orientation from which style sensitivity can be conceptualized.
Learning Theory

Experience is important to cognitive-developmental theorists—a point learning theorists often seem to overlook. It is just that from the cognitive-developmental standpoint, the effects of experience are always tempered by cognitive structures that result, in part, from physical maturity of underlying neurological structures and, in part, from individual's accommodation to the environment. Traditional learning theory does not emphasize this interplay between experience and underlying cognitive or neurological structure; cognitive-developmental levels are not necessary for learning to occur. From the standpoint of learning theory, given the proper training, even a very young child might learn to discriminate different artistic styles. There are three types of learning theory that may contribute to our understanding of the development of style sensitivity: concept formation, discrimination-learning theory, and perceptual-learning theory.
Related to hierarchical classification as defined in concrete operations, concept formation is the trial and error process whereby the individual learns the appropriate combination of attributes that define a particular category or concept. Using the concept-learning paradigm, both Walk (1967) and Tighe (1968) were able to train adult subjects to classify paintings by artist. Their work suggests that adults can be trained to be sensitive to individual styles of painting. Tighe commented, however, that there were wide individual differences in performance, "ranging from chance performance throughout training to perfect classification over the last two sets." In this case, cognitive developmental level is not affecting learning, since we can assume that most of Tighe’s subjects had reached formal operations. Even so, Tighe’s observation that not all subjects learned to classify by style suggests that certain specific abilities or aptitudes may be necessary for training to have an effect.

Walk’s and Tighe’s studies concentrate on concept formation as it is related to style sensitivity in adult populations, and so they do not address whether or not children are capable of learning how to classify artistic style within this training paradigm. Indeed, Gardner
(1972b) adopts with hesitation the position that style sensitivity is the result of a type of concept formation, pointing out that the research defining this area may be too artificial; the standard concept-formation tasks may not model the development of style sensitivity as it occurs during childhood.

**Discrimination Learning**

The early studies of discrimination learning were done with animals (Harlow, 1949, 1959; Sutherland & Mackintosh, 1971). In the typical discrimination-learning experiment the animal is rewarded for choosing the correct shape, color, or form. Similar studies have been done with children by developmental psychologists examining the reversal shift phenomenon (Kendler and Kendler, 1970; Zeamon and House, 1963; and Tighe and Tighe, 1972).

Though investigators differ as to how much verbal mediation is involved in reversal-shift tasks, it is apparent that the children, like the animals in the discrimination-learning studies, must learn to attend to dimensions relevant to the specific task (such as brightness) and disregard irrelevant dimensions (such as position). Tighe (1965) has been able to improve performance through pretraining designed to sensitize his
subjects to all of the stimulus dimensions that may be involved in the reversal shift. Such training teaches the child to focus on the dimensions of change rather than on the specific properties of a single object (Gardner, 1978).

This form of discrimination learning may be important to the young child who is learning to discern artistic style. Certain stimulus dimensions, such as subject matter and color, may not be as important to style discrimination in painting, for instance, as brush stroke or line quality. Through the process of discrimination learning the child may come to understand which stimulus dimensions characterize style. As with the concept-formation tasks, however, it is difficult to know whether discrimination-learning tasks model the development of style sensitivity completely. The typical discrimination learning task requires the ability to focus on only one, possibly two, dimensions at any one time. As mentioned earlier, artistic style is most likely characterized by the interrelationship of specific features along several stimulus dimensions. Discerning this characteristic relationship of distinctive features may involve a different process than that which allows a child or animal to make a correct choice based on a change along only one dimension at a time.
Secondly, the stimulus dimensions used in discrimination-learning tasks are straightforward and simple—shape, size, color, brightness. For the most part, they are readily distinguishable at the outset of the task. Some of the stimulus dimensions that may be important for style discrimination—harmony, rhythm, balance, chiaroscuro—are more subtle and sophisticated. In other words, they are not readily distinguishable at the outset, and people may have to undergo a process whereby they gradually differentiate these more subtle dimensions before a pattern among specific properties can be discerned. This possibility leads us to the last area of learning theory to be considered.

**Perceptual Learning**

*Gibsonian Theory.* The capacity to attend to the relevant features or dimensions of the stimulus while learning to disregard the irrelevant characteristics, though an important aspect of discrimination learning, is also an important aspect of perceptual learning as defined by E. J. Gibson (1969). Unlike concept-formation and discrimination-learning theorists, however, Gibson believes that perceptual learning occurs largely as a result of long-term, repeated exposure to the stimulus information in the environment; external positive
reinforcement for "the right choice" is not necessary. The individual gradually makes finer and finer discriminations and extracts the distinctive features of the object or the environment as a whole. Gibson’s theory accords well with the traditional view of the art, wine, or music connoisseur who is able to perceive subtleties to which the average individual, with less exposure or experience with the art form in question, is completely insensitive.

Perceptual learning according to Gibson involves discriminating properties of stimulation not previously detected, even though they have been present in the environment. As mentioned earlier, the stimulus dimensions involved in style sensitivity, and especially the distinctive features of an individual artist’s style, may be quite subtle. To the inexperienced observer, they may not be readily apparent at all. Consequently, the initial stages of the development of style sensitivity may involve an "uncovering" or differentiation of the important stimulus dimensions not previously detected. In this way, the development of style sensitivity might involve a sophisticated form of discrimination learning, but one not dependent upon external reinforcement.

As a result of not having differentiated the environment, perception for the inexperienced observer is
grossly selective (E. J. Gibson, 1969). The inexperienced perceiver has not learned which stimulus dimensions are relevant and which ones are irrelevant. So not only does perceptual learning involve making finer discriminations, it also involves learning to focus on or to selectively attend to those features which make an object distinctive. In the perception of artistic style, until the observer has differentiated all of the stimulus dimensions present, he or she may focus on one or two fairly obvious ones, such as subject matter or color, which are often not relevant to style.

E. J. Gibson (1969) also points out that "complex objects in real life can seldom be differentiated on the basis of single properties which render them unique" (p. 82). Rather, they are differentiated on the basis of a "bundle" of distinctive features. Artistic style, as a complex phenomenon, is probably no exception. Gibson also comments that the cluster of distinctive features that differentiate an object has the potential for higher order structure. In other words, the properties relate to one another in an invariant manner across a wide range of situations. Gibson (1966) calls this invariant relationship, the "non-change that persists during change." Indeed, it might be useful to conceptualize artistic style as an invariant relationship of
distinctive features. An artist's style remains evident despite the subject matter of the artwork, throughout years of the artist's career and artistic development, and often across different media.

Gestalt psychology. A second perceptual-learning theory that may aid our understanding of style perception can be found in Gestalt psychology (Koffka, 1931, 1935; Lorenz, 1966). Like the Gibsons, Gestalt psychologists do not explain perception or perceptual learning in terms of stimulus-response associations, but emphasize the discovery of relational pattern and whole structure. As Gestalt psychology has shown us, the human perceiver has a strong compulsion to dissect the visual field into figure and ground. Indeed, according to Koffka (1959) this tendency may be one of the earliest, most primitive discriminations made of the environment:

It is the very first experience of the child that we are attempting to characterize. Our characterization, then, is this, that the first phenomena are qualities, of figures upon a ground . . . they are the simplest of mental configurations. (p. 145)

Gibson (1969) cites studies of form perception in infants that suggest that some differentiation of figure from ground occurs in neonatal visual perception (Salapatek and Kessen, 1966; Fantz, 1961; Hershenson, 1964; and Stechler, 1965). She comments, though, that
this work does not tell us the extent the stimulus object is differentiated perceptually, nor whether an object is perceived as a whole; in most instances, the infants appeared to be singling out individual areas, such as high contrast edges, vertices, and spots. (Gibson, 1969)

More recent research, however, indicates that infants are perceiving the whole form. McGurk (1972) demonstrated a sensitivity to changes in form orientation in six-month-old infants. Pipp and Haith (1977) found that two-month-old infants were sensitive to the solidity of form. And, Salapatak (1975) points out that one- and two-month old infants do not look straight at the mother but at her outer edges. Such research supports Koffka's assertion that one of the first visual discriminations of the infant is that of figure apart from ground, though Walk (1981) suggests that figure-ground discrimination becomes more sophisticated and differentiated with age.

E. J. Gibson (1982) commented that J. J. Gibson did agree that the figure-ground phenomenon was important, and that he agreed that there are holistic entities or Gestalten that were related to one another in an orderly way, as distinguished from assemblages of particles, it is just that "he considered the best exemplars of orderly relations in the world to be the world’s surfaces and
substances, its places, objects and events, not soap bubbles and the like" (p. 160).

Given the salience of figure-ground perception, Gardner (1972c) suggests that style sensitivity may involve a sensitivity to textural properties that pervade both the figure and the ground of the work. In relationship to this, he cites Ehrenzweig's (1967) comment that it is important to train oneself to scatter attention over the entire structure of the work of art. According to Ehrenzweig, the good artist cannot afford to compartmentalize his or her work into significant figure and insignificant ground. Form elements such as texture cannot be treated as decorative "additions" that have no structural significance. Rather, textural fields serve to integrate figure and ground in artistic composition.

Elements such as texture, line quality, and chiaroscuro are examples of distinctive features that may be components of artistic style. Artistic style, then, may be what serves to unite or pull together figure and ground into an integrated whole, and it may not be until we can perceive the style of the work, as opposed to just its figure-ground relationships, that we can perceive its overall structure, its Gestalt.

One could argue that the perception of the artistic style itself is a form of Gestalt perception. We have
considered artistic style in terms of a characteristic relationship of distinctive features and a higher-order invariant that persists throughout a wide range of work. Since a very important aspect of Gestalt perception involves being able to perceive structure and interrelationships, one might suggest that when people extract the invariant of artistic style, they are engaging in a sophisticated form of Gestalt perception.

Individual Differences

The last theoretical area which may enhance our understanding of artistic style sensitivity is that of individual differences. Some individuals may develop style sensitivity, while others never do, at least not to a great extent. This individual difference could be explained in terms of differences in general intellectual ability, special abilities, or in terms of the relationship between special ability and past experience.

General Ability

Intelligence has been conceptualized as a single unitary ability that reveals itself in everything a person does. Charles Spearman, who pioneered factor
analysis, was the champion of this theoretical orientation. He postulated a g-factor which all tests of mental ability tapped, even tests of special ability. The g-factor served to explain the intercorrelation of all tests of ability. (Spearman, 1904, 1927)

Style sensitivity could be considered just another manifestation of general ability. Individual differences in style sensitivity may be a reflection of individual differences in general ability. Indeed, in Gardner's various writings, there is the implication that despite some individual variation, style sensitivity, and aesthetic perception in general, is the manifestation of a general developmental phenomenon:

In my view any individual of normal intelligence should pass--at a faster or slower rate--through the stages of aesthetic perception outlined here. Given reasonable interest and motivation, all normal individuals should be able to attain sensitivity to style, expressiveness, and composition across the range of art forms; to understand the processes involved in artistic production; and to make motivated critical distinctions and judgements. The extent to which they can render these judgements accurately with reference to a specific work (and their proclivity for doing so) may well be limited by their perceptual and mnemonic abilities in the particular art forms; but their overall status as a competent aesthetic perceiver should not be vulnerable. In other words, we confront here a genuine and universal developmental progression. (Gardner, 1981, p. 146)
Other theorists have adopted Spearman’s notion of general intelligence, but with some modification. R. B. Cattell (1971) and J. L. Horn (1968) have divided the g-factor into fluid ability and/or crystallized ability. Fluid intelligence is the genetically determined potential for problem solving as determined by neural-physiological structures and incidental learning. It declines with age and brain damage. Crystallized intelligence reflects the acculturation of the individual in a particular society, and as such, increases with education and experience.

Vernon (1971) holds a similar view. For him the g-factor is divided into practical-mechanical ability (which is much like fluid ability) and verbal-educational ability (which is much like crystallized ability). Both the Cattell-Horn and Vernon theories are hierarchical, as defined by Sternberg and Powell (1982) and Gleitman (1981); though fluid and crystallized intelligence are considered distinct from one another on one level, they are still linked together at a higher level; they are both considered manifestations of general intelligence.

Style sensitivity could be considered a manifestation of crystallized intelligence. Individuals who perceive a style and classify it correctly do so as a result of having learned what defines that style as opposed to
another. They have learned a set of rules that allow them to arrive at the correct classification.

Specific Ability

Intelligence has also been conceptualized in terms of an array of distinct, specific abilities that are not necessarily linked together by an overarching general factor. Thurstone (1938, 1962) was one of the leading exponents of such multiple-factor theories. On the basis of research on over 50 different tests of special ability, Thurstone proposed about a dozen group factors, including as "verbal comprehension," "space," "associative memory," and "perceptual speed."

J. P. Guilford (1967) is another prominent multifactor theorist. He proposes over 120 different factors, which he organizes in a three-dimensional model of intellectual functioning. Each factor is defined in terms of (1) operations, or the type of processing involved, such as cognition, memory, or divergent production; (2) contents, or the type of material on which the operations are performed, such as semantic or behavioral material (3) products, or the form in which the information is processed, such as systems, transformations, or relations.
From the multifactor theoretical orientation, artistic style sensitivity would not be conceptualized as another manifestation of general intelligence or even crystallized intelligence. Rather, it would be the reflection of a special ability explained in terms of one or several of the multifactors. For instance, it might be related to Thurstone's "space" or "perceptual speed" factors but not to his "number" or "induction" factors.

To consider artistic style sensitivity in terms of a special ability is attractive when presented with both anecdotal and research evidence that despite training some people seem to evidence aesthetic or style perception while others do not. Walk's (1968) and Tighe's (1968) studies using concept-learning tasks reviewed earlier provide good examples. Others can be found in Gardner's discussion of research by Feldman (1980): "Some individuals can hear a selection of musical works only a few times and virtually know the pieces totally; others of equivalent background and intelligence can hear them literally dozens of times without even mastering their basic form." (Gardner, 1981, p. 145) Gardner provides other more dramatic examples in his discussions of child prodigies and idiot savants (Gardner, 1980, 1982, 1983).
The Relationship between Traits and Learning

With such extreme cases of individual differences aside, we can consider the possibility that traits and learning both contribute to the development of individual differences. In general, multifactor theorists have concentrated on defining the factors or traits of the human intellect without giving much theoretical or empirical attention to where they come from. Learning or experience no doubt has some bearing on the development, or at least the expression, of special abilities or traits. Crystallized intelligence is a good example. However, it is safe to say that there has been a tendency to consider traits or special abilities as innate or genetically based and independent of learning. In actuality, certain genetic predispositions may not lead to the development of certain traits so much as they determine the extent to which training has an effect. Traits and learning are probably interrelated, each having a synergistic effect on the other.

Tyler (1974) comments on the dichotomy between the research emphasis in individual differences versus that of experimental psychology.

While the main thrust of mental measurement has been toward increasing standardization of conditions in order to remove all the sources of error variance that might blur distinctions between individuals on a trait being measured, an increasing number of
Laboratories have been undertaking investigations designed to find out what are the effects on individual differences of varying rather than controlling conditions. For a time, the two kinds of research were almost completely independent of one another. Experimental psychologists varied instruction, incentives, and other aspects of the testing situation, but usually reported only the averages for the groups tested under different conditions. Differential psychologists made precise measurements of individual performances, but held stimulating conditions as constant as possible.

(p. 33)

Tyler's comments serve as an introduction to her discussion of aptitude-treatment interaction as outlined by Cronbach (1957). This area of research suggests that children with a certain pattern of scores on measures of mental ability, cognitive style, or temperament may benefit from one form of instruction as opposed to another. Though applied in nature, the literature on aptitude-treatment interaction underscores the need to consider individual differences in studies of learning.

Samuel (1981) commented that experimental psychologists "have always been concerned about individual differences, but mostly as a source of unwanted variation in their measurements which was beyond their control." (p. 375) She suggests that modality preference and special perceptual abilities should be studied to learn about perception in general and the effects of experience on perception. In particular, she
has studied how field-independence as defined by Witkin, Goodenough, and Karp (1967); modality preference as defined by Bruner, Oliver, and Greenfield (1966); and past experience in athletics and the arts affect prism adaptation and visual capture.

E. J. Gibson (1969) cites research by House (1966) that demonstrates a relationship between IQ and the ability to perceive order. In her discussion of this topic and the role of attention on perceptual learning, it becomes clear that individual differences in selective attention resulting from developmental change or perceptual deficit have an effect on learning to discriminate stimulus features and extract structure in the perceptual environment.

Given these observations, it might be useful to conceptualize the development of style sensitivity as a form of perceptual learning that interacts with or is supported by specific abilities or traits. A particular profile of special traits, perceptual preference, cognitive style, or capacity for attention may predispose one individual to learn how to discriminate artistic styles more readily than another.

Related to this idea, Gardner (1983) has proposed a theory of multiple intelligences in which he suggests not one form of intelligence, nor a set of separate,
independent traits or skills—whether they be innately
determined or the result of specific training—but,
rather, a set of different kinds of intelligences, each
of which has its own set of characteristics and is
responsive to a specific type of training or experience.
Gardner does not think that his list of intelligences is
exclusive, but he includes on it linguistic intelligence,
musical intelligence, logical-mathematical intelligence,
spatial intelligence, bodily-kinesthetic intelligence,
and the personal intelligences.

According to Gardner, each of these intelligences
would have an identifiable core operation or set of
operations:

Central to my notion of an intelligence is the
existence of one or more basic information-processing
operations or mechanisms, which can deal with
specific kinds of input. One might go so far as to
define a human intelligence as a neural mechanism or
computational system which is genetically programmed
to be activated or "triggered" by certain kinds of
internally or externally presented information.
Examples would include sensitivity to pitch relations
as one core of musical intelligence, or the ability
to imitate movement by others as one core of bodily
intelligence. (p. 64)

The core operations are the "raw stuff" of the
intelligence, but they, by themselves, do not explain
high levels of competence. Rather, they are what
predispose the individual to benefit from experience and
special training. In fact, Gardner stresses the importance of identifying the developmental history of the intelligence so as to determine when it is susceptible to modification and training—to determine its critical periods.

At the core of Gardner's theory is this notion of traits or predispositions interacting with experience. It is this characteristic of the theory that distinguishes it from traditional theories of intelligence that do not emphasize the role of learning, as well as the traditional theories of learning, which do not stress individual differences. As such, as a theoretical orientation, it may be useful in our understanding of the development of style sensitivity. Style sensitivity appears to be a complex process that may draw upon cognitive structure, special ability, perceptual learning, and past experience. Consequently, it may require either a combination of theories to model its development completely, or at least an eclectic theory such as Gardner's theory of multiple intelligences. For instance, style sensitivity could be one manifestation of something like an aesthetic intelligence.

Keeping in mind the various theoretical orientations discussed in this chapter, let us review Gardner's
empirical studies of the development of style sensitivity in painting, literature, and music. After a careful examination of his methods and findings in these areas, an extension of Gardner's work to the performing art of modern dance will be proposed and a theoretical model of the development of style sensitivity will be suggested.
CHAPTER III
REVIEW OF GARDNER’S EMPIRICAL WORK

Given psychology’s bias against studies of the aesthetic experience, and, in particular, the perception of art, it is not surprising that Gardner (1970) commented in the introduction of his first paper on the development of style perception that "because of a dearth of research in this area, it was necessary to proceed intuitively" (p. 1). Today, there is still relatively little work on style perception, especially as that ability is developed by children. It is for this reason that Gardner’s work remains one of the few stepping stones developmental psychology has to offer. Gardner examined the development of style perception in the arts of painting, literature, and music.
Initial Findings

Gardner (1970a) defined "style" in the graphic arts as "those qualities of line, texture, and composition which characterize a range of works by the same artist, and which remain discernable regardless of subject, dominant colors, size, or medium" (p. 814). To test the development of a sensitivity to painting style, he had children from each of the first, third, sixth, and ninth grades make judgments about post-card reproductions of works by various artists. He presented the subjects with a standard array of paintings all composed by the same artist and a test array that included a third work by the artist who did the paintings in the standard array and three additional works by different artists. The subjects were asked to indicate which of the paintings in the test array were done by the artist who did the paintings in the standard array.

Results indicated that the ninth graders scored significantly better than the sixth graders, but that the scores for the first and the sixth graders were not significantly different. Secondly, the sixth-grade girls performed better than boys of the same group, though this result only approached significance. Lastly, more
significant age differences appeared in stimulus sets composed of mixture of portraits and landscapes as opposed to sets containing solely portraits or abstract work. This result indicates that subject matter may be an important clue for younger subjects. In general, younger subjects responded more quickly and in terms of overall impressions. Gardner mentions that this response style may be helpful, actually, when judging abstract work.

Younger subjects also had a tendency to base their choice on some trivial detail such as the presence of a lamp in one picture and not another or a moustache in one portrait and not the other. Also, younger subjects often persisted in matching one of the standard paintings with one of the test paintings. They were unable to consider the similarities and differences of the group of paintings as a whole. Lastly, the younger subjects had a tendency to pick paintings that they liked. In general, younger subjects were less introspective about their choices and, according to Gardner, tended to center on and be distracted by detail and subject matter.

Older subjects who were less successful often created some story that linked their choice with the standard array. According to Gardner, older subjects who were more successful were often more introspective about their
choices, spontaneously offering explanations for their decisions. They also seemed more aware that they were in a problem-solving situation. Both of these observations suggest that they were expressing what has been termed metacognition—an awareness of one's own cognitive processes. Older subjects also seemed more attuned to the emotional tones of the paintings, and based their choices on this information. Lastly, they were more apt to pause and consider the arrays before making their choices.

Studies Designed to Redirect Attention

Gardner (1970b) explored his finding that adolescents (age 14) were more successful at classifying paintings according to artist (style) than were children drawn from the first, third, and sixth grades. In particular, he was curious about how subject matter distracts the younger subjects. In an attempt to improve his subjects' scores, he devised two manipulations of the stimulus materials. In one study he inverted the paintings and did not allow the subjects to move them. Supposedly, this inversion would shift the subject's attention away from the subject matter so that they would then attend to those aspects of the painting, such as the textural qualities, associated with style. In the second study
Gardner presented only one painting in the standard array, after having eliminated the one in each of the original standard pairs that was judged to be more distracting in terms of subject matter or dominant figure. In both of these studies only the first and sixth graders were tested.

The changes in stimulus materials had different effects for the two age groups. In both variations the first graders performed worse on arrays composed solely of portraits or abstract work. However, on the arrays composed of a mixture of landscapes and portraits they performed the same in the "Inverted" condition and only a little better in the "Single Painting" condition, but, in general, the predicted effect was not strongly evident. Gardner notes that it is possible that the first graders were confused by the manipulations.

The sixth graders, in contrast, generally improved in both variations. Their performance was better on the mixed arrays, but remained the same on the abstract arrays. This result is not surprising, since abstract arrays do not have the miscue of specific subject matter. Gardner notes that these results, coupled with the fact that the sixth-grade girls in his first study approached adolescent performance, led him to suggest that such stimulus manipulations would be most beneficial
for subjects close to a developmental (maturational) shift; sixth-grade girls are much closer to puberty than sixth-grade boys.

In the previous study the stimulus materials appeared to direct the subject's attention away from the subject matter of the painting so that stylistic features might become more apparent. Gardner and Gardner (1970) attempted to determine whether the instructions subjects receive might also direct their attention to stylistic features. In each of two studies subjects were presented with stimulus sets composed of two paintings by one artist and two paintings by another artist. All sets were constructed so that subjects could easily group by figure (subject matter) or by style (artist).

In the first study, subjects were asked simply to sort the four paintings into two piles so that the two paintings in each pile were the ones they found "most similar" to one another. In the second study subjects were presented with stimulus sets, but much like earlier studies, they were told that two of the paintings were done by one artist and the other two by a second artist. The subjects were then asked to sort by artist, placing together paintings that they thought had been done by the same artist.
The Gardners discovered that, when the subjects were told to sort simply by "similarity," there were no significant differences across age groups. In other words, when subject matter and painting style are alternative means of grouping, subjects at all age levels tend to classify by subject matter. The Gardners note that "only a few idiosyncratic or aesthetically sophisticated subjects appear willing or able to suspend this strong classificatory tendency" (p. 14).

This strong proclivity to sort by subject matter does not mean necessarily that all subjects were unable to discern stylistic differences. The Gardners mention that "when subjects are explicitly instructed to group by style, most at or above the sixth grade level are able to take into account aspects other than subject matter. Only the first graders appear insensitive to the new set of instructions" (p. 14). Though none of the first graders were able to sort by style in this study, the Gardners mention that in Gardner (1970), young subjects responded much like the older ones when subject matter was not present as a miscue—in abstract paintings, for instance. There were no sex differences in either of these studies.
The Effects of Learning versus Cognitive Development

In an attempt to explore the relative importance of cognitive development versus learning, Gardner (1972) devised a study involving a seven-week training program to find out whether seven and ten year olds could learn to classify paintings consistently by style or by figure. Gardner used his "sort by similarity" task described earlier to elicit the subject's natural classificatory tendencies. For each stimulus set, three ways of grouping were possible: by style (artist), by figure (subject matter), or by some anomalous way that had nothing to do with style or figure.

After their natural way of classifying the paintings was determined, the subjects were divided into two groups: one which would be reinforced verbally for grouping by figure, and one which would be reinforced verbally for grouping by style. Both groups had an equal number of males and females and had the same proportion of initially high and low style responders. After six weeks of training, the sorting task was administered as a post test. Three weeks later, subjects were once again given the sorting task, but this time they were asked to match the paintings a different way, which was by figure for the style-trained group and by style for the
figure-trained group. The younger subjects were given four tasks of concrete operations.

The results of the first post-test revealed that the figure-trained group decreased its number of style responses and increased its number of figure responses. The style-trained group, in turn, decreased its number of figure responses and increased its number of style responses. These data suggest that subjects were able to respond to training and sort paintings according to a consistent criterion. There were significant age differences, however, which indicated that older subjects were more sensitive to the demands of the task.

If the mean number of style responses throughout training and testing are examined, it is evident that older subjects learned the style response rapidly, while the younger subjects improved more gradually. Also, even though both younger and older subjects in the style group decreased their number of "figure" responses during training, there was a persistent tendency for the younger style-trained subjects to continue making more "figure" responses than the older style-trained subjects. A frequency distribution that summarized the number of younger subjects at different levels of style response was strongly bimodal, suggesting that one group of
younger subjects were responding to training whereas another lacked a consistent basis for sorting of any kind.

The results of the second post-test indicated that subjects trained to sort by one criterion could switch their basis of sorting. As with the first post-test results, however, there were age differences; the response pattern was less clearcut for the younger subjects. First of all, the older figure-trained subjects had a tendency to produce more style responses on the second post-test than did the younger figure-trained subjects. Secondly, the younger figure-trained subjects produced significantly more "other" or anomalous responses on the second post-test than the older figure-trained subjects. It should be noted that the figure-trained subjects in general produced more anomalous responses than the style-trained subjects. Even so, the younger style-trained subjects also produced more anomalous responses than the older style-trained subjects. Lastly, age interacted with the amount of difference between the first and second post-tests for the figure responses by the style-trained group. Taken together, these results indicate that the ability to shift sorting criteria was greater for the older subjects.
The last major set of findings examined the relationship between concrete operations and style sensitivity. There was no relationship between class inclusion and style sensitivity, and a variety of analyses demonstrated no relationship between level of concrete operations and style sensitivity. Gardner gives the example of one Level III figure-trained subject who went from 19 figure responses on the first post-test to 16 style responses on the second post-test. But, at the same time, one of the figure-trained subjects went from 20 figure responses to 17 style sortings. Secondly, a number of concrete operational subjects never learned to sort by style, so Gardner concluded that concrete operations were neither necessary nor sufficient for style sensitivity.

The Gardners suggested that this study left little doubt that preadolescents can sort paintings in a consistent manner, and that at both age levels there were dramatic increases among the style-trained subjects in sorting by style, as well as a solidification of figural tendencies in the figure-trained group. It should be stressed, however, that even though Gardner was able to train subjects at both age levels to sort by style, some of the younger style-trained subjects did not respond to the training—as indicated by their persistent tendency
to group by figure. Secondly, his finding that younger figure-trained subjects made more anomalous responses on the second post-test suggested that they had not noticed the alternative way of grouping by style during their figure-training. Apparently the older figure-trained subjects noticed the style similarities spontaneously—as evidenced by their ability to switch criteria so easily on the second post-test. Gardner mentions that many of the younger subjects were shocked to learn of alternative ways of grouping, and expressed disbelief when the "special way" was shown. Many had difficulty abandoning their original approaches to the paintings.

Literature

Gardner and Gardner (1971) examined the ability of children in the first, third, sixth, and ninth grades to discern style in children's literature, as well as understand, create, and retell stories. The subjects were told two stories: one original and the other adapted from an old poem, both of which had been rewritten in two different styles. According to Gardner, the first style was reminiscent of fairy tales, with long complex sentences, remote setting, antiquated
dialogue, and a neutral pose toward reader and subject matter, whereas the second style was "more contemporary and colloquial, featured short pungent sentences, slang numerous exclamations, and asides by the narrator" (p. 42). Neither of the plots had endings and subjects were asked to generate endings for the stories and retell the story.

Transcriptions of the stories were scored in terms of length and nature of endings, degree of recall, originality, and sensitivity to style. The Gardners report that evidence of style sensitivity in the created endings was negligible. Only one subject at each of the three higher grade levels was judged definitely sensitive to style. The Gardners report that evidence of style sensitivity was much greater in the retellings than in the subject-created endings. However, they also note that this index of style sensitivity was probably confounded by memory; at each age level there were vast individual differences. Two first graders, four third graders, six sixth graders, and three ninth graders displayed a sensitivity to style in their retellings. These results should be interpreted with caution due to the problem of subject report; the subjects may have been able to distinguish the two styles, but they may not have been able to emulate them or reproduce them.
Although specific discussion will not be made of the typical performance at each age level in terms of other measures, it should be noted that the Gardners described the sixth grade as the "watershed of literary development." Subjects understood the stories, selected appropriate endings, and were in control of syntax and ideas. The Gardners reported that superior performances in most skills were found at this age level and that a majority of the sixth graders "combine the daring inventiveness of the younger child with the control and direction of the older child" (p. 45).

In contrast, the Gardners report that literary creativity in the older subjects appeared to be hindered by self-consciousness and self-criticism. "Most are already 'professional' in their approach, competent executing the task, but less able to preserve stylistic nuances than the sixth graders" (p. 45). In relationship to this finding the Gardners comment that the advent of formal operations, "which enable the child to fit different contents into the same operational structure, paradoxically seems to diminish the child's ability to remain within the style, rhythm, or tone created by the author" (p. 46).

Perhaps, though, the most important observation made by the Gardners from this study had to do with individual
differences. They noted that on every measure the variation within age groups was striking. At every age level there were subjects who performed like the average first grader, and one or two who performed as well as the most talented child.

Music

Gardner (1973) examined music style sensitivity in subjects aged 6, 8, 11, 14, and 18-19. Music style sensitivity was operationalized as the ability to judge whether or not two 15 second fragments of music came from the same composition. The compositions were drawn from the repertoire of classical music written between 1680 and 1960. Sixteen pairs of musical selections were taped with a 15 second period of silence in between each 15 second fragment of music. Eight of the pairs consisted of halves from the same composition (S), the other eight pairs consisted of halves from different compositions (D). Four of the S pairs and four of the D pairs were composed of music that was exclusively instrumental (I), having three or more instruments playing. The other four S and four D pairs were mixed (M); a soloist was singing with the orchestra in only the first or second half of
the pair. Gardner assumed that the solo voice against
the instrumental background would serve as a figural
miscue. In line with his earlier studies, Gardner
hypothesized that younger subjects would assume that "a
pair having a musical figure in one but not the other
half of the pair could not have come from the same
composition" (p. 69).

The results indicated significant age differences,
and females performed somewhat better than males, though
this result only approached significance. The three
oldest age groups did not differ in terms of style
sensitivity, but the 11 year olds had a slightly higher
score than either the 14 or 16 year olds. Both the 6 and
8 year olds scored significantly lower than the 11 year
olds, but they did not differ significantly from one
another. Gardner notes that the mean scores for all of
the groups, however, were above chance level. This
result is interesting since Gardner mentions that his
colleagues felt the test was too sophisticated, and
anticipated that subjects would have "grave difficulties"
with it.

Further analysis indicated that the two oldest age
groups performed better on those items that came from
divergent eras, and the younger subjects also expressed a
nonsignificant tendency in this direction. Also, t-tests
at each age level indicated that the three youngest age groups had a tendency to judge the halves of the mixed pairs as having come from different compositions. As hypothesized, the younger subjects appeared to be mislead or distracted by the "figural" aspects of the music. Lastly, there was a strong tendency for subjects 11 years old and younger to give more "different" than "same" responses, while the 14 and 18 year olds showed no trend in this direction. Gardner suggests that younger subjects may have set a higher standard for answering "same" because they had an insufficient appreciation for the differences possible within a composition, or that they thought the two halves had to be directly continuous.

Gardner makes some general observations about the conceptions of music held by each group. As mentioned above, the six-year-olds had strict requirements for a pair to judged "same." The pieces had to sound identical or directly continuous. Six of the six-year-olds could not give any explanations for their judgments; those that did spoke in terms of "high/low," "loud/soft" or "fast/slow" music. The eight-year-olds often mentioned more than one dimension, and they commonly described the music in terms of metaphors and used such adjectives as "preppy," "dull," "churchy," or "like a race horse."
Gardner reports that the eleven-year-olds mentioned several different variables in their explanations, such as instrumentation, rhythm, and texture. In general, "they were unencumbered by specific knowledge of musical forms or terminology, appeared to listen attentively to the music, to retain it without difficulty, to avoid facile categorization, and to think of the music in its own (rather than in personal or historical) terms" (p. 73).

In contrast, the older subjects had a tendency to speak in terms of formal schools of music (baroque, jazz) and to use formal terminology (harmony, melody, staccato). On the one hand, such sophistication aided the older subjects, but Gardner notes that at times it led to excessive introspection and interfered with the subject's ability to examine the music for its own sake--independent of any quick categorization. The relative lack of sophistication about the formal categories of music, coupled with the cognitive abilities and attentional capacity of the older subjects probably led to the slight advantage held by the eleven-year-olds.
Summary

Gardner’s first study suggested that only adolescents were sensitive to stylistic differences in painting, a finding which would have been in line with studies reviewed earlier by Matchoka (1966) and Frechtling and Davidson (1970). His subsequent studies, however, indicated that with certain stimulus manipulations and training, sixth graders—and to a certain extent even younger subjects—could become sensitive to stylistic differences in painting.

His studies of style sensitivity in literature and music indicated that sixth graders could discriminate style in these art forms without special training or stimulus manipulations; they were also slightly better than older subjects at discriminating style.

One of the most interesting findings from the Gardner and Gardner (1970a) study, however, was that when given instructions to sort simply by “similarity,” most subjects, no matter what their age, initially had a tendency to classify by subject matter. As stated in Chapter Two, E. J. Gibson (1969) notes that since the inexperienced perceiver has not yet differentiated all of the stimulus features, he or she makes judgments based on gross, obvious discriminations. From our discussion
of Gestalt psychology and our review of studies of perceptual development in Chapter Two, it is evident that one of our earliest stimulus differentiations is that of figure from ground. The tendency of subjects to group by figure in Gardner's studies may be a reflection of this early and strong compulsion to bisect the visual field into figures and ground. Since, for the most part, the subjects were not familiar with the paintings and had not yet fully differentiated them, they may have been sorting on the basis of figure not only because that was an easy, obvious basis of classification, but also because that may have been the only basis for classification available to them at that point in their style development.

The stimulus manipulations in Gardner (1970b), particularly inverting the paintings, appeared to direct the subjects' attention away from subject matter so that differentiation of other stimulus dimensions could begin. For older subjects this manipulation may not override the distracting influences of subject matter so much as it may accelerate the process of discovering other stimulus dimensions and, consequently, other means by which objects can be classified.

Results from Gardner's training study support this hypotheses. The older figure-trained subjects appeared to notice style as a basis of classification without
benefit of either reinforcement or stimulus manipulations; they were able to switch to style classifications almost immediately upon being asked to do so.

Younger subjects in Gardner (1970a) did not respond to the stimulus manipulations at all, and in Gardner (1970b), they did not respond to training as quickly as did the older subjects. Subject matter may have been so salient for the younger subjects that stimulus manipulations were not sufficient to override its distracting influence. In Piagetian terms, the child could not "decenter." As mentioned earlier, in the arrays composed of abstract work, when subject matter was not available as a miscue, the younger subjects performed about as well as the older subjects.

As stated in Chapter Two, the ability to decenter and the ability to be able to consider more than one aspect of the situation at the same time--on a perceptual and cognitive level--are both aspects of concrete operations. It would have been theoretically appealing if Gardner had found that those younger subjects who were not responding to training were those who had not completed development in the concrete-operational stage. However, we saw that level of concrete operations was not related to style sensitivity in painting.
It is possible that the younger subjects who did not respond to the stimulus manipulations and who did not respond to the training were those who had not yet developed some other ability that might support style perception. As mentioned earlier, E. J. Gibson (1969) suggested that different developmental levels of attention may affect the ability to perceive order in the environment. The capacity for selective attention might be one of a cluster of abilities that the individual must develop before he or she can learn to perceive style.

Developmental differences in cognitive style, particularly on Kagan's (1964) dimension of conceptual tempo, may also be related to attention and the development of style sensitivity. In Gardner (1970), younger subjects had a tendency to respond quickly and in terms of overall impressions; they were less introspective about their choices. In contrast, the older, more successful subjects seemed aware that they were in a problem-solving situation; they were more introspective and often offered explanations for their choices. Older subjects were also more apt to pause and consider the stimulus arrays before making their choices. In short, older subjects, as a group, were
expressing a "reflective" cognitive style as defined by Kagan (1964), whereas younger subjects appeared more "impulsive."

It is possible that the developmental changes in conceptual tempo interact with perceptual learning as defined by Gibson (1969). A certain degree of reflectivity may be necessary before differentiation of the stimulus can occur, or at least occur efficiently. Impulsive subjects often have trouble discerning the differences in the figures on Kagan's measure of conceptual tempo. It is only after they learn to pause and study the figures that these differences become apparent to them. Such developmental differences in conceptual tempo may be an another reason why Gardner's (1972) younger subjects did not respond to training as quickly or as well as did his older subjects.

In our review of Gardner's work thus far, we have been discussing individual differences in style sensitivity in terms of developmental differences. From this orientation, if a subject has not developed style sensitivity, it is because he or she has not fully developed other general cognitive skills, such as attention or memory, that would support the perceptual learning necessary for style discrimination. From this
standpoint, we are framing style sensitivity in terms of general development, though not cognitive development as defined by Piaget.

Generally speaking, Gardner's work does support the hypothesis that all individuals eventually develop a certain degree of style sensitivity. However, in all of his studies, Gardner noted striking individual differences among his subjects at each age level. Though these individual differences could have been due to differences in past experience with art, music, or literature, it is also possible that they result, in part, from individual differences in special ability. Certain individuals may be predisposed to respond to exposure to a particular art form or to specific training for style sensitivity. This predisposition may result from a specific set of traits or, in line with Gardner's more recent theory of multiple intelligences, a specific set of core abilities or information-processing mechanisms.

In summary, from Gardner's work it appears that for most people the ability to perceive style improves with age; to a certain extent it is a general developmental phenomenon. However, it also appears to be an individual-difference dimension; not all people develop
the sensitivity equally, and some people never do at all—even with specific training. Style sensitivity may result from special ability as well as perceptual learning, but from Gardner's work, it does not appear to be dependent upon cognitive developmental stages as defined by Piaget.
CHAPTER IV

STATEMENT OF THE PROBLEM

With the exception of music, Gardner has not examined the development of a sensitivity to stylistic differences in the performing arts. Specifically, he has not examined the development of an ability to discriminate different styles in dance. There are very broad stylistic differences among jazz, ballet, and modern dance, and within each one of these categories choreographers exhibit different styles. But stylistic differences in human movement are not restricted to dance. Even in the realm of mundane everyday movement, individuals exhibit different styles.

For instance, Wolff (1943) noted that people seem to be able to recognize friends by their walk. Obviously, individual style differences must be present in this universally human movement, and most people are, apparently, able to discern them. Cutting and his associates (Cutting & Koslowski, 1977; Cutting & Proffitt, 1981) have attempted to uncover the specific visual cues necessary for movement-style discrimination.
These researchers, however, have only studied this ability in adult populations, and Walk and Pick (1981) note the need to study the development of movement-style discrimination in children.

Neisser (1976) observes that infants prefer moving objects to stationary stimuli, perhaps because the infant can obtain more visual information from a moving object. Using methods similar to those employed by Cutting and his associates, Fox and McDaniel (1982) have discovered that infants prefer dynamic visual displays that are based on biological motion—specifically human movement—as opposed to random or nonbiological patterns. Infants appear predisposed to orient toward human movement. A rudimentary sensitivity to stylistic differences in human movement patterns may be innate, rather than an ability that is derived from experience. Indeed, it would be adaptive for infants to be sensitive to different styles of human movement, as individual movement style may be one of the many perceptual cues that they use to identify their primary caretaker, and therefore, primary source of food and comfort.

There are a scattered number of investigators who have noted not only individual styles of walking, but also different movement styles associated with personality differences (Allport & Vernon, 1933; North,
1975; Lowen, 1967, 1971), as well as broad cultural differences (Efron, 1941; Lomax, 1968). Movement style may be a primary means of individual and cultural identification, but one which has received very little attention in the psychological literature.

Age Differences in Choreographic Style Perception

Dance, as a sample of human movement and as an art form, represents movement that is much more complex than walking or gesturing. Like composers of music or fine artists, choreographers display unique styles in their creations. Anyone familiar with Martha Grahm's repertoire, for instance, would never confuse her works with dances choreographed by Twyla Tharp. In the same vein, people writing about ballet have spoken for years about the classic "Ballanchine Line."

Does the rudimentary sensitivity to human movement patterns displayed by infants develop to the point where stylistic differences of more complex movements such as dance can be discerned? In an attempt to answer that question, it is proposed that Gardner's work on the development of a sensitivity to artistic style be extended to the performing art of dance, both as a means
to see if the perception of choreographic style follows the same developmental trend as does the perception of artistic style in those media studied by Gardner and to see if children are sensitive to stylistic differences in dance as a subset, though a specialized one, of human movement patterns in general.

It is possible that a sensitivity to movement styles may decrease with age, especially as nonverbal, concrete thinking gives way to symbolic, abstract thought. It is expected, however, that choreographic style sensitivity is related to artistic style sensitivity in general and follows a similar developmental progression. Therefore, the following hypothesis will be tested:

I. Adult and sixth-grade subjects will perform significantly better on a measure of choreographic style sensitivity than will first graders.

Style Development as Perceptual Learning

Since Gardner did not find that sensitivity to artistic style in painting was related to cognitive development as defined by Piaget, and since Gardner was
able to train subjects to classify paintings by style, it appears that the development of style sensitivity may involve perceptual learning as defined by E. J. Gibson. This possibility is especially evident when we consider that the subjects in Gardner's training study who were not specifically rewarded for style classifications appeared to learn them merely as a result of repeated exposure to the paintings. Therefore, it is hypothesized that:

II. There will be a significant positive correlation between an ability to discern differences in choreographic style and past experience viewing dance.

III. There will be a significant positive correlation between an ability to discern differences in choreographic style and past training in dance.

If a perceptual-learning model of style-sensitivity development is correct, repeated exposure to dance through viewing dance and dance training allows individuals to differentiate the stimulus dimensions that define choreographic style in general and the distinctive features of specific styles. Exposure to other forms of
human movement that are quite different from dance, such as traditional sports like basketball and football, should not improve choreographic style discrimination since the stimulus dimensions and distinctive features present in those movement patterns are specific to those classes of movement only. Therefore, it is hypothesized that:

IV. There will be no relationship between an ability to discern differences in choreographic style and past experience viewing sports.

V. There will be no relationship between an ability to discern differences in choreographic style and past training in sports.

Cognitive Style Supporting Perceptual Learning

Kagan’s cognitive-style dimension of impulsivity versus reflectivity, as measured by his Matching Familiar Figures Test (MFFT), may shed some light on the type of perceptual learning and information processing that is involved in the development of style sensitivity. In general, studies have suggested that reflective children
show a superior performance on tasks which require a detailed visual analysis of distinctive stimulus features in that they concentrate, in a systematic fashion, on homologous parts of the variants (Measer, 1976; De V. Peters, 1979; Hetherington & Parke, 1979).

Odem, McIntyre, and Neale (1971) examined the relative performance of reflectives and impulsives within the context of two different types of perceptual learning paradigms: prototypic learning (Solley & Murphy, 1960) versus distinctive-feature learning (Pick, 1965). The reflectives performed better than the impulsives in both learning conditions. However, the reflectives performed better in the distinctive-feature condition than in the prototype condition. Odem et al. suggest that their study confirms Pick's original findings that perceptual learning depends more on the isolation of distinctive features than on the formation of a prototype.

Odem et al. did not find any results indicating that impulsives use a prototypic approach to perceptual learning and information processing. Zelkniker and Jeffrey (1976), however, noted that reflectives make fewer errors on the MFPT when the change in the figure is located on the inside than when it is located on the contour. Impulsive subjects show the opposite profile. This result supports the common finding that reflectives
are attuned to detail, but it also points to the possible use of an overall prototype or Gestalt by the impulsives.

Hetherington and Parke (1979) suggest that the relative performance of impulsives versus reflectives may depend upon the nature of the task—whether it requires a global or an analytic approach. Clearly, perceptual learning may not always depend more on the isolation of distinctive features than the formation of prototypes, as Pick (1965) and Odem et al. (1971) suggest, unless that is what the task demands. In some instances prototypic learning or the perception of Gestalten may be more important.

Ault, Crawford, and Jeffrey (1972) examined the visual scanning strategies of not only impulsive and reflective subjects, but also "fast-accurate" and "slow-inaccurate subjects"—the two groups of subjects normally excluded from consideration in traditional studies of conceptual tempo. Ault et al. found that reflective and fast-accurate groups appear to achieve low error rates by spending a larger proportion of fixations on "returns" to the standard after looking at a variant. Impulsives and slow-inaccurate subjects are less systematic and make a smaller number of "returns." The fast-accurate subjects are different from the reflective subjects in that they look at fewer of the variants.
Instead of systematically eliminating all of the incorrect standards before making their choice, like the more cautious reflectives, they seek to match the standard by making a large number of comparisons between the standard and just some of the variants.

One of the reasons why the "fast-accurate" and "slow-inaccurate" groups have not been studied is that the manner in which the reflective and impulsive groups are formed tends to lead to a small \( n \) for the fast-accurate and slow-inaccurate groups. Messer (1976) warns against the loss of information and other problems associated with the dichotomization necessary in traditional studies of reflectivity and impulsivity. He suggests that the error and latency scores from Kagan's measure be used instead, since they are continuous variables.

Salkind and Wright (1977) have provided a solution to the problems associated with dichotomization by providing an alternate scoring procedure that yields continuous scores on two dimensions: impulsivity and efficiency. Impulsivity is defined as a dimension of individual differences ranging from slow-accurate to fast-inaccurate performance on Kagan's measure of conceptual tempo. Efficiency is defined as a dimension conceptually and computationally orthogonal to impulsivity, along which
individual differences range from fast-accurate to slow-inaccurate performance. Given the way the scores are computed (see Appendix A), high positive scores on the impulsive dimension indicate impulsivity, whereas high negative scores indicate reflectivity. High positive scores on the efficiency dimension indicate inefficiency, whereas high negative scores indicate efficiency.

The literature on the relationship between conceptual tempo and perceptual learning indicates that reflectivity is associated with the Gibson distinctive-feature model. We have suggested that style sensitivity develops as the result of perceptual learning as defined by Gibson in which the subject comes to differentiate the distinctive features of different choreographic styles. If a reflective cognitive style is necessary for perceptual learning to occur, then the development of reflectivity may be necessary for the development of style sensitivity.

This relationship between reflectivity and perceptual learning may provide an explanation for why the younger subjects in Gardner's training study did not respond to training as well as the older subjects. Gardner noted that his younger subjects and his less successful older subjects appeared more impulsive in their approach to the
style-discrimination task. Gardner's younger subjects may not have achieved a sufficient level of reflectivity to support the perceptual learning necessary for the development of style sensitivity. As stated earlier, the increase in reflectivity with age may be one of the developmental changes necessary for style sensitivity to emerge. Therefore, it is hypothesized that:

VI. There will be a significant negative correlation between the perception of choreographic style and the dimension of impulsivity as defined by Salkind and Wright (1977).

Style Sensitivity as an Individual Difference

As we have seen, Gardner suggests in his various writings that the development of style sensitivity, and aesthetic sensitivity as well, is universal, whether it is explained in terms of cognitive developmental stages or perceptual learning. Similarly, when Walk (1967) and Tighe (1968) demonstrated that style sensitivity could be taught within the context of a concept learning paradigm, they too suggested that it was an ability that could be learned by all. As we have seen, Gardner found no
relationship between style sensitivity and cognitive developmental stage as defined by Piaget, and he repeatedly notes that despite the general increase in style sensitivity with age, there were striking individual differences between subjects at each age level. Walk and Tighe made similar observations, noting that some individuals responded to training extremely well, whereas others did not at all.

The individual differences observed by Gardner, Walk, and Tighe could have resulted from differences in general ability. Those subjects that did not respond to training were, perhaps, not as intelligent as those that did. Perhaps these subjects would score higher on measures of crystallized intelligence as defined by Horn or general intelligence as defined by Spearman.

Of course, a minimum level of intelligence is necessary for any learning to occur. However, as noted earlier, Feldman (1980) suggests that aesthetic sensitivity does not appear to be related to general intelligence. Even though style sensitivity in the arts may show developmental progression, and even though it may be refined by training or experience, it may also be related to a specific set of cognitive abilities, perceptual skills, or core operations as defined by Gardner in his theory of multiple intelligences. Such
abilities, skills, or operations might enhance perceptual learning; an individual with a particular profile of scores on this set of individual-difference measures might respond to training better than another individual with a different profile of scores.

To determine the importance of general versus specific ability in the development of style sensitivity, it is proposed that the relationship between performance on the Wechsler scales and an ability to discern choreographic style be explored. If style sensitivity is related to a small number of the subscales as opposed to the overall intelligence quotient, we would find support for the suggestion that the development of style sensitivity is affected by special ability as opposed to its being just another manifestation of general ability. No relationship is expected between style sensitivity and the overall intelligence quotients derived from the Wechsler scales. The relationship between style sensitivity and specific subscales of the Wechsler, however, may help us understand the perceptual and cognitive abilities associated with style sensitivity.

Visual-Spatial Skills Associated with Style Sensitivity

Since viewing and creating art and dance appears to involve nonverbal visual-spatial abilities, one might
expect style sensitivity in the arts to be related to some of the performance subscales of the Weschler battery as opposed to the verbal subscales. Matarazzo (1972) comments that a variety of researchers have reported that artisans and creative people do much better than other individuals on both the Block Design and Object Assembly subscales.

Matarazzo, however, makes an important distinction between the two types of perceptual processing that appear to be involved in these two tasks. He notes that individuals who do best on Block Design are not necessarily those who see the pattern as a whole but more often those who are able to break it up into small portions. In contrast, individuals who do well on Object Assembly have an immediate perception of the whole accompanied by an understanding of the interrelationship of the parts. Highly successful subjects are able to look at the parts and very quickly determine what they compose—"oh, it's an elephant." Once this Gestalt has been discovered, these subjects are able to use it as a framework to guide their rapid assembly of the parts; their ability to deal with part/whole relationships enhances their performance.
Subjects who are not as successful on Object Assembly often focus so much on the details of the pieces that they do not have any idea what it is they are putting together until they have finished their assembly. They appear to be unable to shift attention from the parts to the whole and lack an understanding of the interrelationship of the parts to the whole.

It has been suggested that the perception of style involves not only an ability to differentiate specific stimulus features but also an ability to see the characteristic interrelationship of those features which defines a specific style. Therefore it is hypothesized that:

VII. There will be a significant positive correlation between perception of choreographic style and performance on the Object Assembly subscale of the Wechsler battery.

Picture Completion is a second performance subscale that may be related to the development of style sensitivity. Matarazzo (1972) states that for individuals to see what is missing from any particular picture, they must first know what the picture represents, but, in addition, they must realize that the
missing part is essential to the form or to the function of the object or picture. He states that in a broad sense the test measures the ability of the individual to differentiate essential from nonessential details. From our discussion of perceptual learning we have seen an important aspect of that process involves the capacity to attend to the relevant features or dimensions of the stimulus while learning to disregard the irrelevant characteristics. To the extent that this process and the ability tapped by Picture Completion are related, it is hypothesized that:

VIII. There will be a significant positive correlation between the perception of differences in choreographic style and the Picture Completion subscale of the Wechsler battery.

Verbal Skills Associated with Style Sensitivity

A relationship between verbal skills and style sensitivity is not immediately evident. Gardner (1970), however, noted that the sixth-grade girls in his study were able to discriminate style almost as well as the adolescent subjects could. In several of his subsequent studies, female subjects performed better than males, though this result was not always significant. Since
females as a group are typically superior in language skills and often not as proficient at visual-spatial skills, it might be possible that a sensitivity to stylistic differences in the arts (but not necessarily creativity within the arts) is associated with some form of verbal skill.

Related to this sex difference in ability, it is interesting to note Waber's (1976) finding that early maturing females performed better on verbal tasks than early maturing males or late maturing females. In addition, early maturing males performed better than late maturing males. Gardner's sixth-grade girls were close to puberty if not already there. Sixth-grade males, in contrast, typically have not reached puberty. Gardner suggested that subjects close to maturation may be more responsive to training, but he did not indicate why. It is possible that the superior verbal skills associated with early maturity may have been what allowed the sixth-grade females in his study to perform well on his measure of style sensitivity without benefit of specific training.

One of the verbal subscales on the Wechsler that may be associated with the development of style sensitivity is Digit Span. Cronbach (1970) suggests that Digit Span may be nothing more than a measure of short-term memory.
Indeed, Anastasi (1976) reports factorial analyses of the WAIS that suggest that Arithmetic and Digit Span form a "memory" factor, but she also suggests that an ability to concentrate and to resist distraction may also be represented by this factor. In a factor analysis of the WISC subscales and measures of field independence, Goodenough and Karp (1961) report an "attention/concentration" factor composed of high loadings for Digit Span, Arithmetic, and Coding. Kaufman (1975, 1979) provides evidence from a variety of analyses that show Digit Span loading highly on a "freedom from distractibility" factor composed of Arithmetic, Digit Span, and Coding. Kaufman (1979) suggests that Digit Span is a measure not only of memory but also of attention, ability to concentrate, and sequencing ability.

Since dance is not only a visual-spatial phenomenon but also, like music, a temporal one, memory may be very important for an ability to discern choreographic style to develop. Unlike the comparison of two paintings, which can be done simultaneously, the comparison of dance or music must be done sequentially. Walk (1978), suggests that the introduction of memory, or a successive factor, into the visual situation may influence the way complex stimulus features are learned. As mentioned
earlier, E. J. Gibson suggests that attention may influence the efficiency of perceptual learning. It is very likely that though memory and attention do not explain perceptual learning per se, they are abilities that support it. Therefore, it is hypothesized that:

IX. There will be a significant positive correlation between the ability to perceive choreographic style differences and the Digit Span subscale of the Wechsler battery.

The linguist Benjamin Whorf provides us with an intriguing, though controversial, hypothesis concerning the relationship between language and perceptual learning. The Whorfian Hypothesis, as it has come to be known, suggests that language directly influences thought and perception (Whorf, 1961). In other words, to the extent that the language provides highly differentiated words and categories to describe and classify things and qualities of things in the world so is the perception of those things and qualities highly differentiated. The classic illustration of the Whorfian Hypothesis is that since Eskimos are raised in a linguistic environment rich with terms indicating different qualities of snow, they
learn to make finer discriminations of snow than individuals from other cultures.

One of the criticisms of the Whorfian Hypothesis has been that even the most differentiated of languages is still inadequate to describe and categorize the world in its full complexity, and to the extent that the language limits or influences perceptual discrimination, perception becomes distorted and stereotyped (Gibson, 1966). This interpretation of the hypothesis implies that if you don’t have a word for it you can’t see it, or at least you can’t see it accurately.

This is likely an overextension of the hypothesis. At some point individuals in the culture make fine perceptual discriminations without the benefit of words to label them. It seems obvious that the creation of labels for stimulus qualities has to come, out of necessity, after the perception of those qualities. The most important point of the Whorfian Hypothesis is that once the culture makes labels and categories available to the perceiver, perceptual learning may be accelerated or made more efficient by directing attention or enhancing memory of what is seen. This does not mean that the labels are necessary for the perceptual learning to occur, nor does it mean that what is perceived without a label is distorted.
As E. J. Gibson (1969) points out, "the fact that a man does not have words for several different kinds of snow does not in itself demonstrate that he is unable to perceive differences between them. That words may direct us to look for and discover features which we might not otherwise notice is, on the other hand, entirely likely" (pg. 158). J. J. Gibson (1966) agrees that language can direct attention to important stimulus features, but he suggests another function of language as it enhances perceptual learning:

The learning of the language code as a vocabulary should be distinguished from the child's learning to consolidate his knowledge by prediction. He gets information first by focusing, enhancing, detecting, and extracting it from nonverbal stimulation. Later, the extracting and consolidating go on together. Perceiving helps talking, and talking fixes the gains of perceiving. It is true that the adult who talks to the child can educate his attention to certain differences instead of others. It is true that when a child talks to himself he may enhance the tuning of his perception to certain differences rather than others. The range of possible discriminations is unlimited. Selection is inevitable. (pg. 282)

To the extent that language helps us "consolidate" or "fix the gains of perception," it helps us remember what is seen and perhaps influence what we look at next. In this sense, language may also form a cognitive set for what is perceived. This is one of the conclusions drawn
The easy accessibility of simple and separate names for the different kinds of snow may facilitate the Eskimos' recognition of and perhaps discrimination between them. Though others may be capable of the same behavior, they are, as a result of the set-inducing properties of their language, less likely to make the Eskimos' spontaneous responses to snow. Language, thus, may implicitly influence set, and hence partly shape people's immediate perception of their environment. To the extent that set, broadly defined, can influence perception, language may reasonably be expected to exert the same influence. From this point of view, Whorf's hypothesis becomes a special case of the more general postulation of a relation between set and perception. (p. 354)

Whether one sees language as directing attention to certain stimulus dimensions, as do the Gibsons, or, like Dember, as providing a cognitive set, it would seem likely that language skills may play a part in the development of a sensitivity to stylistic differences in dance. If, upon seeing a complex stimulus like dance, individuals are able to label, describe, or classify some of the qualities or distinctive features of that dance, they may be better able to remember and focus their attention on them upon seeing another dance. To the extent that individuals may have a descriptive categorical system specific to the qualities of dance (see Appendix E), this process may be enhanced further.
Therefore, language skills, and a rich vocabulary of descriptive words in particular, may also support the perceptual learning involved in the development of style perception.

The three verbal subscales on the Wechsler that are most directly related to language are Vocabulary, Similarities, and Comprehension. Anastasi (1976) and Kaufman (1979) both cite several factor-analytic studies that indicate these three subscales clustering together to form a single factor. All three scales appear to tap verbal skills associated specifically with language as opposed to those verbal skills tapped by Arithmetic, Digit Span, and Information. Although general language skills associated with Similarities and Comprehension may also be necessary to mediate memory, classify objects, and focus attention in the perception of style, it is specifically hypothesized that:

X. There will be a significant positive correlation between the perception of choreographic style and the Vocabulary subscale of the Wechsler battery.
Style Sensitivity as a Complex Process

From our discussion of the development of style sensitivity, it appears that the process is better modeled from a combination of several theoretical viewpoints as opposed to just one. It was suggested that perceptual learning as defined by the Gibsons is involved as the individual discriminates the stimulus dimensions that define choreographic styles in general and the distinctive features of one artist's style in particular. However, it was also suggested that specific perceptual and verbal skills, as well as a the cognitive style of reflectivity, supports this perceptual learning. In which case, the development of style sensitivity is also related to the development of special abilities and individual-difference dimensions. Lastly, it was suggested that style discrimination involves the perception of an invariant relationship among distinctive features, and it involves an understanding of part-whole relationships on both a perceptual and cognitive level.
Given these theoretical considerations, it is hypothesized that:

XI. A model of the development of style sensitivity that includes dance-experience variables and individual-difference variables will account for significantly more variance than one which includes dance-experience variables alone.
CHAPTER V

METHODOLOGY

Subjects

Subjects for this study were 20 males and 20 females at each of three age levels: first graders, sixth graders, and adults. The elementary school children were from a school district on the outskirts of Columbus that served families from a variety of socio-economic backgrounds. The first graders ranged from 6.26 to 7.93 years of age, with a mean age of 7.53. The sixth graders ranged from 11.35 to 13.40 years of age, with a mean age of 12.28. The adult subjects were recruited from introductory psychology courses at the University and received extra credit for their participation in the study. Since approximately half of these subjects were drawn from summer-session classes, they included continuing education students and returning students, and they ranged from 17.97 to 30.28 years of age, with a mean age of 20.06. Like the elementary school subjects, they came from a wide variety of socio-economic backgrounds.
Measures

Style Measure

Following Gardner's (1972) study of sensitivity to styles in music, a same/different task was created. It comprised 14 stimulus pairs created from videotaped excerpts of 21 different dances by different choreographers. Seven of the pairs consisted of halves drawn from the same composition, while the remaining seven pairs consisted of halves each drawn from compositions choreographed by different choreographers. The dances represented a broad range of modern dance, selected from works by professional choreographers, dance faculty, and student projects.

Each stimulus pair consisted of two halves approximately 19 seconds each in duration, separated by a four second waiting period in which the screen went to black. Every attempt was made to edit each half of the stimulus pair at the end of a movement phrase so as to eliminate the distraction of discontinuity. In the "same pairs," the selections were presented in reverse order from the order in which they originally appeared in the dance. This was done to ensure any break in the thematic line would not lead to correct "same" judgments based solely on cues of continuity.
The editing was done on a high-speed videoediting machine which allowed edits within a sixtieth of a second. Each stimulus pair was preceded by a computer-generated five-second countdown in which the subject saw in succession the numbers "5," "4," "3," "2." On the one-second count the screen went to black, and on the zero count the first part of the stimulus pair began.

Since many dancers have individual movement styles that are often evident across choreographic style, individual movement style of the dancer was controlled by having each of the selections performed by one highly competent dancer with a wide movement repertoire. Each choreographer taught the dancer the selection from the dance and rehearsed her until she had mastered the movement and style to the choreographer's satisfaction. At this time the selection was videotaped and the dancer learned a new selection from a different dance.

For the videotaping of each selection, the dancer wore a white body leotard and danced on a stage with a black floor and black background. The selections were videotaped onto 3/4-inch color tape to ensure clarity and then translated onto 1/2-inch tape during the editing process. The stimulus pairs were shown with a portable videoplayer on a portable black and white television.
Since there was some concern about the difficulty of the discriminations being asked of the subjects, an initial edit was made and the measure was tested on a pilot group of 73 subjects. This version of the measure yielded a range of performance from 36% to 86% correct.

After the elimination of several particularly difficult items, a second version of the measure was created and tested on 40 subjects who were retested after two weeks. This version of the measure yielded a range of performance from 50% to 95% correct with a test-retest reliability of .85 (p < .0001). In most cases, subjects missed exactly the same items on the retest as they had on the first test, though they reported having no memory as to how they had responded.

Matching Familiar Figures Test (MFFT)

The children's and adult forms of Kagan's (1965) match-to-sample measure of conceptual tempo were employed to assess reflectivity/impulsivity. Each item contains a standard figure, a line drawing of a common object, and six comparison figures, all but one of which differ from the standard in some detail. The subject is asked to select the variant that matches the standard exactly. Time to the first response to each of the 12 items and total number of errors were recorded.
Wechsler Scales

Both the Wechsler Intelligence Scale for Children (WISC-R) and the Wechsler Adult Intelligence Scale (WAIS) were used as measures of general ability versus specialized intelligence. The battery comprises six different verbal subscales and five performance scales. All of the scales were administered; coding was used instead of mazes on the WISC-R.

Movement Experience Checklist (MEC)

An assessment of viewing as well as participating in sports, dance, and other types of movement was obtained through a structured interview with the subject based on a Movement Experience Checklist (MEC) developed by the investigator (see Appendix B). For each subject, an Overall Movement Experience score was obtained based on an Overall Dance score, an Overall Sports score, and an Other Experience score, which included questions about more unusual types of movement training and experience such as martial-arts training or mime. The dance and sports scores were further broken down into scores for Dance Viewing, Dance Participation, Sports Viewing, and Sports Participation.
Procedure

All tests were administered to each subject individually in two different sessions approximately a week to two weeks apart. During the first session the experimenter interviewed the subject using the MEC. The subject was also asked about general interest and past training in music; the older subjects were asked about their major field of study.

At the completion of the interview, the style-perception task was explained to the subject (see Appendix C for the full directions to the subject). The younger subjects were asked to paraphrase the instructions and the older subjects were asked if they had any questions. All subjects were given two practice items and asked for reasons for their answers. If the subject missed either of the the practice items, he or she was shown that item until the difference or similarity between the two parts of the pairs was discerned. At the end of each stimulus pair, the experimenter stopped the tape, waited for the subject's answer, and asked the subject the reason for his or her answer. The subjects were not given specific feedback
concerning the correctness of their answers, but they were generally encouraged.

At the conclusion of the style-perception task, the subjects were administered Kagan's measure of conceptual tempo. Both latency to first response and total number of errors were recorded. From these scores each subject's level of impulsivity and efficiency as defined by Salkind and Wright (1977) was calculated (see Appendix A for formulas).

Approximately two weeks after the first session of testing, the subject met with either the investigator or a research assistant and was administered the Wechsler scales. The first session lasted approximately one hour; the second session lasted approximately one and a half hours.

Statistical Analysis

To determine whether or not there were sex differences on the style measure, t-tests were performed at each age level. Males and females were grouped together in all subsequent analyses pending nonsignificant sex differences on the style measure.
In order to test the first hypothesis concerning age differences, a univariate analysis of variance (ANOVA) was performed, with age level as the independent variable and scores on the style perception measure as the dependent variable. Since dance experience was significantly related to style perception at the sixth-grade and adult age levels, an analysis of covariance (ANCOVA) was performed with overall dance experience as the covariate, age as the independent variable, and scores on the style measure as the dependent variable. The ANCOVA was performed to determine the presence of age differences independent of dance experience.

In order to test the second through fifth hypotheses concerning the relationship between dance and sports experience and style perception in dance, Pearson product-moment correlations were calculated between each of the subscores generated from the movement experience checklist and the scores on the style measure for each age group. To explore the interrelationships among the movement-experience checklist subscores, as well as their relationships with sex and age, a correlation matrix of Pearson product-moment correlations was generated with these variables for each age group.
In order to test the sixth hypothesis concerning the relationship between impulsivity and reflectivity as defined by Salkind and Wright (1977), Pearson product-moment correlations were calculated for the impulsivity scores and the style-measure scores for each age group. To examine these relationships independent of dance experience, partial correlations were also calculated between impulsivity and style perception with Overall Dance Experience partialled out.

In order to test the seventh through the tenth hypotheses concerning the relationships between the scores from the Wechsler scales and style measure, first-order Pearson product-moment correlations, as well as partial correlations controlling for Overall Dance Experience were calculated for each of the Wechsler scales and the style measure.

In order to test the eleventh hypothesis concerning the predictive power of dance experience in conjunction with individual-difference variables, simultaneous (unordered) multiple-linear regressions were performed. Only those variables that were significant at the first-order level or significant when Overall Dance Experience was partialled out of the relationship were considered for the analysis.
CHAPTER VI
RESULTS

Preliminary Analyses

Preliminary analysis of sex differences in style perception was performed for all three groups. The results of t-tests indicated that there were no sex differences on the style measure for the adults (t = 1.03, p < .31), the sixth-graders (t = 1.08, p < .29), nor for the first graders (t = 0.10, p < .91). Consequently, for all subsequent analyses, male and female subjects were grouped together.

The Pearson product-moment correlations between age and style perception were calculated within each age group. For the adults, age was significantly related to style perception (r = .45, p < .01). There was no relationship between age and style perception for the sixth-grade group (r = .08). Within the first-grade group, the relationship between age and style perception was in the positive direction but not statistically significant (r = .21, p < .19).
Additional preliminary analyses included intercorrelations among the subscales of the Wechsler; the correlations between each of the Wechsler subscales with impulsivity, efficiency, age, and sex for each age group; the intercorrelations among the subscores from the MEC, age, and sex for each age group; and the correlations between each of the subscales of the Wechsler with the dance-experience subscores from the MEC for each age group. Tables for each of these analyses appear in Appendix D.

Analysis of Variance

A one-way ANOVA of the style measure scores for all subjects revealed significant age differences (F = 27.40, p < .0001). A complete summary of the analysis is presented in Table 1. The mean number of correct responses and the standard deviations for each age level are presented in Table 2. A Duncan multiple-range test indicated that both the sixth graders and the adults were performing better than the first graders (p < .05). The adult group mean was slightly higher than the sixth-grade group mean, but this difference was not significant.
Table 1
ANOVA of Style Perception Scores by Age

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Level</td>
<td>128.217</td>
<td>2</td>
<td>64.108</td>
<td>27.40 *</td>
</tr>
<tr>
<td>Error</td>
<td>273.750</td>
<td>117</td>
<td>2.340</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>401.967</td>
<td>119</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .0001
Table 2

Means and Standard Deviations of Style Perception Scores by Age Level

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>6th graders</th>
<th>1st graders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>9.80</td>
<td>9.63</td>
<td>7.53</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.54</td>
<td>1.61</td>
<td>1.43</td>
</tr>
</tbody>
</table>

N = 40 for each age group
Table 3

**ANCOVA of Style Perception by Age**
(Covariate: Overall Dance Experience)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Level</td>
<td>34.001</td>
<td>2</td>
<td>17.001</td>
<td>8.97 *</td>
</tr>
<tr>
<td>Dance Experience</td>
<td>53.919</td>
<td>1</td>
<td>53.919</td>
<td>28.45 **</td>
</tr>
<tr>
<td>Error</td>
<td>219.832</td>
<td>116</td>
<td>1.895</td>
<td></td>
</tr>
</tbody>
</table>

* p < .0002
** p < .0001
Table 4
Adjusted Means and Standard Errors for Style Scores by Age
(Covariate: Overall Dance Experience)

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>6th Graders</th>
<th>9th Graders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>9.43</td>
<td>9.42</td>
<td>8.10</td>
</tr>
<tr>
<td>Standard Error</td>
<td>.23</td>
<td>.22</td>
<td>.24</td>
</tr>
</tbody>
</table>

N = 40 for each age level
Analysis of Covariance

Since Overall Dance Experience from the MEC was related to style perception (see Table 5), an ANCOVA was performed on the style scores with Overall Dance Experience as the covariate. The covariate was highly significant ($F = 28.45, p < .0001$), but age remained significant as well ($F = 8.97, p < .0002$). A summary of the analysis is presented in Table 3. The adjusted means and their standard errors are presented in Table 4. As with the observed means, the adjusted means for the adult and sixth-grade groups were both significantly higher than the adjusted mean for the first-grade group ($p < .0003$), but they were not significantly different from one another.

Movement Experience Correlations

Adults

The correlations between style perception and scores from the MEC appear for all age levels in Table 5. For the adults, Dance Viewing had the highest correlation with style perception ($r = .61, p < .0001$), followed by
Table 5
Correlations between Style Perception and Subscores of the Movement Experience Checklist

<table>
<thead>
<tr>
<th></th>
<th>Adults</th>
<th>6th Graders</th>
<th>1st Graders</th>
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</thead>
<tbody>
<tr>
<td>Overall Movement</td>
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<td>.32</td>
<td>.09</td>
</tr>
<tr>
<td>Overall Dance</td>
<td>.59 ****</td>
<td>.41 **</td>
<td>.26</td>
</tr>
<tr>
<td>Dance Viewing</td>
<td>.61 ****</td>
<td>.38 **</td>
<td>.17</td>
</tr>
<tr>
<td>Dance Participation</td>
<td>.36 *</td>
<td>.36 *</td>
<td>.29</td>
</tr>
<tr>
<td>Social Dance</td>
<td>.31 *</td>
<td>.38 **</td>
<td>.21</td>
</tr>
<tr>
<td>Dance Training</td>
<td>.26</td>
<td>.23</td>
<td>.10</td>
</tr>
<tr>
<td>Overall Sports</td>
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<td>.02</td>
<td>-.06</td>
</tr>
<tr>
<td>Sports Viewing</td>
<td>-.05</td>
<td>-.20</td>
<td>-.03</td>
</tr>
<tr>
<td>Sports Participation</td>
<td>-.21</td>
<td>.08</td>
<td>-.05</td>
</tr>
<tr>
<td>Other Experience</td>
<td>.31 *</td>
<td>.21</td>
<td>-.06</td>
</tr>
</tbody>
</table>

* = p < .05
** = p < .01
*** = p < .001
**** = p < .0001
Overall Dance Experience \( (r = .59, p < .0001) \). Overall Dance Participation was also significant \( (r = .36, p < .05) \), though of its two subscores, only Social Dance was significant \( (r = .31, p < .05) \). Formal Dance Training alone, although in the positive direction, was not significant \( (r = .26, p < .10) \).

None of the sports subscores was significant, and all of them were in the negative direction. Other Experience was barely significant \( (r = .31, p < .05) \), and Overall Movement Experience approached significance \( (r = .30, p < .05) \).

**Sixth Graders**

For the sixth graders, Overall Dance Experience had the highest correlation with the style measure \( (r = .41, p < .01) \). Though not as high as it was for the adult group, the correlation between Dance Viewing and the style measure was significant \( (r = .38, p < .01) \). The correlation between Overall Dance Participation and style perception for the sixth graders was the same as that found in the adult group \( (r = .36, p < .05) \). The correlation between the style measure and Social Dance, however, was higher for the sixth graders \( (r = .38, p < .01) \). The correlation between Other Experience and style perception, though in the positive direction, was
not significant. As in the adult group, the correlation coefficients for Formal Dance Training and the sports subscores were not significant.

First Graders

None of the correlations between the movement experience subscores and the style measure was significant for the first graders. The correlation coefficient for Dance Participation was close to being significant, however ($r = .29, p < .06$). The other dance scores were in the positive direction, and the sports scores were close to zero and negative.

Wechsler Scale Correlations

Adults

The correlations between the individual scales of the WAIS and style perception for the adults are listed in Table 6. Since Overall Dance Experience was highly correlated to style perception, the partial correlations (first order) between style perception and each of the Wechsler scales, with Overall Dance Experience as the covariate, are also presented in Table 6.
Three of the verbal scales show a relationship with style perception at the zero- or first-order level. Vocabulary was significantly related to style perception \( (r = .40, p < .01) \). When Overall Dance Experience was partialled out of the relationship, the correlation coefficient decreased but remained significant \( (r = .37, p < .05) \). Comprehension had a significant correlation with style perception at the zero-order level \( (r = .36, p < .05) \), but the correlation did not remain significant when Overall Dance Experience was partialled out of the relationship \( (r = .28, p < .05) \). The Similarities correlation was barely significant at the zero-order level \( (r = .31, p < .05) \), but increased at the first-order level \( (r = .33, p < .05) \).

None of the other subtests was significant at the zero-order level. Object Assembly was the only other subtest to become significant once Overall Dance Experience was partialled out of the relationship \( (r = .33, p < .05) \). The Full IQ score correlation increased at the first-order level, but it did not become significant \( (r = .27, p < .10) \).

**Sixth Graders**

The Pearson product-moment correlations between each of the WISC-R subscales and style perception for the
Table 6
Correlations and Partial Correlations between Style Perception and the Wechsler Subscales: Adults (Covariate: Overall Dance Experience)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Full IQ</td>
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</tr>
<tr>
<td>Verbal IQ</td>
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<td>.20</td>
</tr>
<tr>
<td>Performance IQ</td>
<td>.08</td>
<td>.21</td>
</tr>
<tr>
<td>Information</td>
<td>.14</td>
<td>.19</td>
</tr>
<tr>
<td>Digit Span</td>
<td>.15</td>
<td>.12</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>.40 **</td>
<td>.37 *</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>.05</td>
<td>.07</td>
</tr>
<tr>
<td>Comprehension</td>
<td>.36 *</td>
<td>.28</td>
</tr>
<tr>
<td>Similarities</td>
<td>.31 *</td>
<td>.33 *</td>
</tr>
<tr>
<td>Picture Completion</td>
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<td>.03</td>
</tr>
<tr>
<td>Picture Arrangement</td>
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<td>.14</td>
</tr>
<tr>
<td>Block Design</td>
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<td>.23</td>
</tr>
<tr>
<td>Object Assembly</td>
<td>.15</td>
<td>.33 *</td>
</tr>
<tr>
<td>Digit Symbol</td>
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<td>.07</td>
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</tbody>
</table>

* = p < .05
** = p < .01
Table 7
Correlations and Partial Correlations between Style Perception and the Wechsler Subscales: 6th Graders
(Covariate: Overall Dance Experience)

<table>
<thead>
<tr>
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<td>.09</td>
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<tr>
<td>Performance IQ</td>
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<td>.17</td>
</tr>
<tr>
<td>Information</td>
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<td>-.05</td>
</tr>
<tr>
<td>Digit Span</td>
<td>.33 *</td>
<td>.38 *</td>
</tr>
<tr>
<td>Vocabulary</td>
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<td>.19</td>
</tr>
<tr>
<td>Arithmetic</td>
<td>.10</td>
<td>.19</td>
</tr>
<tr>
<td>Comprehension</td>
<td>.14</td>
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</tr>
<tr>
<td>Similarities</td>
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<td>-.03</td>
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<td>-.12</td>
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<tr>
<td>Picture Arrangement</td>
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<td>.22</td>
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<td>Block Design</td>
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<tr>
<td>Object Assembly</td>
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<td>.29</td>
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<tr>
<td>Digit Symbol</td>
<td>.15</td>
<td>.21</td>
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</tbody>
</table>

* = p < .05
** = p < .01
Table 8
Correlations and Partial Correlations between Style Perception and the Wechsler Subscales: 1st Graders (Covariate: Overall Dance Experience)

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<tr>
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<tbody>
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<tr>
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<td>.02</td>
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<tr>
<td>Performance IQ</td>
<td>-.05</td>
<td>-.06</td>
</tr>
<tr>
<td>Information</td>
<td>.05</td>
<td>.00</td>
</tr>
<tr>
<td>Digit Span</td>
<td>.06</td>
<td>.01</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>.11</td>
<td>.06</td>
</tr>
<tr>
<td>Arithmetic</td>
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<td>-.19</td>
</tr>
<tr>
<td>Comprehension</td>
<td>-.01</td>
<td>.01</td>
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<tr>
<td>Similarities</td>
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<td>.11</td>
</tr>
<tr>
<td>Picture Completion</td>
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<td>-.03</td>
</tr>
<tr>
<td>Picture Arrangement</td>
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<td>-.09</td>
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<tr>
<td>Block Design</td>
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<td>-.04</td>
</tr>
<tr>
<td>Object Assembly</td>
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<td>-.09</td>
</tr>
<tr>
<td>Digit Symbol</td>
<td>.07</td>
<td>.05</td>
</tr>
</tbody>
</table>
sixth graders are presented in Table 7. The partial (first order) correlations between these variables, with Overall Dance Experience as the covariate, are also presented in Table 7.

Digit Span was the only subscale that had a significant correlation with style sensitivity ($r = .33$, $p < .05$) at either the zero- or first-order level. The correlation coefficient between Digit Span and style perception increased when Overall Dance Experience was partialled out of the relationship ($r = .38$, $p < .05$). Object Assembly increased and approached significance at the first-order level ($r = .29$, $p < .08$).

First Graders

The Pearson product-moment correlations between the WISC-R subscales and style perception for the first graders are presented in Table 8. The partial correlations (first order) between the WISC-R subscales and style perception, with Overall Dance Experience as the covariate, are also presented in Table 8. None of the subscales was significantly related to style perception at the zero- or first-order level.
Correlations for the Conceptual Tempo Measures

Adults

The Pearson product-moment correlations between style perception and the Latency and Error scores from the MFFT, as well as the Impulsivity and Efficiency scores as defined by Salkind and Wright (1977) appear for the adult subjects in Table 9. Partial correlations between these variables and style perception, with Overall Dance Experience as the covariate, also appear for the adults in Table 9.

Neither the Latency nor Error scores from the MFFT nor the Impulsivity and Efficiency scores as defined by Salkind and Wright were related to style perception for the adult subjects at the zero- or first-order levels.

Sixth Graders

The Pearson product-moment correlations between style perception and the Latency and Error scores on the MFFT as well as the Impulsivity and Efficiency scores as defined by Salkind and Wright appear for the sixth-grade subjects in Table 10. Partial correlations between these variables and style perception, with Overall Dance Experience as the covariate, also appear for the sixth graders in Table 11.
Table 9
Correlations and Partial Correlations between Style Perception and Conceptual Tempo Scores: Adults (Covariate: Overall Dance Experience)

<table>
<thead>
<tr>
<th></th>
<th>Zero Order</th>
<th>Partial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Errors</td>
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<tr>
<td>Latency</td>
<td>.03</td>
<td>.11</td>
</tr>
<tr>
<td>Impulsivity</td>
<td>.05</td>
<td>.04</td>
</tr>
<tr>
<td>Efficiency</td>
<td>.18</td>
<td>.16</td>
</tr>
</tbody>
</table>
Table 10

Correlations and Partial Correlations between Style Perception and Conceptual Tempo Scores: 6th Graders (Covariate: Overall Dance Experience)

<table>
<thead>
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</thead>
<tbody>
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<td>-.31 *</td>
</tr>
<tr>
<td>Latency</td>
<td>.15</td>
<td>.33 *</td>
</tr>
<tr>
<td>Impulsivity</td>
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<td>-.35 *</td>
</tr>
<tr>
<td>Efficiency</td>
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<td>.00</td>
</tr>
</tbody>
</table>

* p < .05
Table 11

Correlations and Partial Correlations between Style Perception and Conceptual Tempo Scores: 1st Graders (Covariate: Overall Dance Experience)

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Errors</td>
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<td>-0.07</td>
</tr>
<tr>
<td>Latency</td>
<td>-0.05</td>
<td>-0.11</td>
</tr>
<tr>
<td>Impulsivity</td>
<td>-0.04</td>
<td>-0.02</td>
</tr>
<tr>
<td>Efficiency</td>
<td>-0.22</td>
<td>-0.21</td>
</tr>
</tbody>
</table>
Style perception was negatively related to the Error score from the MFFT ($r = .34$, $p < .05$). Though it decreased, the partial correlation coefficient for this relationship remained significant ($r = .31$, $p < .05$). The Latency score from the MFFT was not significant at the zero-order level, but the partial correlation coefficient between Latency and style perception was significant ($r = .33$, $p < .05$).

The negative correlation for the Error score coupled with the positive partial correlation for Latency suggests that style perception is related to a reflective cognitive style for the sixth graders. However, the zero-order correlation for the Impulsivity score was not significant. When Overall Dance Experience was partialled out of the relationship, the partial correlation was significant ($r = .35$, $p < .05$). Neither the zero- nor first-order correlation between the efficiency score and style perception was significant.

First Graders

The Pearson product-moment correlations between style perception and the Latency and Error scores from the MFFT, as well as the Impulsivity and Efficiency scores as defined by Salkind and Wright appear for the first-grade subjects in Table 11. Partial correlations between these
variables and style perception, with Overall Dance Experience as the covariate, also appear in Table 11. None of the MFFT scores was significantly related to style perception.

Multiple Linear Regression

In an attempt to explore the interrelationships among the variables related to style perception and to determine the best predictive model for style perception at each age group, the data for the adult and the sixth-grade subjects were analyzed using simultaneous multiple-linear regression. The simultaneous approach was used instead of a hierarchical one due to the amount of intercorrelation among the variables and because the theoretical model being considered does not call for an ordering of the variables. To be included in the regression analysis, the variables had to meet two criteria. They had to be those predicted on the basis of theory, and they had to have significant zero-order or partial correlations with style perception. Since the first-grade group did not have any significant zero-order or partial correlations between the style score and any of the predictors, no attempt was made to create
regression models for it. The best predictive models of style sensitivity for the adults and sixth graders are presented below.

**Adults**

The variables considered for the analysis in the adult group included the Vocabulary, Comprehension, Similarities, and Object Assembly subscales of the WAIS; the Dance Viewing, Dance Participation, and the Other Experience subscore from the Movement Experience Checklist; and Age. \( r = .45, p < .01 \) for age and style perception in the adult group.

Since there were quite a few variables under consideration for the adult group, an RSQUARE analysis was performed to determine the best combination of four variables for the prediction of style perception. The number of variables allowed for any one model was restricted to four due to the number of subjects available.

The RSQUARE technique is similar to a STEPWISE procedure in that it determines the best predictive model given the variables at hand. The STEPWISE procedure chooses the best predictor, finds the next best predictor given the first one, finds the third best predictor given the first two, and so on. Instead of building one model
in a "stepping" or hierarchical fashion, the RQUARE technique examines all possible combinations of the variables. By allowing an examination of several different models, it provides a better understanding of the interrelationships among the variables than could be obtained through examination of the one model generated by the STEPWISE procedure. It must be emphasized, however, that the R SQUARE technique is an exploratory one and provides the best predictive models but not necessarily the best explanatory model.

Complete summaries of the three best four-variable models selected by the procedure are presented in Tables 12, 13, and 14. The tests of significance for individual predictors are based on Type III sums of squares and therefore reflect a simultaneous multiple regression.

The model presented in Table 12 accounted for 56% of the variance in the style-perception scores. Dance Viewing and Age were its strongest predictors. In this model, the Similarities subscore of the WAIS was significant. The Other Experience subscore was not significant.

The model presented in Table 13 also accounted for 56% of the variance in the style-perception scores. Its strongest predictors were also Dance Viewing and Age. Object Assembly from the WAIS was a significant
Table 12

Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, Object Assembly, and Other Experience

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
<th>p</th>
<th>R-sq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>11.91</td>
<td>.0001</td>
<td>.58</td>
</tr>
<tr>
<td>Dance Viewing</td>
<td>12.99</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>12.23</td>
<td>.001</td>
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</tr>
<tr>
<td>Object Assembly</td>
<td>4.47</td>
<td>.042</td>
<td></td>
</tr>
<tr>
<td>Other Experience</td>
<td>3.35</td>
<td>.076</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
Table 13
Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, Similarities and Other Experience

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
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<tr>
<td>Model</td>
<td>12.06</td>
<td>.0001</td>
<td>.58</td>
</tr>
<tr>
<td>Dance Viewing</td>
<td>11.00</td>
<td>.002</td>
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</tr>
<tr>
<td>Age</td>
<td>11.68</td>
<td>.002</td>
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</tr>
<tr>
<td>Similarities</td>
<td>4.77</td>
<td>.036</td>
<td></td>
</tr>
<tr>
<td>Other Experience</td>
<td>2.67</td>
<td>.111</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
Table 14

Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, Similarities and Object Assembly

<table>
<thead>
<tr>
<th>Source</th>
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<th>p</th>
<th>R-sq</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>Dance Viewing</td>
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<td>.0001</td>
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<tr>
<td>Age</td>
<td>8.61</td>
<td>.006</td>
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</tr>
<tr>
<td>Similarities</td>
<td>3.13</td>
<td>.085</td>
<td></td>
</tr>
<tr>
<td>Object Assembly</td>
<td>2.17</td>
<td>.149</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
predictor, but to a lesser degree. The Other Experience subscore from the MEC approached significance in this model.

The third best model, presented in Table 14, accounted for 57% of the variance in the style-perception scores. As in the first two models, Dance Viewing and Age were its best predictors. When Object Assembly and Similarities are selected together, as they are in this model, neither are significant.

Since Other Experience was not significant in either of the first two models, it was decided to examine both of them without it. A comparison of these two models would also allow a better understanding of the relative strength of Object Assembly versus Similarities as predictors of style sensitivity.

The model including Object Assembly is presented in Table 15. It was significant (F = 13.85, p < .0001) and accounted for 54% of the variance in the style-perception scores. As expected, Dance Viewing and Age were the strongest predictors. Object Assembly approached but did not reach significance (F = 3.03, p < .09).

The model including Similarities is presented in Table 16. It was significant (F = 14.42, p < .0001) and accounted for 55% of the variance in the style perception scores. As in each of the other models presented thus
Table 15
Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, and Object Assembly

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
<th>p</th>
<th>R-sq</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.54</td>
</tr>
<tr>
<td>Dance Viewing</td>
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<td>.0001</td>
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</tr>
<tr>
<td>Age</td>
<td>8.93</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td>Object Assembly</td>
<td>3.03</td>
<td>.09</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
Table 16

Multiple Regression of Adult Style Perception Scores Using Age, Dance Viewing, and Similarities

<table>
<thead>
<tr>
<th>Source</th>
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<th>R-sq</th>
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</thead>
<tbody>
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<td>.0001</td>
<td>.55</td>
</tr>
<tr>
<td>Dance Viewing</td>
<td>21.71</td>
<td>.0001</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>8.97</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td>Similarities</td>
<td>4.04</td>
<td>.05</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
far, Dance Viewing and Age remained the strongest predictors of style perception. Similarities was significant as well ($F = 4.04, p < .05$) but to a lesser degree.

**Sixth Graders**

The variables considered for analysis in the sixth-grade group included the Digit Span subscore of the WISC, the Dance Viewing and Dance Participation scores of the Movement Experience Checklist, and the Impulsivity score as defined by Salkind and Wright. Since the Overall Dance score from the Movement Experience Checklist was more highly related to style perception than either of its two subscores, it was used to represent both of them in the analysis. This left only three variables for consideration, so the RSQUARE technique was not used for the sixth-grade data. The results of the simultaneous multiple regression of the style perception scores using Overall Dance Experience, Impulsivity, and Digit Span appear in Table 17.

The model was significant ($F = 5.95, p < .002$) and accounted for 33% of the variance in the style perception scores. Overall Dance Experience, however, was the only of its individual predictors that was significant in the context of the model. Since Impulsivity and Digit Span
Table 17

Multiple Regression of 6th-grade Style Perception Scores Using Overall Dance Experience, Digit Span, and Impulsivity

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
<th>p</th>
<th>R-sq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
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<td>.002</td>
<td>.33</td>
</tr>
<tr>
<td>Dance Experience</td>
<td>10.50</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Digit Span</td>
<td>3.33</td>
<td>.076</td>
<td></td>
</tr>
<tr>
<td>Impulsivity</td>
<td>2.15</td>
<td>.151</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
Table 18

Multiple Regression of 6th-grade Style Perception Scores using Overall Dance Experience and Digit Span

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
<th>p</th>
<th>R-sq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>7.61</td>
<td>.002</td>
<td>.29</td>
</tr>
<tr>
<td>Dance Experience</td>
<td>9.47</td>
<td>.004</td>
<td></td>
</tr>
<tr>
<td>Digit Span</td>
<td>6.30</td>
<td>.017</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
Table 19

Multiple Regression of 6th-grade Style Perception Scores using Overall Dance Experience and Impulsivity

<table>
<thead>
<tr>
<th>Source</th>
<th>F</th>
<th>p</th>
<th>R-sq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>6.82</td>
<td>.003</td>
<td>.27</td>
</tr>
<tr>
<td>Dance Experience</td>
<td>9.85</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Impulsivity</td>
<td>5.01</td>
<td>.03</td>
<td></td>
</tr>
</tbody>
</table>

* based on Type III SS
were significantly correlated ($r = -.37, p < .01$; see Table 24 in Appendix D), it was decided to examine each in separate models with Overall Dance Experience. The results of the two two-variable models appear in Tables 18 and 19.

The model including Overall Dance Experience and Digit Span only is presented in Table 18. It was significant ($F = 7.61, p < .002$) and only accounted for 29% of the variance in the style-perception scores. Overall Dance Experience remained the strongest predictor, but the Digit Span subscore of the WISC-R was also significant ($F = 6.30, p < .02$).

The model including Overall Dance Experience and Impulsivity only is presented in Table 19. It was also significant ($F = 6.82, p < .003$), but accounted for only 27% of the variance in the style-perception scores. As expected, Overall Dance Experience remained the strongest predictor for style perception. Though its F value was lower than that for Digit Span, Impulsivity was also significant ($F = 5.01, p < .03$).
Several significant results were obtained through the statistical analyses performed in this study. There were highly significant age differences in style perception. The adults and sixth graders performed significantly better than the first graders. The sixth graders and the adults, however, did not differ in their performance on the style measure. These age differences remained highly significant even when Overall Dance Experience was included as a covariate in the analysis. Age was also significantly related to style perception within the adult group, but not within the sixth-grade and first-grade groups. The first graders performed barely above chance on the style measure.

The dance-experience variables were strongly related to style perception for the adults and the sixth graders. Though the pattern of correlations between style perception and the dance-experience variables was similar for the adult and sixth-grade groups, the correlations for the sixth graders were slightly lower. Also, for the adults, Dance Viewing was clearly the strongest Movement Experience Checklist (MEC) subscore in the prediction of style perception; whereas for the sixth graders, Dance Viewing and Social Dance were equally
strong predictors. Overall Dance Experience had the highest correlation with style perception in the sixth-grade group. Though none of the dance-experience variables was significantly related to style perception for the first graders, Dance Participation approached significance and was the only predictive variable to do so for the first-grade group.

The pattern of correlations between the Wechsler subscales and style perception differed for the adult and sixth-grade groups. For the adults, Vocabulary, Comprehension, and Similarities were related to style perception. When Overall Dance Experience was partialled out of the relationships, however, the correlation for Comprehension dropped below significance, the correlation for Similarities increased, and the correlation for Vocabulary decreased but remained significant.

For the sixth graders, Digit Span was the only Wechsler subscale that was significantly related to style perception. When Overall Dance Experience was partialled out of the relationship, the Digit Span correlation increased and the Object Assembly correlation approached significance.

For the first graders, none of the correlations between the Wechsler subscales and the style measure was significant.
The conceptual-tempo variables generated from the Matching Familiar Figures Test (MFFT) were not related to style perception for the adults nor for the first graders. For the sixth graders, there was a significant negative correlation between style perception and the Errors score from the MFFT. When Overall Dance Experience was partialled out of the correlations, Latency showed a significant positive correlation with style perception and Impulsivity, as defined by Salkind and Wright, showed a significant negative correlation with style perception. These results suggest that after controlling for dance experience, reflectivity is positively related to style perception for the sixth graders.

Since none of the predictor variables was significantly related to style perception for the first graders, their data were not submitted to multiple regression analysis. The results of the multiple regression analyses for the adults and the sixth graders were different.

For the adults, Dance Viewing and Age were by far the strongest predictors in each of the three best models selected by the RSQUARE procedure. Object Assembly and Similarities were each significant when considered in the context of separate models that had Other Experience as
the fourth predictor. When Object Assembly and Similarities were considered in the same model; however, neither was significant. Each of the models accounted for about 58% of the variance in the style-perception scores.

Since Other Experience was not significant as a predictor, it was dropped from the first two models selected by the RSQUARE procedure. When Other Experience was eliminated, Object Assembly was no longer significant in the context of the regression model, whereas Similarities remained significant. So even though Similarities and Object Assembly had the same partial correlations with style sensitivity, Similarities appears to be a stronger predictor of style sensitivity in the context of the regression model for the adult group. The three-variable model including Similarities accounted for approximately 55% of the variance in the adult style-perception scores.

For the sixth graders, Overall Dance Experience, Digit Span, and Impulsivity were the only three variables considered in the regression analysis. The model that included all three of these variables accounted for 33% of the variance in the style-perception scores. However, Overall Dance Experience was the only significant
predictor in the context of the model. When Digit Span and Impulsivity were considered in separate models with Overall Dance Experience, each was significant, but the models accounted for only 29% and 27% of the variance in the style-perception scores respectively.
CHAPTER VII

DISCUSSION

The main purpose of this study has been to extend Howard Gardner's work on the development of a sensitivity to artistic style in painting, music, and literature to the performing art of modern dance. A second purpose has been to explore, at each age level, the relationship between choreographic style sensitivity and different cognitive and perceptual skills, as well as past experience with movement. In this way, it was hoped that more information could be obtained about the nature of choreographic style perception and its development.

In this chapter, the results of the study and the conclusions that can be drawn from these results will be discussed. Secondly, the problem of conceptualizing the development of an ability as complex as style sensitivity from just one theoretical orientation will be addressed. Since the study has been exploratory in nature, its limitations will be discussed and suggestions for future
research in the development of choreographic style sensitivity will be made. Lastly, implications for dance educators will be discussed.

Age Differences and Style Sensitivity

As noted earlier, throughout Gardner's writings there is the implication that the development of some degree of style sensitivity is universal. Despite individual differences, all individuals continue to improve with age in their ability to perceive artistic style. Secondly, from Gardner's studies it appears that the pattern of style development may be the same across different art media. Children approximately six or seven years of age were not as successful at perceiving artistic style in both painting and music as were sixth graders and adults.

Age Effects between Groups

Based on Gardner's work, it was hypothesized that the ability to perceive differences in choreographic style would improve with age. The data support this hypothesis. Age group was highly significant even when Overall Dance Experience was taken into account. As in Gardner's studies, the sixth graders and adults performed
significantly better on the style measure than the first graders. Gardner (1973) noted, however, that all of his subjects, including first graders, were performing above chance. In the present study, there were several first graders who performed above the mean of the adult group, but as a group the first graders performed barely above chance.

This difference may be a reflection of the difficulty of the dance-style measure. Gardner (1973) mentioned that his colleagues were skeptical that children would be able to perform well on his measure of music-style sensitivity. As we saw, his subjects proved his colleagues wrong. It is possible, however, that Gardner’s first-grade subjects may have benefited from the items on his measure that were composed of excerpts from widely divergent musical eras. Gardner noted that the first graders did not perform as well when they had to perceive stylistic differences in selections from the same musical era. Likewise, in his studies of style sensitivity in painting, Gardner noted that the first graders performed as well as older subjects on the abstract arrays but not as well on arrays that juxtaposed portraits and landscapes.

From the percent correct for each item, it was apparent that the items on the dance-style measure
employed in this study ranged in difficulty. The number of "easier" items was probably not as great as on Gardner’s measures, though. First of all, due to problems in obtaining permission to reconstruct older modern dance from notated scores, it was impossible to include modern dance from different eras in the measure. All of the stimulus pairs were constructed from recently choreographed works. In addition, with the exception of works from two New York choreographers, most of the dance was created by local student, faculty, and professional choreographers who, as a result of being in the same dance community, probably influenced one another’s work. Consequently, the discriminations required for the "different" pairs were quite difficult.

In addition, many of the "same" pairs were composed of excerpts containing fairly different movement patterns, making it difficult to discern the stylistic similarities. The overall difficulty of the dance-style measure may explain why the first graders, as a group, did not perform much above chance and why the adults and sixth-graders did not have a higher level of performance. In fact, given the difficulty of the measure, it was a pleasant surprise to find a few subjects in both the adult and sixth-grade groups who missed only one or two items.
Age Effects within Groups

Adults. It is interesting to note that age was also significantly correlated to style perception within the adult group. Since Overall Dance Experience was highly related to style perception and since it is presumably an age-related variable, it is tempting to suggest that the relationship between age and style perception resulted from the adults having had continued exposure to dance with age. Upon examination of the correlations between age and the dance subscores from the Movement Experience Checklist (MEC) (see Table 26, Appendix D), it is evident that although correlations for the dance subscores were in the positive direction, none of them was significant. The dance subscores do, however, show a much stronger relationship with age than the sports and Other Experience subscores, whose correlations with age, in addition to being low, are all negative.

Even though the correlations between age and dance experience were not significant for the adult group, the possibility that age has an effect on the type of dance experience a subject has had should not be discounted. It became evident that the older subjects in the adult group were more likely to have seen a wider range of different kinds of dance. An older subject was more
likely, for instance, to have seen a Fred Astair/Ginger Rogers movie, ballet at the opera, as well as currently popular forms of dance like break dancing. The younger subjects within the adult group were not as likely to have seen this range of dance forms, even though they may have seen a fair amount of dance. Presumably, having seen a wide variety of different kinds of dance would have more of an effect on an ability to perceive style differences than having seen a lot of any one kind. The scores from the MEC did not reflect this difference in dance experience. If any had, it is possible that the correlation between style perception and Dance Viewing would have been even higher for the adult group.

Sixth-grade group. As noted in Chapter Six, within the sixth-grade group, the relationship between age and style perception was absent. There are two possible explanations for this finding. One could be a restriction of range on the age variable. As mentioned in Chapter Five, the adult group included first-year college students, upperclassmen, as well as continuing education students; the ages of this diverse group ranged from 17 to 30 years. In contrast, the age range for the sixth-grade group spanned not more than three years.

A second reason for the lack of relationship between style perception and age in the sixth-grade group may
have resulted from special characteristics of the oldest subjects in that group. It was evident that several of the older sixth graders appeared to be experiencing behavioral, attentional, and academic problems. The older sixth grader group also included two subjects that had been held back a year in school. The youngest sixth graders, in contrast, appeared to be doing better in school and did not appear to have any behavioral problems. The strong negative correlations between subscores on the WISC-R and age for the sixth graders support these observations (see Table 24 in Appendix D).

First-grade group. As noted in Chapter Six, the correlation between age and the style measure within the first-grade group was positive and much higher than that for the sixth-grade subjects, but it did not reach significance. As with the sixth graders, the age range was restricted in the first-grade group. Also, as mentioned earlier, the first graders were performing barely above chance level on the style-perception measure.
Movement Experience and Style Sensitivity

Dance Viewing and Style Sensitivity

It was predicted that past experience viewing dance would be related to an ability to perceive choreographic style. The data for the adult and sixth-grade groups support this hypothesis. In fact, for the adult group, Dance Viewing had a stronger correlation with style perception than any of the other dance-experience subscores. The correlation between Dance Viewing and style perception for the sixth-grade group was lower than that for the adults. This difference may have reflected less dance-viewing experience on the part of the sixth graders. However, as mentioned above, the dance-viewing experience of older adult subjects was often more varied; this age difference may have accounted for the stronger relationship between Dance Viewing and style sensitivity in the adult group.

Dance Participation versus Dance Viewing and Style Sensitivity

The relationship between style perception and formal dance training was positive but not significant for both the adults and sixth graders. However, not many subjects had had dance training. It is possible that in a larger
subject population that included more subjects with dance
training the relationship between this form of dance
experience and style perception might be higher.
Secondly, most subjects with dance training had only had
ballet. Although there were some items on the style
measure that were heavily influenced by ballet, all items
were samples of modern dance. If subjects had received
modern-dance training as well as ballet, the relationship
between dance training and style sensitivity might have
been higher. This seems especially likely when one
considers that ballet classes are often regimented and
emphasize a specific movement vocabulary that has evolved
over centuries. Though modern-dance classes usually
follow a certain order in terms of technique, stretching,
and floor work, the instructor will often create
exercises that train students in his or her own
idiosyncratic style. There is often more variation in a
modern-dance as opposed to a ballet class.

It is possible that even in a larger subject
population which included more individuals with varied
dance training that dance training, and even social
dancing, would not have an effect on the development of
style sensitivity independent of dance viewing. In other
words, someone who has viewed a lot of different kinds of
dance may perform as well or better on measures of
choreographic style perception than would individuals who have only had dance training and very little dance-viewing experience. It may not be dance training or social dancing per se that is contributing to the development of style sensitivity so much as the viewing of dance that goes on in the dance studio or on the disco floor.

**Sports Experience and Style Sensitivity**

Since the stimulus dimensions and distinctive features of sports movement are likely to be different from those defining dance movement, it was predicted that the sports-experience subscores would not be related to the development of style sensitivity. The data supported this hypothesis. The sports-experience subscores for all three groups were either close to zero or in the negative direction. It appears that there is no transfer of experience from sports to dance in terms of an ability to perceive choreographic style.

**Other Experience and Style Sensitivity**

The Other Experience subscore from the MEC showed a low but positive significant relationship to style perception in the adult group and a positive but nonsignificant correlation to style perception in the
sixth-grade group. The type of movement experience sampled by the other-experience items was more like dance experience than that sampled by the sports items. For instance, figure skating, and especially the popular winter-olympic event of ice dancing, bears a strong resemblance to certain forms of dance. Likewise, Martial arts, particularly forms like T’ai Chi and Akido, also have very graceful, dance-like movements. These similarities may account for the relationship between Other Experience and style perception.

Secondly, individuals with high Other Experience scores have been exposed to a wide variety of human movement. This varied exposure may allow them to have a better understanding of the range of stimulus dimensions involved in different kinds of human movement. Indeed, the novelty of the modern dance was distracting to some subjects, and they appeared to have trouble figuring out what to look at to enable them to make a style judgment. Individuals with a varied movement-experience background were not as disrupted by the novelty of the dance. They appeared more tolerant of it, less distracted by it, and better able to focus on the movement itself. As a result, it may have been easier for them to differentiate the stimulus dimensions related to choreographic style.
This suggestion is consistent with a perceptual-learning explanation of style development. As mentioned in Chapter Two, a very important aspect of perceptual learning as defined by the Gibsons involves a process by which the individual comes to uncover the relevant stimulus dimensions and distinctive features of a particular object or class. An individual who has had experience almost exclusively with sports movement may have more difficulty perceiving a new set of stimulus dimensions than would an individual who has been exposed to and is aware of the diversity of human movement. As mentioned in Chapter Two, Tighe (1965) was able to improve performance on reversal-shift tasks when he familiarized subjects with all of the dimensions along which the change in the stimulus could occur. Likewise, familiarity with a large number of dimensions along which movement can vary may also enhance the development of style perception.

Movement Experience and Style Sensitivity:

First Graders

As we saw in Chapter Six, for the first graders style perception was not significantly correlated with any of the other measures. However, the correlations between style perception and the dance-experience subscores from
the MEC were in the positive direction and, in general, higher than any of the correlations between style perception and the individual-difference variables. As we saw earlier, the correlation between style perception and Dance Participation approached significance for the first graders ($r = .29, p < .08$).

Since we can fairly safely assume that most of the first graders could not have had the same amount of dance experience as most of the older subjects, these correlations point to the strength of dance experience in the development of choreographic style perception. This possibility is particularly evident when we consider that the MEC was a fairly rough assessment of predominantly casual experience with dance. It is possible that, with more specific exposure to different dance styles, even some of the first graders could learn to perceive choreographic style.

The importance of specific dance viewing was very evident for one subject, in particular, although she was an adult. This subject had not had any dance training, she did not like to dance in social situations, and she had seen very few theatrical productions or movies featuring dance. Yet, she missed only one item on the style measure and was very confident of her responses. The investigator learned that she had taken a
dance-history class at the University and, in that class, she had seen a large number of films and videotapes of all different kinds of dance. It would be very interesting to see if all subjects, including those at very young ages, would respond as well to this sort of specific exposure to choreographic style. It must be remembered, however, that this subject was an adult and she had developed other skills and abilities that may have enabled her to benefit from her specific exposure to different choreographic styles. Given this consideration, we turn to the results dealing with the relationship between the development of choreographic style sensitivity and individual differences.

Conceptual Tempo and Style Sensitivity

As discussed in Chapter Four, the cognitive style of reflectivity appears to be associated with focused attention and discrimination of subtle feature differences, both of which are necessary for perceptual learning as defined by the Gibsons. Since it was suggested that the development of style sensitivity may result in large part from the this form of perceptual learning, it was hypothesized that style sensitivity
would be related to reflectivity. Such a relationship would lend additional support to a perceptual-learning model of the development of style sensitivity.

The hypothesized relationship between reflectivity and style sensitivity received only moderate support from the data. As we saw in Chapter Six, none of the correlations between the MFFT variables was significant for the adults or the first graders. However, for the sixth graders, there were moderate relationships between the MFFT variables and style sensitivity, but only when dance experience was taken into account. As discussed below, these developmental differences in the relationship between style sensitivity and conceptual tempo may point to a minimum developmental level of reflectivity for efficient perceptual learning to occur.

For the first-grade group, the absence of a relationship between reflectivity and style sensitivity could have resulted from two factors. Since past experience with dance may be the most important variable in the development of style perception, it is possible that the first graders had not had enough dance experience for a relationship between reflectivity and style perception to emerge. If the first graders as a group had had sufficient exposure to dance, the reflective first graders might have been better than
their impulsive classmates at uncovering the stimulus dimensions of choreographic style. But without having had sufficient dance experience, they could not have undergone the perceptual learning necessary for the development of style sensitivity and, as a result, were no better at discriminating style differences than their impulsive classmates.

It is also possible, however, that even with sufficient exposure to dance that the reflective first graders would not have become sensitive to style. Conceptual tempo is a developmental dimension. Though individuals may remain reflective or impulsive relative to their cohort, they generally become more reflective with age. Since the determination of conceptual tempo is relative to the age group, a reflective first grader may be more impulsive than his or her sixth-grade counterpart. As a result, the first graders, as a group, may have been too impulsive to discriminate the stimulus dimensions and distinctive features of choreographic style--both in the context of this study, and in the context of their experience to date with dance.

On the opposite end of the spectrum, the subjects in the adult group were presumably more reflective, as a group, than either the sixth graders or the first graders. In the adult group, impulsive subjects may be
quite reflective in relationship to their first-grade or sixth-grade counterparts. The adults were probably all sufficiently reflective in their cognitive style to undergo the perceptual learning necessary for style sensitivity. Their individual differences in style sensitivity appeared to result, instead, from different levels of dance experience coupled with individual differences in special ability.

As mentioned above, though individuals may remain more reflective or more impulsive relative to their cohort, all individuals become more reflective with age. A minimal level of reflectivity, independent of the cohort, is probably necessary for it to enhance the perceptual learning associated with the development of style sensitivity, and from the results of this study, it appears that the sixth graders may be in the process of reaching that minimum level. Since the sixth-grade group was the only group to display a relationship between style sensitivity and reflectivity, it may be that the minimum level of reflectivity associated with enhanced perceptual learning may lie somewhere within the range of impulsivity to reflectivity typically displayed by sixth graders.
The Wechsler Subscales and Style Sensitivity

One of the purposes of this study was to examine the relationship between an ability to perceive style and other measures of specific ability. If such relationships exist, then an explanation might be found for the individual differences observed in studies by Gardner, Walk, and Tighe in the rate and degree of perceptual learning associated with the acquisition of style sensitivity. The development of style sensitivity would then be conceptualized in terms of an interaction between specific abilities and perceptual learning. As mentioned in Chapter Two, such a theoretical orientation would be in line with Gardner's more recent theory of multiple intelligences (Gardner, 1983).

General Ability and Style Sensitivity

It was expected that neither the Full Scale IQ, the Performance IQ, nor the Verbal IQ from the Wechsler scales would be related to style perception. For all three groups, the data were in line with these expectations. After Overall Dance Experience had been partialled out of the correlations between the IQ scores and style perception, they increased for the adult group, but none was significant. The increase in the Full Scale
IQ correlation for the adult group is probably a reflection of the significant correlations between style perception and Similarities and Vocabulary, both of which are often more highly correlated with the Full Scale IQ score than most of the other scales (Wechsler, 1974, 1981). It appears from these data that style sensitivity is not just another manifestation of general ability. A high IQ will not guarantee style sensitivity.

**Visual-spatial Ability and Style Sensitivity**

It was predicted that Object Assembly would be related to style perception. As we have seen, at the zero-order level, the correlation between these two variables was not significant for any of the age groups. When Overall Dance Experience was partialled out of the relationship, however, Object Assembly was significantly related to style sensitivity for the adults and approached significance for the sixth graders. Consequently, there was moderate support for the suggestion that an ability to perceive interrelationships among the parts of a whole might be related to style sensitivity.

Intuitively, one might have expected Block Design to be related to an ability to perceive style since it, like Object Assembly, involves a certain amount of spatial
ability. However, as mentioned in Chapter Four, there is a fundamental difference between the two tasks. Although Block Design requires the subject to put blocks together much like Object Assembly requires the subject to put pieces of a puzzle together, it also requires subjects to break the Gestalt of the design before they can copy it. In the first two items of the test, subjects are helped with this process by the black lines printed on top of the design to show how it can be broken into blocks. In subsequent designs, the black lines are eliminated, and subjects must break the whole into parts before they can proceed.

In contrast, for good performance on the Object Assembly scale, subjects must look at a set of parts and perceive how they go together to make a whole. Instead of breaking a Gestalt, they must quickly synthesize one. This difference between the two scales may provide an explanation for why the predicted relationship between style perception and Picture Completion was not found for any of the age groups. Typically, when one perceives an integrated whole, such as the pictures in the Picture Completion scale, any missing parts are automatically "filled in." The structure of the Gestalt "carries" the
missing part. To find that missing part, the subject
must break the Gestalt—something the good style
perceiver may not be inclined to do.

Verbal Skills and Style Sensitivity

The hypothesized relationship between Digit Span and
style perception found support, but for the sixth graders
only, for which it was significant at the zero-order
level and increased in significance when Overall Dance
Experience was partialled out of the relationship.
Short-term memory and an ability to concentrate and focus
attention appear to be important to the development of
style sensitivity in the sixth-grade group.

The relationship between Digit Span and style
perception for the sixth graders is consistent with the
significant negative relationship between style
perception and impulsivity for that group. Achieving a
low Error score on the MFFT requires careful focused
attention on each of the variants.

The absence of a relationship between Digit Span and
style perception in the adult group does not necessarily
mean that memory and attention are not important for
adult style perception. Like reflectivity, the ability
to concentrate and focus attention increases with age, as
does short-term memory. It is possible that even though
the adult subjects displayed a range of performance on Digit Span, all of the adults, even those at the lower end of the scale, had sufficient levels of attention and memory necessary for the perceptual learning involved in the development of style sensitivity. Consequently, no relationship between Digit Span and style sensitivity would emerge. The cognitive skills associated with Digit Span, like those associated with reflectivity, may be necessary for the development of style sensitivity, but they are not sufficient in the absence of adequate dance-viewing experience.

The predicted relationship between Vocabulary and style perception was supported by the adult data only. As we saw in Chapter Six, two of the other verbal scales were significantly related to style sensitivity in the adult group: Comprehension, which dropped below significance once Overall Dance Experience was partialled out of the relationship, and Similarities, whose correlation increased when Overall Dance Experience was partialled out. As mentioned in Chapter Four, both Anastasi (1976) and Kaufman (1979) noted that Vocabulary, Comprehension, and Similarities have been found to form a separate verbal factor in factor-analytic studies. For the adult group, general language ability appears to be related to style sensitivity.
As we saw in Chapter Six, none of these three verbal scales was related to style sensitivity in the sixth-grade group, even when Overall Dance Experience was partialled out of the correlation. It is possible that even the highest-scoring sixth grader did not have the level or type of vocabulary to enhance style perception. As mentioned in Chapter Two, language may help individuals remember what they have seen, particularly the qualities of what they have seen. In the absence of a suitable set of descriptive words to label various qualities, and thereby aid memory, the sixth graders may have relied on more rote memory skills such as those tapped by the Digit Span scale.

There may be another means by which the sixth graders dealt with an insufficient descriptive vocabulary. There was a distinct difference between the way sixth graders and adults described what they saw in the dances. For instance, one of the adults who scored very well on the style measure described one of the dances by commenting, "In both parts the movement was very angular and sharp, her arms seemed to pierce and slice through the air." In contrast, one of the sixth graders who scored very well described the same stimulus pair by saying, "Both times it looked like she was an Indian doing a war dance." Both descriptions were very accurate. The adult
described the qualities of the movement in abstract terms; the sixth grader obviously saw those qualities, but represented them as a whole by attributing them to a character. In general, the sixth graders used much more simile and metaphor to describe the movement: "She moved like a wild animal," "it was like flames jumping," "she looked like a princess, like Cinderella."

These descriptions require language skills, but ones very different from those tapped by the Wechsler scales. The Vocabulary scale reflects a type of crystallized intelligence that increases with age as does the Similarities scale. The Comprehension scale might be considered more of a measure of fluid intelligence because it appears to require a certain amount of common sense, but it does not tap the creative thinking involved in the production of metaphor and simile.

Except for writers and individuals who are active in the arts or other creative activities, the use of characterization, simile, and metaphor in description may actually decrease in adulthood. Gardner (1978, 1982) reviews research which suggests that children do not fully comprehend nor use metaphor until around ten or eleven years of age. The sixth graders in this study averaged about eleven years of age, and their tendency to use metaphor and simile in their descriptions may reflect
an exercising of this newfound ability—much as a young child who has learned a new word uses it all the time until it has been fully assimilated into his or her vocabulary.

Age Differences and Individual Differences

Although the adults scored slightly higher than the sixth graders on the style-perception measure, the difference between the means for the two groups was not significant. One might expect the correlations between style perception and the predictive variables to be similar for both groups. Generally speaking, the dance-experience correlations were similar for the two groups, and to a certain extent, so was the relationship between Object Assembly and style perception. However, for impulsivity and the verbal subscales on the Wechsler, the pattern of correlations varied between the sixth graders and the adults.

The age differences in the correlations between the predictor variables and style sensitivity may result from differences in the developmental schedules for each individual-difference dimension as it relates and contributes to the development of style sensitivity. As
mentioned earlier, a certain level of attention, short term memory, and reflectivity is probably necessary for the perceptual learning involved in the development of style sensitivity. The sixth graders may have been in the process of attaining these optimum levels, whereas the adults may have already reached them. In contrast, the optimum level for Vocabulary to support style sensitivity may be higher, and the sixth graders may have had to compensate for that developmental deficit by using other verbal skills, such as metaphor.

These developmental differences in ability may result in different styles of problem solving and different strategies of perceptual learning across age groups. This interpretation suggests that not all of the developmental achievements and specific abilities associated with the development of style sensitivity have to be present in the individual's cognitive profile for perceptual learning to occur. Some may be much more important to that learning process than others, however, and depending on an individual's developmental level and his or her profile of specific abilities, the ease with which he or she develops style sensitivity may differ.

For instance, having a large descriptive vocabulary may not be necessary for the perceptual learning involved in the development of style sensitivity as long as one
has a sufficient capacity for focused attention and enough exposure to dance. However, with a large descriptive vocabulary in addition to a capacity for focused attention, one may be more efficient at perceptual learning and might not need as much exposure to dance as others would to uncover the stimulus dimensions that define choreographic style.

The Development of Style Sensitivity as a Complex Process

One of the primary purposes of this study has been to consider the development of an ability to perceive style from the vantage point of three different theories—perceptual-learning theory, individual differences, and Gestalt psychology—as opposed to just one. In this way it was hoped that a better understanding of the complexity of style development could be achieved. Consequently, it was hypothesized that dance-experience variables in conjunction with individual-difference variables would model the development of style sensitivity better than dance-experience variables alone. The data provided moderate support for this hypothesis.
Multiple Regression Analysis

Adults. From the partial correlations between the individual-difference measures and style perception for the adult group, it appears that the Vocabulary, Similarities, and Object Assembly subscales are related to style perception independently of Overall Dance Experience. In fact, the relationship between Object Assembly and style perception does not emerge at all until dance experience has been taken into account.

When these variables were submitted to simultaneous regression analyses, their predictive power relative to both Dance Viewing and age was small. Although Vocabulary had the highest zero- and first-order correlations with style perception, it was not selected by the RSQUARE procedure. It should be remembered, however, that the RSQUARE procedure searches for the best predictive model. Since Vocabulary was significantly related to age whereas Similarities was not (see Table 23 in Appendix D), Similarities made a stronger contribution to the prediction of style perception in the context of a model that includes age.

Of course, age itself is not an explanatory variable. It is carrying the variance of other variables that may be more directly related to style sensitivity--one of which may be Vocabulary. As
mentioned earlier, it appeared that older subjects in the adult group had experienced a wider range of dance-viewing experience than younger subjects. This may provide another explanation for the strength of the age variable.

As mentioned earlier, Similarities, Comprehension, and Vocabulary may all tap general language skills, so in one sense, Similarities could be considered a substitute for Vocabulary in the regression equation. It may also reflect a slightly different set of language skills, however, that could be as important to the development of style sensitivity as a descriptive vocabulary.

As discussed in Chapter Two, hierarchical classification and concept learning—both related ideas coming from very different theoretical orientations—may be important to style sensitivity. Gardner was unable to find a relationship between style sensitivity and an ability to classify hierarchically, as operationalized by Piaget. Similarities, however, could also be considered a test of one’s ability to classify hierarchically. To receive a high score for the question, "How are a banana and an apple alike?" one must go beyond any concrete similarities between the two objects and answer, "They are both fruit." As Kaufman (1979) notes, Similarities requires the subject to distinguish essential from
nonessential details. (As noted earlier, this is also necessary for success on Picture Completion, though this scale was not significantly related to style perception.) As discussed in Chapter Two, an ability to recognize that two items very different in many of their concrete characteristics are members of the same larger class may be an important aspect of style perception.

It should be noted that Similarities and Object Assembly made significant contributions to the adult regression models only when they were included in separate models. The fact that neither of them were significant when they were considered in the same model suggests that they are sharing variance and neither are particularly strong predictors of style perception. When Other Experience was dropped from each of the models that included these two variables separately, however, Similarities remained significant whereas Object Assembly dropped below significance. Similarities, then, appears to be the better predictor of the two, and the model which includes it accounts for more variance than one with dance-experience variables only.

Sixth Graders. The results of the multiple regression analyses for the sixth graders were not as strong as those for the adults. This may have resulted largely from lower dance-experience correlations with
style perception, as well as the lack of correlation between age and style perception in the sixth-grade group. Both age and Dance Viewing were the strongest predictors of style perception for the adults and appeared to account for most of the variance in the adult regression models. The sixth graders may not have had enough varied dance experience for Dance Viewing to be as strong a predictor as it was for the adults. The performance of the sixth graders may have depended in part on other types of movement experience not tapped by the MEC or on other individual-difference variables not included in this model.

Secondly, the two individual-difference variables that were related to style perception in the sixth-grade group, Digit Span and Impulsivity, were also related to one another (See Appendix D, Table 24). Consequently, when both were considered in the same regression model, neither was significant. Upon examination of the two models that included them separately, it appeared that Digit Span was a slightly better predictor than Impulsivity.

Each of the models considered for the sixth graders accounted for only about a third of the variance in the style scores. In the adult group, Dance Viewing alone accounted for over a third of the variance. It is
possible that the sixth graders did not have quite enough
dance experience for the individual-difference
correlations to emerge fully. Even so, as with the
adults, consideration of both dance experience and an
individual-difference variable still provided a better
model of the sixth-grade style scores than consideration
of dance experience alone.

The Problem of Meaning and Affect

Up to this point, the development of a sensitivity to
choreographic style has been considered in terms of
cognitive or perceptual abilities coupled with dance
experience. The aesthetic experience, however, and the
perception of art and artistic style, in particular, is
likely to involve affective responses and interpretation
based on personal experience. In Gardner’s study of
music-style sensitivity, he noted that his eight year old
subjects often characterized the classical music they
heard in terms of their own experiences. Lindauer (1981)
cites various authors who suggest that aesthetic
perception may be different from ordinary perception in
that it is not as analytical, not as accurate, and
overlaps affective and motivational processes. Werner
(1955, 1956) has suggested that the physiognomic or tertiary properties of an object are apparent during aesthetic perception.

In this study, subjects often related the dance used in the dance-style measure to their own experience. This was especially evident for the sixth graders who would describe the movement in terms of a story-book character. In all age groups, there were some subjects who often attempted to figure out what the dancer was doing or what the dance was about—despite the fact that, in most cases, the choreographer was working with purely abstract movement—movement for movement's sake.

Many subjects would respond to what they perceived as emotion: "It seemed like a sad dance." Fraisse (1961) suggests that there is a relationship between affect and rhythm, whether its source is in song, dance, music, or even manual labor. Dance is a human activity, and it may well be one of the most primitive forms of human expression. And, as a human activity that is also an art form, it may be particularly powerful in evoking emotion.

Gardner (1973) notes that an important consideration in the perception of the arts is how works "feel" and an important consideration in perceiving styles is whether two works "feel" different or have different Gestalten. He suggested that when subjects describe music in terms
of an amusement park or a church, they are creating metaphors in order to share their experience of how these works feel and to share their perception of the work's ambience.

To perceive the ambience or the mood of a work of art, one has to view it as a whole, to form a global impression of the work. Gibson's theory of perceptual development as it deals with the gradual discovery of specific stimulus dimensions and distinctive features does not provide an adequate explanation for this type of perception. Earlier in Chapter Two we discussed how the perception of an invariant could be a sophisticated form of Gestalt perception in that it involves the extraction of a structured whole, but even this form of perception does not explain sensitivity to "ambience." An invariant as defined by the Gibsons is an interrelationship of physical and/or temporal properties that remains constant through change over time. When we perceive an invariant, we extract such higher-order information from the environment irrespective of emotional overtone or meaning.

It is likely that the perception of choreographic style does involve a differentiation of distinctive features and perceptual invariants, but it may also involve a sensitivity to the emotional tone of a work of
art. Second, style sensitivity is likely to be influenced or enhanced by the perception of meaning. In some cases, an overall, global impression of the work, as well as the perception of meaning through, say metaphor, may be crucial to the perception of style. In other cases it may supplement the perception of distinctive features in the identification of style. And, in yet other cases, it may arise only after the perception of the style’s distinctive features.

It is quite possible, however, that the perception of the whole or Gestalt—whether on the perceptual, affective, or cognitive level—and the perception of the distinctive features or parts occurs simultaneously. It is also possible, that these two forms of perception are of equal importance. In discussing whole versus part perception, Walk (1981) reviews research pitting the prototype or schema theories and the distinctive-feature model of perceptual learning and concludes that both approaches are useful.

Wilding (1983) suggests that perception for complex organisms may involve global and holistic processing or the use of feature lists in an analytical, sequential manner depending on the developmental level of the organism, the degree of experience the organism has had with the stimulus, the task demands of the situation, the
level of processing involved, and the nature of the stimulus. For instance, he reviews research that suggests that faces are processed as wholes. In dealing with very unfamiliar stimulus patterns, however, the perceiver may first process stimulus features slowly, analytically, and sequentially until the pattern is well known, at which point these features will be processed simultaneously.

Neisser’s (1976) concept of the perceptual cycle explains how we can perceive meaning as well as more perceptually based information such as spatial position and form. In Neisser’s view, specific cognitive structures, which he calls anticipatory schemata, prepare us to accept certain kinds of information. He contends that a large portion of what we will see is what we know how to look for; our anticipatory schemata determine what we explore and, in turn, what we see. It should be noted however, that what we see then modifies the nature of our schemata. The process is cyclic: schemata direct our exploration of the environment; through exploration we sample available information from the environment; the obtained information changes our anticipations about what it is we are seeing; and our now modified anticipatory schemata once again direct our exploration.
Neisser suggests that optical information can specify objects or events at various levels of abstraction and meaning and that we organize different schemata at these different levels. He gives the example of perceiving someone smile. We perceive, all at the same time, the shapes of that person's teeth, the changing positions of his or her lips, the fact that the person is carrying out a certain culturally specific act, and something about the person's mood, whether it is cheerful, sardonic, or merely polite. Neisser suggests that when we perceive the person's mood, we are not engaged in the same perceptual cycle as when we are attending to his or her lip movements. He comments that in perceiving the smile or any other complex perceptual event, we develop a different (though perhaps overlapping) sets of anticipations; we pick up information that extends over different spans of time; we do not use the information for the same purposes, and we may remember different aspects of the event differently as a result.

Let us go back to the adult and sixth grader who were particularly good style perceivers. It appeared that they were continually developing and modifying anticipatory schemata which directed their attention to specific aspects of the dance. The sixth grader, after seeing the first part of the stimulus pair may have
decided at that point that the movement resembled that of an Indian doing a war dance. Upon seeing the second part, he was anticipating "Indian war-dance movement"—his description of the movement and one loaded with meaning and very much tied to his past experience. In anticipating a very specific type of movement, his attention was directed toward specific features of the movement in the second stimulus pair; in finding them, his notion of what that dance was like was confirmed. As a result, he was able to answer with confidence that the two parts of the pair came from the same dance. If his anticipation had not been confirmed, he probably would have answered that the two parts came from different dances.

A similar process appeared to be going on for the adult, though she was representing the movement to herself in a different manner, one which was more abstract and feature oriented. In both cases, however, the perception of the physical characteristics of the dance gave rise to a verbal representation of specific dance qualities. Seeing the arm accelerate on a straight line directly from the center of the body gave rise to the quality "piercing" for the adult. The sixth grader, upon seeing that movement, was reminded of an Indian thrusting his spear away from his body. Though the sixth
Grader was also perceiving specific physical characteristics of the movement, his perception was even more directly couched in meaning. As Neisser suggests, perception or perceptual cycles may occur on different levels and involve different psychological processes—from feature detection, to affective responses, to cognitive reasoning.

Neisser's suggestion of different perceptual cycles occurring during the perception of a single event and Wilding's discussions of part versus whole perception bring up the idea of parallel processing. Gardner (1985) reviews a new wave of artificial-intelligence theories that attempt to explain the process of visual perception in terms of parallel processing. He notes that instead of a complex passing of information from lower to higher levels in the central nervous system and, in particular, the brain, these new theories suggest that many units at many different neurological levels operate simultaneously and achieve their effects statistically. Consequently, the multiple connections allow much of the knowledge of the entire system to be applied in any instance of recognition or problem solving. In these theories, Gestalt phenomena might emerge from the competition and cooperation of various neural networks.
Gardner views this approach as being somewhere in between direct perception as advocated by the Gibsons and the classical cognitive theories involving symbolic structures and logical decision-making systems in which the steps of problem solving are carried out in a specified order. A full discussion of these new parallel-processing theories of visual perception is not within the scope of this discussion. They are important, however, because they suggest that any psychological process, whether it is the visual recognition of a rose or the calculation of an algebraic formula, cannot be compartmentalized, completely localized on a neurological level, nor explained in terms of just one theory. Even so, there is still a strong tendency in psychology, in both our research and in our theory, to separate perception from cognition, cognition from affect, and so on. These new theories of visual perception, along with Neisser’s theory, suggest that to understand any psychological process completely, we must call upon what we know about perception, learning, cognition, and affect, for all these psychological phenomenon continually interact, whether we are considering a predominantly perceptual task or a predominantly cognitive one.
Different Levels of Processing and Development

As we have seen, subjects in this study had a tendency to couch their perception of dance in terms of their own experience, to search for meaning in the dances, or to perceive emotional qualities in the movement. In some cases, picking up on the emotional tone of the dance may be important to the perception of its style. In other cases, the perception of specific meaning in the movement may not enhance style perception at all but may actually interfere with it.

None-the-less, the tendency for subjects to perceive meaning and affect cannot be discounted. As we have suggested, to the extent that subjects respond to dance on an emotional and cognitive level, as well as on a purely perceptual one, it is very difficult to explain style perception completely in terms of perceptual learning as defined by the Gibsons; or in terms of cognitive skills such as attention, class inclusion, or descriptive ability; or in terms of Gestalt perception—though we have found some evidence for each of these theories.

Neisser would probably suggest that each of these relationships might explain different aspects or phases of a complex process composed of perceptual cycles occurring at different levels of processing. It is
possible that at different ages and with different amounts of experience that the perceptual cycles involved in style sensitivity, as well as the various phases of those perceptual cycles, are more or less predominant. O'Hare and Westwood (1983) have found evidence that first graders are sensitive to the formal properties of artistic style; however, it is still unclear whether children this young can discern the interrelationship among these properties and thereby be sensitive to the style itself. As children mature, they may continue to refine their attention to the specific features of style and may begin to process them as an integrated whole through the use of metaphor or in terms of movement they have already experienced.

For instance, inexperienced children or adults, uninformed of specific dance terminology, may tend to process style in terms of the emotional response it evokes or in terms of some other physical activity it reminds them of—such as skipping rope or ice skating. In contrast, children or adults who have seen a lot of dance and have been exposed to the formal terminology of dance (including that discussed in Appendix E), may also be aware of the emotional and personal aspects of the dance, but they may be more apt to process its style in terms of specific distinctive features. Given different
developmental levels and different amounts of dance experience, subjects may be involved in different aspects of style sensitivity and employ different strategies to perceive style.

Limitations of the Study and Future Research

By considering the development of style sensitivity from the standpoint of perceptual-learning theory in conjunction with individual differences and Gestalt perception, we have provided a better model of the process than would be obtained from perceptual-learning theory alone. But as we have seen, the complexity of the development of style sensitivity probably arises not only from the interaction of learning with specific ability, but also from the way personal meaning and the emotional responses evoked by dance affect one's ability to perceive and remember styles. In its failure to operationalize and include all of these variables, this study is lacking. In the adult group, over half the variance was accounted for with age and the individual-difference and dance-experience variables, but for the sixth graders, only a third of the variance was
accounted for with these variables. One could say that other unknown variables needed to be included in both models.

It is possible, however, that dance experience might have accounted for more variance than it did, if it had been operationalized more accurately. As mentioned earlier, the Movement Experience Checklist (MEC) was a very rough measure of dance experience. For all subjects, but for the children especially, the MEC is susceptible to the inaccuracies involved with subject report of past behavior. For instance, in terms of degree of experience, what one subject considers "a lot" another subject may consider "not much at all." Ideally, if a careful record of specific past experience with dance could have been kept, it would have been possible to quantify dance experience more accurately and objectively. Also, as mentioned earlier, the MEC did not take into account the range of different kinds of dance experience—a variable that may be more important than the amount of dance experience.

Since dance experience was the strongest predictor of style perception, its effects should be studied under more controlled conditions with more accurate measures of dance experience. One alternative would be to conduct a longitudinal study in which teachers and parents would be
asked to keep specific records of their children's dance training and exposure to dance through concerts and theatrical productions. This might be done for children enrolled in alternative schools and schools of performing arts versus regular public schools or schools devoted to the study of the sciences and traditional college preparation.

Such a study might lead to more accurate measures of dance experience; however, since it would still be correlational in nature, as was this one, it might not tease out the effects of individual differences and the development of cognitive skills as they interact with dance experience. Training studies like the one conducted by Gardner (1972a) would provide more control of the variables in question.

For instance, from this study, it appears that the developmental dimension of impulsivity/reflectivity may be related to the efficiency of perceptual learning involved in the development of style sensitivity. One way to test this relationship more carefully would be to conduct a training study in which different age groups were exposed to a variety of dance styles through films and videotapes of dances. At different intervals in the training, the subjects could be tested for their ability
to perceive style. Presumably the slope of the learning curve for reflective subjects would be greater than that for impulsive subjects.

Also, such training studies could resolve the question as to whether the development of style sensitivity is linked to the acquisition of other cognitive skills as opposed to its simply being a function of perceptual learning occurring at any age. If the perceptual learning involved is not dependent upon high levels of attention, reflectivity, or verbal ability, then with sufficient training, very young subjects might be able to learn to perceive style. Even if it was determined that younger subjects could learn to perceive style, one might find that they would require more training to reach the same level of style sensitivity as adults who had also undergone training. Such a finding would indicate that development of certain cognitive skills may not be absolutely necessary for the development of style sensitivity, but they may make the perceptual learning involved more efficient.

Training studies could also clarify the interaction between special ability and the development of style sensitivity. From this study, subjects who score high on the Object Assembly subscale of the Wechsler would be expected to respond to style training more readily than
subjects who scored low on this subscale. Scoring high on Object Assembly may also predispose the sixth graders to respond more readily to training. As we saw in Chapter Six, for the sixth graders, Object Assembly approached significance when Overall Dance Experience was partialled out of its correlation with style perception. Post-hoc analysis indicated that when Dance Viewing alone was the covariate, the relationship was significant \( r = .31, p < .05 \).

This last finding brings to question the relationship between Dance Viewing and Formal Dance Training in the development of style sensitivity. As seen in this study, dance training had a positive but nonsignificant relationship with style perception. Further research could clarify this relationship. A group of subjects in dance training could be compared to a group which was given dance-viewing experience only. In addition, a group that received both dance training and dance-viewing experience could be compared to the first two groups.

For the adults, verbal ability was an individual difference related to style sensitivity. Further research could clarify this relationship by comparing groups high and low in verbal ability in terms of the efficiency with which they learned the stimulus dimensions and distinctive features of choreographic
style in a training study. From our discussion of the relationship between language and perception in Chapter Two, it would be very interesting to include specific instruction on the elements and qualities of dance (such as those defined in Appendix E) as an independent variable. Presumably, subjects who are taught verbal labels for the elements of dance might be better able to direct their attention to the distinctive features of choreographic style than subjects who were only given the chance to view many different kinds of dance. In addition, subjects who score higher on tests of verbal ability should benefit most from a combination of verbal instruction and dance-viewing experience.

Implications for Dance Educators

From this study several recommendations can be made to dance educators, whether they are teaching dance technique, dance history, or dance appreciation. For students at all age levels, viewing many different kinds of dance may be the most important aspect of the development of style sensitivity and dance appreciation. Even in dance-technique classes, imitating others and modeling movement is one of the primary ways in which
students learn correct technique. The results of this study indicate that in the process of viewing many different kinds of dance and becoming aware of the range of movement dimensions and movement qualities available to them, students will expand their movement repertoire. Such exposure may be especially important to students in creative-movement or composition classes.

Since Digit Span was related to style sensitivity for the sixth graders and since it appears to be related to short-term memory and selective attention, it is important for teachers to keep material to be viewed or danced by children quite short. This is something dance teachers undoubtedly already understand. Teachers should also search for techniques that might maintain or focus attention on the object of the lesson and on specific movement qualities. Such techniques might involve the use of props, the use of breathing, the use of rhythm instruments, and changing activity and pace frequently. It may also be important for dance teachers to relate movement to the children's own experiences. In this way, it will be more meaningful, it will capture their attention, and it will be easier to remember.

From the descriptions of the dances provided by the sixth graders, one might suggest that dance teachers use metaphor, simile, and imagery in their classes. Joyce
(1980), however, discusses the problems associated with the use of imagery in teaching creative dance. Even though children may know and be able to produce the movement qualities associated with "wild horses galloping" or "ice cream melting" or "popcorn popping," when they are asked to move like these things, they have a tendency to pantomime rather than dance. As a result, the activity becomes more like play than dance. Consequently, Joyce suggests that when using such imagery, the teacher must always focus on other objects, animals, or people that share the same movement qualities by asking students "What else moves like that?"

Joyce comments that teachers must always try to impress upon their students that dance is not about something. Dance is something. Earlier, we noted that all subjects had a tendency to try to figure out what the dance was about even when the original basis of the movement was abstract. This tendency to search for specific meaning and representation may be indigenous to our nature and our culture. In terms of art appreciation, however, it could, in some cases, indicate an unsophisticated viewer--one who has not differentiated the stimulus dimensions and distinctive features of the medium and the styles of the artists who work with it. According to Gardner, such an unsophisticated viewer
might only search for figure in a work of art and remain insensitive to stylistic qualities that integrate figure and ground. Indeed, the perception of style may be one of the first indications that a person is beginning to understand the work as art as opposed to just another means of representation.

Joyce feels that children should be taught the elements of dance—the basic steps, the use of space, time, and force. In this way, specific features of movement quality can be dissected and understood by the children, and they begin to consider creative movement in terms of dance and not pantomime or play. Of course the verbal labels that Joyce has used with her dance students are not as sophisticated as those defined in Appendix E. They are, however, very much related. From her practical experience in the studio, it appears that a style-training study which includes instruction on the elements of dance would be effective with younger subjects as well as adults. It may well be that such instruction would be even more effective with younger subjects since they are not as verbally sophisticated and cannot generate their own labels for the qualities of dance as, apparently, adults can.
Summary

From this study it appears that the development of an ability to perceive choreographic style in dance follows a pattern similar to that in music and painting. Furthermore, the strongest predictor of choreographic style sensitivity appears to be past experience with dance, particularly experience viewing dance. This finding lends support to a perceptual-learning model of the development of style sensitivity.

There was also some support for the suggestion that individual differences—whether they arise from developmental differences or from differences in specific ability—may predispose some people to be better at differentiating the stimulus dimensions and distinctive features of choreographic style. The exact nature of the contribution of individual differences as they interact with perceptual learning—both throughout the development of the child and for the adult who is learning to perceive style—will not be completely understood until we conduct more controlled training studies. In addition, the introduction of certain principles from Gestalt psychology allowed a better understanding of
certain aspects of style perception—such as the
perception of a style as an integrated whole—that could
not be obtained from the first two theories.

In examining style development from the perspective
of perceptual-learning theory coupled with individual
differences and Gestalt psychology, we have made the
first attempt to model what appears to be a complex
process from more than one theoretical perspective. From
our discussion of the problem of meaning and affect, it
appears that there are aspects of the development of
style sensitivity left unexplained. Eclectic approaches
such as those espoused by Gardner in his theory of
multiple intelligences, by Neisser in his theory of the
perceptual cycle, and by researchers exploring theories
of parallel processing in the field of artificial
intelligence may be necessary to completely understand
the processes involved in the development of artistic
style sensitivity.

As dance can be considered an art form, this study
makes a contribution to the literature on aesthetic
development. However, dance is a subset of human
movement, and the study of human-movement styles in
general can have other implications and applications.
Perhaps one of the most obvious is in the teaching and
learning of sports. For the most part, individuals in
sports have been more concerned about the goal of the action—whether it is getting the ball over the net, in the end zone, or in the basket—than the specific movement qualities of the players. If more attention were paid to the way extremely good players moved and the qualities of their actions, learning to play a sport well might progress much more efficiently.

Character actors are performing artists that might benefit from specific instruction on movement styles. Theater students could be taught the elements of movement style, such as those discussed in Appendix E, and asked to analyze the qualities of movement that different kinds of people exhibit. They could also be asked to construct a movement quality profile of the character that they might be working on in a play.

Learning to be perceptive of different movement styles and qualities of movement might be very useful in clinical disciplines such as medicine and clinical psychology. Dance has been employed in some settings as therapy itself, but the specific training of clinicians to be able to perceive changes in movement quality of their patients may provide them with another means by which to monitor the success of more conventional forms of therapy.
Another area in which an understanding of movement styles could be very important is that human factors. Many of Laban's earliest studies of human movement attempted to uncover the specific qualities of efficient movement involved in various kinds of manual labor. As today's industrial designers, engineers, and architects attempt to create equipment and working spaces that afford efficient comfortable movement, they would benefit from an understanding of the different styles of human movement.

With all theoretical and practical implications aside, the ability to perceive different styles of human movement, whether as subtle and complex as choreographic style or merely the way someone walks across the room, is to be sensitive to another form of human expression—a form that gets little attention in a culture that is largely verbal in its mode of communication. Unlike most other living creatures, no two human beings have the same voice, the same fingerprint, or the same way of moving. Our individual styles or ways of moving are as much an expression of who we are as specifically what we do or say. As we become aware of these differences in others and in ourselves, we enrich our day-to-day experience, and we come in touch with that which makes us distinctly human.
REFERENCES


Solley, C. M., & Murphy, G. Development of the perceptual world. New York: Basic.


APPENDIX A

Calculation of Salkind's Dimensions
The speed vs. accuracy domain of reflectivity/impulsivity is defined in terms of two dimensions: impulsivity and efficiency. Impulsivity is defined as a dimension of individual differences ranging from fast-accurate to slow-accurate performance. Efficiency is defined as a dimension of individual differences ranging from slow-inaccurate to fast-accurate performance. Impulsivity and efficiency scores (I and E respectively) are generated from raw latency and error scores by the following formulas:

\[ I(i) = Z(e_i) - Z(l_i) \]
\[ E(i) = Z(e_i) + Z(l_i) \]

I(i) = impulsivity for the ith individual
E(i) = efficiency for the ith individual
Z(e_i) = standard score for the ith individual’s total errors
Z(l_i) = standard score for the ith individual’s mean latency
Large positive I scores indicate impulsivity and large negative I scores indicate reflectivity. Large positive E scores indicate inefficiency and large negative E scores indicate efficiency.

APPENDIX B

Movement Experience Checklist
Movement Experience Checklist

1. Do you like sports?
   yes____(1)
   no____(0)

2. Have you ever been on any teams?
   yes____(scored below)
   no____(0)

   What kind?

   Type                        How long?
   ______ football
   ______ baseball
   ______ basketball
   ______ soccer
   ______ track
   ______ volleyball
   ______ wrestling
   ______ tennis
   ______ ice hockey
   ______ field hockey
   ______ lacrosse
   ______ swimteam
   ______ other
   ______ diving
   ______ cheerleading

   (One point was given for each year or season on a team. The last three teams were scored as part of the Other Experience score.)

3. Are (were) any of your friends, or brothers or sisters (or children) on any kind of team?
   yes____(scored below)
   no____(0)

   Do you ever watch them play? Go to their games?
   yes____(scored below)          no____(0)
4. Have you ever been in a marching band or on a drill team?
   yes____(1)   no____(0)

5. Do you ever watch sports on TV?
   yes____(scored below)   no____(0)

   What do you watch? (not scored)
   baseball _____
   football _____
   Wide World of Sports _____
   Olympics _____

   How often would you say that you watched sports on TV?
   a lot____(3)  sometimes____(2)  rarely____(1)
   (not much at all)

6. Do you go to many sporting events?
   (Do you go to watch people play games like sports or tennis?)
   yes____(scored below)   no____(0)

   How often do you go to games or matches?
   a lot____(3)  sometimes____(2)  rarely____(1)
   (not much at all)

7. Have you ever had any tennis lessons?
   yes____(scored below)   no____(0)

   How long?____

8. Do you ever play tennis for pleasure?
   (just for fun)
   yes____(scored below)   no____(0)

   How often do you play?
9. Have you ever done gymnastics?
   yes____(scored below)       no____(0)
   how long?____

10. Have you ever played raquetball or squash?
    yes____(scored below)       no____(0)
    How often do you play?
    a lot?____(3)   sometimes____(2)   rarely____(1)
                     (not much at all)

11. Is there any sport that you have training in or that
    you like to play that I haven't mentioned?
    (Is there any other game that you like to play or
     special team that you've been on that we haven't
     talked about yet?)
    yes____(scored below)       no____(0)
    type___________
    How long?____

12. Have you ever had Karate or Judo lessons?
    yes____(scored below)       no____(0)
    how long?____

13. Have you ever been roller skating?
    yes____(scored below)       no____(0)
    How often did (do) you go?
    a lot____(3)   sometimes____(2)   rarely____(1)
                     (not much at all)

14. Have (do) you ever gone (go) ice skating for
    pleasure?
    (just for fun)
15. Have you ever had figure-skating lessons?

yes____(scored below) no____(0)

How long did you take them?_____
(have you been taking)

16. Have you ever been to the ice capades or any other show on ice? (show where people were ice skating)

yes____(scored below) no____(0)

How many times have you been?_____
1 to 2 times scored as (1)
3 to 4 times scored as (2)
over 4 times scored as (3)

17. Have you ever had any dance lessons?

yes____(scored below) no____(0)

What kind?

Type how long?

____ ballet
____ tap
____ jazz
____ modern
____ ball room
____ aerobics
____ folk
____ other

(One point was given for each year or season of lessons.)

18. Have you ever been square dancing?

yes____(scored below) no____
209

How often did (do) you go?

a lot____(3) sometimes____(2) rarely____(1)
(not much at all)

19. Have you ever gone dancing just for fun?
(Do you ever go)

yes____(scored below) no____(0)

How often did (do) you go?

a lot____(3) sometimes____(2) rarely____(1)
(not much at all)

20. Do you like to dance?

yes____(1) no____(0)

21. Do you like to watch people dancing?

yes____(1) no____(0)

22. Have you ever been to a dance concert or a ballet?
(a show where all the people did was dance?)

yes____(scored below) no____(0)

What kind of dance was it? (not scored)

_____ ballet
_____ modern
_____ jazz
_____ show
_____ other

About how many concerts have you been to?_____

1 to 2 times scored as (1)
3 to 4 times scored as (2)
over 4 times scored as (3)

23. Do you ever watch shows on TV where people are dancing?

yes____(scored below) no____(0)

What kind of shows? (not scored)
Fame
MTV
ballet concerts
other concerts

How often do you watch dance on TV?

a lot_____ (3) sometimes_____ (2) rarely_____ (1)
(not much at all)

24. Have you seen any movies that had dance in them?

yes_____ (scored below) no_____ (0)

What kind of dance was it? (not scored)

ballet
modern
jazz
show
break dancing
other

About how many movies have you seen that had dance in them? ______

1 to 2 movies scored as (1)
3 to 5 movies scored as (2)
6 to 8 movies scored as (3)
over 8 movies scores as (4)

25. Have you been to any plays that had dance in them?

yes_____ (scored below) no_____ (0)

What kind of dance was it? (not scored)

ballet
modern
jazz
show
other

About how many plays have you seen that had dance in them? ______

1 to 2 plays scored as (1)
3 to 4 plays scored as (2)
5 to 6 plays scored as (3)
over 6 plays scores as (4)
26. Do you have any brothers or sisters or good friends that have taken (are taking) dance classes?

yes_____ (scored below) no_____ (0)

Do you ever go see them perform in recitals or concerts?

yes_____ (scored below) no_____ (0)

a lot____(3) sometimes____(2) rarely____(1)
(not much at all)

(If the subject indicated "yes" for question 26, his or her answer for question 22 was clarified. If the same concerts were involved for both questions, the subject received points for only one.)

27. Have you ever seen anyone perform pantomime?

yes_____ (scored below) no_____ (0)

about how many times?_____ 

1 to 3 times was scored (1) over 3 times was scored (2)

28. Have you ever done any pantomime?

yes_____ (scored below) no_____ (0)

how much?_____

1 or 2 times was scored (1) specific training in the context of an acting class was scored (2)

The Sports Participation score was determined by adding the total number of points for questions 1, 2, 7, 8, 10, and 11.

The Sports Viewing score was determined by adding the total number of points for questions 3, 5, and 6.

The Overall Sports score was determined by adding the Sports Participation score and the Sports Viewing score.

The Formal Dance Training score was determined by adding the total number of points for question 17.
The Social Dance score was determined by adding the total number of points for questions 18, 19, and 20.

The Dance Participation score was determined by adding the Formal Dance Training score and the Social Dance score.

The Dance Viewing score was determined by adding the total number of points for questions 21-26.

The Overall Dance score was determined by adding the total number of points for the Dance Participation score and the Dance Viewing score.

The Other Experience score was determined by adding the total number of points for questions 4, 9, 12, 13, 14, 15, 16, 27, and 28, plus any points from the last three items on question 2.
APPENDIX C

Directions to the Subject: Style Measure
Directions to the Subject: Style Measure

In a few minutes I am going to show you some small parts of dances. Each time you will be seeing two parts at a time, one right after the other. Sometimes the first part and the second part will be from the same dance, and sometimes the first part and the second part will be from different dances--dances that were made by different people. What I would like you to do is tell me whether you think the two parts came from the same dance or whether you think that they came from two different dances. Do you have any questions (about what I want you to do)?

Ok. I am going to give you a chance to practice. When I turn on the tape player the first thing you will see are some numbers. It will go "5," "4," "3," and then "2." Then the screen will be black for a second, and then the dancer will come on. After the first part is finished, the screen will go black again for five seconds (a little bit) and then the dancer will come back on, and you will see the second part. After the second part is finished, I will turn off the tape and you can tell me whether you think the two parts come from the same dance or whether you think they come from different dances. Do
you have any questions about what you are going to see?

(At this point, the sixth-grade and first-grade subjects were asked to paraphrase the instructions.)

Now you tell me what I want you to do.

(If the child did not accurately paraphrase the directions, they were repeated, and the child was again asked to paraphrase them.)

Ok. Let's try some for practice.

(The subject was shown the two practice items and asked for reasons for their answers. If the subject got either of the two practice items wrong, the experimenter corrected the subject and showed the item again, pointing out similarities or differences, until the subject could see why the two parts came from the same or different dances.)
APPENDIX D

Additional Tables
Table 20
Correlation Matrix for Wechsler Subscales: Adults

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Key:
- a = .05
- b = .01
- c = .001
- d = .0001

FI = Full IQ
VI = Verbal IQ
PI = Performance IQ
IN = Information
DG = Digit Span
VC = Vocabulary
AR = Arithmetic
CP = Comprehension
SI = Similarities
PC = Picture Completion
PA = Picture Arrangement
BD = Block Design
OA = Object Assembly
DS = Digit Symbol
Table 20 continued
Correlation Matrix for Wechsler Subscales: Adults

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Key:

- CP = Comprehension
- SI = Similarities
- PC = Picture Completion
- PA = Picture Arrangement
- BD = Block Design
- OA = Object Assembly
- DS = Digit Symbol

Levels of significance:

- a = .05
- b = .01
- c = .001
- d = .0001
Table 21
Correlation Matrix for Wechsler Subscales: 6th Graders

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a = .05
b = .01
c = .001
d = .0001

Key:

FI = Full IQ  CP = Comprehension
VI = Verbal IQ  SI = Similarities
PI = Performance IQ  PC = Picture Completion
IN = Information  PA = Picture Arrangement
DG = Digit Span  BD = Block Design
VC = Vocabulary  OA = Object Assembly
AR = Arithmetic  DS = Digit Symbol
Table 21 continued
Correlation Matrix for Wechsler Subscales: 6th Graders

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Key:

CP = Comprehension
SI = Similarities
PC = Picture Completion
PA = Picture Arrangement
BD = Block Design
OA = Object Assembly
DS = Digit Symbol
Table 22
Correlation Matrix for Wechsler Subscales: 1st Graders

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a = .05
b = .01
c = .001
d = .0001

Key:
FI = Full IQ
VI = Verbal IQ
PI = Performance IQ
IN = Information
DG = Digit Span
VC = Vocabulary
AR = Arithmetic
CP = Comprehension
SI = Similarities
PC = Picture Completion
PA = Picture Arrangement
BD = Block Design
OA = Object Assembly
DS = Digit Symbol
Table 22 continued  
Correlation Matrix for Wechsler Subscales: 1st Graders

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</table>

*a = .05  
*b = .01  
*c = .001  
*d = .0001

Key:

CP = Comprehension  
SI = Similarities  
PC = Picture Completion  
PA = Picture Arrangement  
BD = Block Design  
OA = Object Assembly  
DS = Digit Symbol
Table 23

Correlations of Age, Sex, and Salkind Dimensions with the Wechsler Subscales: Adults

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<th>Sex</th>
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<th>Efficiency</th>
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a = p < .05
b = p < .01
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<th>Age</th>
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<th>Efficiency</th>
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a = p < .05  
b = p < .01  
c = p < .001
Table 25

Correlations of Age, Sex, and Salkind Dimensions with the Wechsler Subscales: 1st Graders

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a = p < .05
b = p < .01
Table 26
Correlation Matrix for Movement Experience Checklist Subscores, Sex, and Age: Adults

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<tr>
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<th>OD</th>
<th>OS</th>
<th>DV</th>
<th>DP</th>
<th>SD</th>
<th>FD</th>
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</tbody>
</table>

a = p < .05  
b = p < .01  
c = p < .001  
d = p < .0001

Key:  
OM: Overall Movement Experience  
OD: Overall Dance Experience  
OS: Overall Sports Experience  
DV: Dance Viewing  
DP: Dance Participation  
SD: Social Dance  
FD: Formal Dance Training  
SV: Sports Viewing  
SP: Sports Participation  
OT: Other Experience  
AG: Age  
SX: Sex
Table 26 continued

<table>
<thead>
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<td>.06</td>
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</table>

a = p < .05
b = p < .01
c = p < .001
d = p < .0001

Key:
SV: Sports Viewing
SP: Sports Participation
OT: Other Experience
AG: Age
SX: Sex
Table 27
Correlation Matrix for Movement Experience
Checklist, Sex, and Age: 6th Graders

<table>
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SP .65d -.01 .96d .05 -.03 .13 -.16
OT .56d .45b -.08 .34a .45b .34a .38b
AG .17 .31a -.07 .13 .42b .40b .29
SX -.03 .45b -.61d .28 .51c .28 .54c

a = p < .05
b = p < .01
c = p < .001
d = p < .0001

Key:
OM: Overall Movement Experience
OD: Overall Dance Experience
OS: Overall Sports Experience
DV: Dance Viewing
DP: Dance Participation
SD: Social Dance
FD: Formal Dance Training
SV: Sports Viewing
SP: Sports Participation
OT: Other Experience
AG: Age
SX: Sex
Table 27 continued

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b = p < .01  
c = p < .001  
d = p < .0001

Key:

SV: Sports Viewing  
SP: Sports Participation  
OT: Other Experience  
AG: Age  
SX: Sex
Table 28
Correlation Matrix for Movement Experience Checklist, Sex, and Age: 1st Graders

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<th>SD</th>
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Key:
- a = p < .05
- b = p < .01
- c = p < .001
- d = p < .0001

OM: Overall Movement Experience
OD: Overall Dance Experience
OS: Overall Sports Experience
DV: Dance Viewing
DP: Dance Participation
SD: Social Dance
FD: Formal Dance Training
SV: Sports Viewing
SP: Sports Participation
OT: Other Experience
AG: Age
SX: Sex
Table 28 continued

<table>
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Key:

a = $p < .05$

b = $p < .01$

c = $p < .001$

d = $p < .0001$

SV: Sports Viewing
SP: Sports Participation
OT: Other Experience
AG: Age
SX: Sex
### Table 29

Correlations between the Dance and Other Experience Scores and the Wechsler Subscales: Adults

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*a p < .05

*b p < .01

**Key:**

OD: Overall Dance Experience  
DV: Dance Viewing  
DP: Dance Participation  
SD: Social Dance  
FD: Formal Dance  
OT: Other Experience
### Table 30

Correlations between the Dance and Other Experience Scores and the Wechsler Subscales: 6th Graders

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*a* = p < .05  
*b* = p < .01  

**Key:**

- **OD**: Overall Dance Experience  
- **DV**: Dance Viewing  
- **DP**: Dance Participation  
- **SD**: Social Dance  
- **FD**: Formal Dance  
- **OT**: Other Experience
### Table 31

**Correlations between the Dance and Other Experience Scores and the Wechsler Subscales: 1st Graders**

<table>
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*a = p < .05  
b = p < .01*

**Key:**

- OD: Overall Dance Experience
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- DP: Dance Participation
- SD: Social Dance
- FD: Formal Dance
- OT: Other Experience
APPENDIX E

Laban's Theories as Related to Choreographic Style
Laban's Theories as Related to Choreographic Style

To gain an understanding of how choreographic style might be conceptualized and analyzed, it is useful to explore the theories of Rudolf Laban, as well as examples of research on choreographic style that have incorporated his concepts. Laban's notational system (Laban, 1956) is not the only one in existence. There are others, notably, the Benesh system (Benesh & Benesh, 1956) and the Eshkol/Wachman system (Eshkol & Wachman, 1958). These systems, however, do not capture many of the subtleties, the dynamics, and spatial complexity of dance movement (Preston-Dunlop, 1981), and consequently, do not provide the aesthetic vocabulary which is probably necessary to describe differences in choreographic style. Lepczyk (1981) suggests that the Laban perspective does provide the conceptual framework and terminology needed to discuss the uniqueness of different movement styles. This is due largely to his having defined two other theories that allow the dynamics and spatial structure of movement to be described, thereby complementing his already complex notational system.

Secondly, it is Laban's work that has inspired the bulk of research to date on choreographic style. It is for this reason that we review here some of Laban's basic
concepts. Given the complexity of this area, however, the reader is urged to consult the primary sources cited in the discussion for a better understanding of Laban's ideas. We will restrict description of Laban's theory as it relates to choreographic style. However, there is a well-defined and growing body of literature on movement analysis in other disciplines. The interested reader is urged to consult Davis (1975) and Davis and Skupien (1982) for an introduction to this fascinating area of research and theory.

The Work of Rudolf Laban

Most widely known for his dance notation system called Kinetography Laban or Labanotation, Laban also developed two other areas of movement theory--Space Harmony or Choreutics and Eukinetics, which subsequently became known as Effort.

Labanotation

Through the use of a complex symbol system, Labanotation allows movement to be written down and then later reconstructed. Hutchinson (1977) comments that "Labanotation is comparable to music notation in its
universality and application, and provides for movement a level of accuracy and flexibility which music notation has yet to achieve" (p. 5). Labanotation allows the notator to record the patterns of weight displacement, changes in level and direction in space, the duration of movements (timing and rhythm), touch patterns, spatial orientation, and floor patterns (Cohen, 1978). As one reads a Labanotation staff from bar to bar, the path of the movement emerges (Laban, 1956).

Labanotation has been used to record motions of the human body in fields such as anthropology, athletics, and physiotherapy, though its most obvious use is in the preservation of choreography (Hutchinson, 1977). Bartenieff and Davis (1972) and Lepczyk (1981) note that Labanotation has been used extensively throughout Europe and the United States to record ballet, modern, and folk dance. In terms of differentiating individual choreographic styles, however, Laban's theories of Space Harmony and Effort provide a complementary framework for the description of spatial structure and qualitative components.

**Effort**

Effort theory had its origins in the Eukinetics concepts which Laban developed in the 1920's. According
to Davis (1970), Eukinetics was the description and understanding of movement dynamics, the movement equivalents of forte, dolce, pianissimo, etc. As a way to describe the expressive qualities of dance, it was to complement Choreutics, or the understanding of movement in terms of its spatial harmony and form. Maletic (in press) notes that in the 1920's and 1930's Eukinetics and Choreutics were seen as integral parts of choreology, the science of dance.

During World War II, as a result of his studies of industrial workers, Laban expanded Eukinetics to consider the relationship between the mind and the body during all kinds of human movement. Effort theory resulted from this expansion of the original Eukinetics concepts, which had been used until that point primarily to coach movement in dance and theatre (V. Maletic, personal communication, November 20, 1986). After publication of Effort (Laban and Lawrence, 1947), which concentrated on Effort in work and industry, subsequent publications (Laban, 1948, 1950, & 1960) applied Effort theory to dance, acting, and mime.

In Effort theory, Laban defined four Motion Factors which were common to all movement. As North (1975) notes, these factors can be considered quantitatively as:

(1) space, or the measurable degree of angles of
movement; (2) weight, or the measurable degree of strength used in the action; (3) time, or the measurable length of time taken to make a movement; and (4) flow, or the measurable degree of continuity or pausing in the movement.

Laban suggested that different qualities of movement or individual Effort patterns result from a person's mental or inner attitudes toward these four physical characteristics of movement. The degree to which the individual accepts or resists each of the Motion Factors can be described qualitatively in terms of bipolar dimensions. A person's relationship to Space can either be direct or flexible/indirect; to Weight as either strong/firm or light/gentle; to Time as either sudden/quick or sustained; to Flow as either bound or free.

For Laban, these inner attitudes toward the Motion Factors are underlying mental and emotional characteristics that find concrete expression in the body. Indeed, all movement has its origin in a fusion of thought, feeling, and emotion (Bartenieff, 1970), and Laban (1971) states that the attitudes of attention, intention, and decision are stages of the inner preparation of an outer bodily action. A person's attitude toward Space is associated to his or her degree
of directness of attention and thinking. Attitudes toward Weight are associated with degree or forcefulness of intent, degree of willpower, and with sensing. Attitudes toward Time are associated with the degree of urgency of decision and intuiting. Lastly, attitudes toward Flow are associated with progression, degree of precision, degree of ease in relationships, and feeling. Maletic (in press) makes the interesting observation that the mental/emotional states associated with each of the Motion Factors can be linked to C. J. Jung’s division of consciousness.

North (1975) notes that single elements of movement rarely appear over a prolonged period of time, and most of the words we use to describe actions and feelings in everyday life have a combination of two or more elements. Laban and Lawrence (1947) and Laban (1948) defined eight Basic Effort Actions that are a combination of three elements of Weight, Time, and Space:

<table>
<thead>
<tr>
<th>Thrust</th>
<th>and its opposite</th>
<th>Float</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct</td>
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North (1975) states that these eight Basic Effort Actions can be considered functional work actions when they are related to external objective activity, such as in handling or manipulating materials. When these same combinations of three elements appear as mental/emotional "actions," however, North calls them externalized drives. For example, she notes that a thrusting, hitting or jabbing action—such as knocking in a nail or punching a punchball—could become, as a mental action, a hitting or thrusting gesture—perhaps in support of a dogmatic statement. A screwing, wringing action—as in wringing out a cloth, or screwing in a corkscrew—could become, as a mental action, a "wringing of the hands" in agony, writhing of the body in avoiding an issue, screwing up the face in distaste.

A new set of externalized drives is created when the Motion Factor of Flow is substituted for any of the Space, Weight, or Time Effort qualities in the Basic Action Drive. If the Flow factor replaces Space...
qualities, an emotional or passion drive results. When Flow replaces Time, a timeless, spell-like drive is created. Lastly, if we substitute Flow for Weight, a weightless, visionary drive results.

Each of the four three-factor combinations has a potential for eight variations, providing a total of thirty-two different qualities. North (1975), Dell (1977), and Laban (1960) explore these different qualities which result from the various three-factor combinations, and the reader is referred to those sources for further discussion of them.

Dell (1977) makes the important point that the Basic Effort Actions constitute the most highly crystallized exertions described in the Effort system, rather than being its basic ingredients, as many people have assumed. She continues by saying that accurate performance of Basic Effort Actions requires intense concentration and intense interaction with people and objects.

Combinations of two elements are considered Incomplete Efforts, since as North (1975) points out, they are not unlike depleted external actions. As mental or emotional inner attitudes, however, they are complete states of mind and very much a part of expressive movement (Laban, 1971). North (1975) notes
that many sequences and series of them occur in movement phrases that we use in everyday life and that they form the basis of dance movement. Dell (1977) suggests that selection of different two-factor combinations figures largely in what we recognize as one dance style or another.

There are six different two-factor combinations: **Weight and Flow** and its opposite, **Space and Time**; **Weight and Time** and its opposite, **Space and Flow**; **Flow and Time** and its opposite, **Weight and Space**. Laban (1971) states that movement that emphasizes qualities of Space and Time is giving us information about "where and when" and creates an "awake" or alert attitude, whereas its opposite two-factor combination, Weight and Flow gives us information about "how and what" and can be characterized as "dreamlike."

Movement that emphasizes Space and Flow gives information about "where and how" and creates a detached, abstract, remote mood, whereas its opposite combination, **Weight and Time** gives information about "where and what" and creates a warm, rhythmical, earthy, near mood (Maletic, in press).

Movement that emphasizes Space and Weight gives information about "where and what," gives a sense of steadfastness and can be characterized as solid and
stable, whereas its opposite combination, Time and Flow gives information about "when and how" and can be characterized as adaptable and mobile.

Within each combination of two factors, there can be four variations. For instance, Space and Time combinations include direct/sudden movement, which could be characterized as spikey or sharp; direct/sustained movement, which could be characterized as smooth and straight; flexible/sudden movement, which could be characterized as fluttering or quick twisting; and flexible/sustained movement, which could be characterized as stirring or slow twisting (North, 1975). There are twenty-four distinct "incomplete efforts." The reader is urged to consult North (1975) for adjectives describing each two-factor combination and for discussion of the mental/emotional states associated with each.

In terms of using Effort theory to analyze individual movement styles or individual choreographic styles it is important to consider two- and three-factor combinations in the context of movement sequences rather than in isolation. Laban (1947), North (1975), and Maletic (in press) emphasize the importance of examining the transitions between different Effort qualities. When changes are made from one movement combination to a distant or opposite mixture, are transitional movement
elements incorporated to ease the change and make it smooth and natural? Or is there strong contrast and tension, which results from a person jerking directly from one inner attitude to another?

Secondly, Effort analysis could focus on the degree to which Effort qualities are manifest in the body as a whole, or whether different qualities are performed at the same time by different body parts (Maletic, in press). Also, the repetition of certain motion factor combinations or Effort sequences may be important in determining individual movement tendencies (North, 1975).

**Choreutics or Space Harmony**

Whereas Effort theory focuses on the dynamic qualities of the movement, Choreutics or Space Harmony deals with the theory and practice of ordering movement in space (Maletic, in press). As a system, it explores the use of space, the paths along which movement travels, the ways of projecting into space around the body, the axis and directional orientation of movement, and the one- two- and three-dimensional forms created by movement patterns.

The concept of the *kinesphere* forms the basis of Laban’s theory of Space Harmony. The outer boundaries of the kinesphere, or "sphere of movement," are defined by
the normal extension of the limbs to all points surrounding the body without changing one's stance or base of support (Laban, 1948).

The Kinesphere can be subdivided or mapped out by directions and counter-directions which radiate from its center. For instance, Laban defined six dimensional directional rays: and upward or high direction and its counter-direction, down or deep; the right direction and its counter left; the forward direction and its counter, backward. Taken together, these six dimensional rays form a three-dimensional cross (see Figure 1.).

Dimensional Rays

Figure 1.
If the cross is placed in an imaginary cube, the center of the cube and the center of the kinesphere are the same (Laban, 1948). Instead of a cross, we can map out or articulate the kinesphere by using eight diagonal lines radiating from its center. In which case, the diagonal directional rays are defined (see Figure 2.).

Diagonal Rays

![Diagram of diagonal rays in a cube]

Figure 2.

The kinesphere can be articulated or structured in yet another manner by three intersecting planes: the sagittal (wheel), the frontal (door), and the horizontal (table). The twelve diametral directional rays emerge from the center of the kinesphere to the corners of each of these planes (see Figure 3.).
Movement in the different directions can be characterized in terms of its relative stability or lability/mobility. Dimensional directions lend movement that is relatively stable since it is in line or perpendicular to the support. Movement in diagonal directions bring the center of weight out of vertical alignment over the support and result in lability or mobility. Diametral directions may lend either stable or labile movement depending upon their particular configurations (Maletic, in press).

By connecting various points of the kinesphere, Laban identified various spatial forms, which have been called "spatial scales," and "rings." There are a great number
of spatial forms that can be created by moving centrally, peripherally, and/or transversally through the kinesphere, but Laban defined several specific scales that are based on and create ordered crystalline structures. Composed of sequences of movement across intervals of space, these scales are comparable to scales in music. The order of the scales is based on harmonic principles such as counter-tension or opposition, paralellism, and equilibrium (Maletic, in press).

The **Dimensional scale** is based on the octohedron, the crystalline form that is created when the outer points of the dimensional cross are connected (see Figure 4.). Since the dimensional rays create its internal structure, the dimensional scale is characterized by stability.
The **Diagonal** scale is based on the cube, the internal structure of which is defined by the eight diagonal directional rays (see Figure 2.). The labile quality of the diagonal scale leads to locomotion and elevation.

When all of the corners of the sagittal, horizontal, and vertical planes are connected peripherally, the icosahedron, a regular body with twenty triangular facets, is created (see Figure 5). This crystalline structure, due to its complexity, allows for a greater number of scales and rings. It is also the only form which allows **transversal** links, lines that traverse the kinesphere, passing between the center and the periphery, as well as **inclinations**, transversal lines between different planes (Preston-Dunlop, 1980).

![Icosahedron](image)

**Figure 5.**
For further discussion of the spatial scales, as well as the rings and circuits associated with each, the reader is referred to Preston-Dunlop (1980 & 1981), Maletic (in press), and Laban (1966).

Research Related to Choreographic Style Analysis

As mentioned earlier, Laban's theories and concepts have inspired a body of research on choreographic style analysis. The studies listed here are meant to provide examples of this research. Again, the interested reader is urged to consult them directly, largely due to their complexity, but also to see which of Laban's concepts each researcher has elected to emphasize. This is especially important for studies that include his ideas concerning "bodily components," which he discusses in some detail in his book, The Mastery of Movement. Also, many of these studies incorporate "shape" variables, which were developed from Laban's concepts of "spatial affinities" and "spatial intents" by Warren Lamb, Irmgard Bartenieff, and Judith Kestenberg, all of whom have employed Laban's theories in more applied settings (Lamb, 1965; Lamb & Turner, 1969; Bartenieff, 1970; Bartenieff & Davis, 1972; Bartenieff & Levis, 1980; Kestenberg, 1965, 1967, 1972).
Of the studies that incorporate concepts from Laban's theory of Space Harmony for the analysis of choreographic style, Preston-Dunlop (1981), is one of the more ambitious. Through the definition of "choreutic units," "choreutic fragments," and "choreutic clusters," she has attempted to discern "choreutic styles" in works by Martha Graham and Doris Humphrey, among others.

Gellerman (1978) found that spatial dimensions and planes were particularly useful in her differentiation of dances from three American Hasidic communities, but in addition, she was able to observe how Effort and shape characteristics in the movement also reflected cultural attitudes.

By including bodily components, Effort, shape, and Space Harmony variables in her analysis, Kagan (1978) was able to compare characteristic phrases from works by Paul Taylor and Doris Humphrey.

Lepczyk (1981) also employed a range of Laban's concepts to contrast ballet style, as exemplified in George Balanchine's work, and the modern dance styles of Martha Graham and Twyla Tharp.

In addition to the social and cultural influences on dance, Maletic (1980) considers dimensions of temporality, dynamic energy, spatiality, and bodily
articulation in her discussion of choreographic style. Through the incorporation of bodily components, as well as an analysis of the sequencing of Effort actions, she compares works by Twyla Tharp and Dan Wagoner.

Suzanne Youngerman (1978) provides a fascinating discussion of how certain concepts from Laban's theories point to the symbolic importance of movement in Doris Humphrey's work, The Shaker's. In particular, she notes how the eruption of "action drives" provides a highly effective representation of the major values in Shaker culture--industry, precision, and passionate dedication.

Conclusion

The studies cited above are only a sample of the studies of choreographic style that have employed many of Laban's concepts and techniques. In its ability to describe the "feeling states" underlying dance movement, Effort theory, in particular, may be a valuable tool in studies of the aesthetic perception of dance. Perhaps most importantly, Laban's theories coupled with the research they have generated suggest that dance is becoming defined as a discipline. Through Laban's ideas,
dance has found a theoretical base and is developing an aesthetic vocabulary adequate to describe its structure, its elements, and its qualities. To the extent that choreographic style is defined by these components of dance, individual styles can be differentiated.