To the Graduate Council:

I am submitting herewith a dissertation written by Betsy E. Gertz entitled "Developmental and Sex Differences: Cognitive Complexity on the Rorschach." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Sandra Loucks

Sandra Loucks, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Vice Provost
and Dean of The Graduate Council

DEVELOPMENTAL AND SEX DIFFERENCES: COGNITIVE COMPLEXITY ON THE RORSCHACH

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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Betsy E. Gertz

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ABSTRACT

The Purpose of this study was to examine developmental and sex differences in children's Rorschach performance using the Burstein-Loucks scoring system. This study focused upon the area of Cognitive Complexity.

The sample consisted of school children ages 5 through 12. Potential subjects were screened for behavioral, emotional and academic problems so as to obtain a psychologically healthy sample. Rorschach protocols were collected from 96 subjects, and these data were combined with previously collected Rorschach data to obtain a total of 226 subjects with approximately 30 subjects for each age year.

It was predicted that the proportion of Simple and Diffuse responses would decrease with age and the proportion of Integrated, Articulated and Arbitrary responses would increase. It was also predicted that the proportion of Integrated, Articulated and Arbitrary responses would be greater for males and the proportion of Simple and Diffuse responses would be greater for females.

Separate Kruskal-Wallis one-way ANOVA's were performed for each of the five developmental predictions and a multiple comparisons post-hoc procedure was performed to pinpoint specific age differences. The results supported two of the developmental predictions. The proportion of Simple responses decreased with age, and the proportion of Articulated

responses increased with age. The same results were obtained using a two-way parametric ANOVA.

Five separate Mann-Whitney tests were performed for each of the predicted sex differences. No significant sex differences were found. Similar results were obtained using a parametric two-way ANOVA with the exception that Articulated responses were greater proportionately for males than for females.

These results suggest that there are developmental changes in children's Rorschach performance although not as pronounced or consistent as predicted.

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INTRODUCTION

The Rorschach is a test of perceptual and cognitive functioning, interpreted in light of personality characteristics. There are several well-known Rorschach scoring systems (Beck, Beck, Levitt & Molish, 1961; Exner, 1974; Klopfer & Davidson, 1962; and Rapaport, Gill & Schaffer, 1968). A comparatively newer system, developed by Burstein and Loucks (1989), attempts to improve the clinical validity and reliability of the Rorschach by resolving the internal inconsistencies of previous scoring systems. In particular, the Burstein-Loucks system has expanded traditional scoring to include a potentially more sensitive measure of cognitive functioning. This category is labelled Cognitive Complexity, and measures the organizational complexity of a percept.

CHAPTER I

STATEMENT OF THE PROBLEM

Purpose of the Study

The present study was undertaken with the purpose of exploring developmental changes and sex differences on the Rorschach performance of latency age children. The specific focus of this study concerns the structural aspects of the Rorschach response in terms of cognitive organization. This ability was assessed using the Burstein-Loucks (1989) system for scoring Cognitive Complexity. This study thus represents an attempt to determine the presence of age related changes in perceptual organizing ability as reflected on the Rorschach and also to determine whether or not males and females differ according to this variable.

Need for the Study

Although the literature does contain several references to developmental changes in cognitive organization as reflected on the Rorschach, the emergence of a new, and refined scoring system for cognitive complexity, (Burstein & Loucks, 1989) suggests the need for additional research in this area. This study will therefore provide a current perspective on developmental changes for this Rorschach variable.

The usefulness of examining more closely the area of cognitive organizing ability as reflected on the Rorschach was addressed by Exner and Weiner (1982):

> ...to say that a person who shows a strong need to achieve complex organization in forming Rorschach answers is likely to seek complexity and organization in coping with other perceptual/cognitive situations is only a short, compelling inferential step. (p. 5)

As Exner and Weiner indicate, assessment of cognitive complexity on the Rorschach provides a useful index of an individual's basic ability to perceive in an organized manner. Comparison of age groups on this variable therefore provides information regarding development of an essential aspect of cognitive ability.

In terms of sex differences on the Rorschach, there is a dearth of research in this area. The research which does address this area is primarily outdated in its methodology (Carleson, 1952). Additionally, very few studies of sex differences on the Rorschach contain specific reference to cognitive organizing ability. The need for more concise exploration of these differences was addressed by Bieri, Bradburn and Galinsky (1958) in their research in this area:

> First, we are struck by the number of significant or near significant differences between the Female and Male groups on the various determinant categories...the fact that such discrepancies occur between men and women coming from such relatively homogeneous populations as those sampled in the present study suggests that those concerned with the validation and clinical use of the Rorschach may do well to study sex differences more systematically. (p. 7)

Furthermore, many of the child Rorschach studies including Ames, Learned, Metraux and Walker (1952) and Ledwith (1959) did not screen their subjects for psychiatric or behavior problems. Given the limitations of previous research, the present study constitutes an attempt to provide some much needed information regarding sex and developmental differences on children's Rorschachs using a well screened sample of latency age children.

CHAPTER II

LITERATURE REVIEW

Cognitive Complexity

The concept of cognitive complexity has its historical origins in the scoring systems of Beck et al. (1961) and Rapaport et al. (1968) and also derives from the refinements in scoring developed by Mayman (1960) and Friedman (1952). Although each of these systems addressed the area of cognitive complexity, none used this particular label. Beck et al. used a category labelled Organizational Activity. Rapaport et al. and Mayman both used their own system of subscripts. Friedman used a category labelled Developmental Level. It is further noted that although these scoring systems employ various labels, they all refer to a process which includes both perceptual and cognitive functions, i.e. perception of blot contours and shapes, verbal labelling, etc.

The criterion used by Beck et al. (1961) for the category of Organizational Activity was based on the subject's abilities to combine discrete percepts into a larger unit whose meaning then derives from its organization. The criteria used by Beck et al. for scoring Organizational Activity are as follows:

(1) All W is Z.
(2) Any two or more component elements of a figure may be organized into a relationship. The unit may

then consist of two or more D <detail> D with Dd <rare detail>, Ds <detail with white space>, or Dds <rare detail with white space>, or any combination of these.

(3) The meaning reported by S must belong to the larger organized material.

(4) All Z must be in responses determined in part, at least by form. Responses determined entirely by Color, C, or by light values, Y, therefore cannot by Z.

(5) The portions organized need not necessarily be external to each other since subjects will sometimes analyze and resynthesize a figure or detail.

(6) Mere presence of contours between two details is not ipso facto evidence of Z. (p. 48)

(7) When two or more kinds of Z occur in the same response, the one of higher value is credited.

(8) In those precision alternatives that need to be scored, Z is credited only once. (p. 48)

When scoring for Organizational Activity, each blot is given a weighted score (Z) according to "the degree of difficulty in achieving each kind of organization" (p. 47).

Burstein and Loucks (1989) have criticized the method used by Beck et al. for scoring Organizational Activity. Burstein and Loucks disagree with the assumption that all whole (W) responses reflect organization activity; they contend that by assigning a Z score to all W responses, location scoring has been confounded with presumed difficulty of integration.

Like Beck et al. (1961), Rapaport et al. (1968) assumed that all W responses reflect at least a minimum of abstraction and integration; unlike Beck et al., Rapaport et al. recognized that W responses can differ in the quantity and quality of articulation and integration. To reflect this difference in W's, Rapaport et al. assigned a subscript

to each whole response. A W+ indicates a sharply articulated and integrated percept, a Wo indicates an articulated percept, a Wv indicates a vague percept, and a W- indicates an arbitrarily articulated percept. Rapaport et al. did not apply an organizational scoring to nonwhole responses as do Burstein and Loucks.

The concept of organizational complexity in relation to W responses was also addressed by Friedman (1952). In Friedman's system for scoring Rorschach responses, he attempted to measure the developmental level of W responses. That is, he considered the way in which a subject organizes his response to be an indication of level of development. Friedman extended Rapaport et al.'s system of classification to include several additional subscripts: Wa refers to an amorphous response without form; DW refers to a confabulatory response; W+ refers to a response in which discrete portions of the blot are integrated, and W++ refers to a response in which a blot is first divided into separate areas which are then newly articulated and integrated.

Rapaport et al.'s (1968) system for scoring response quality has been adapted with modifications by Mayman (1960). In Mayman's system, Rapaport et al.'s classification of subscripts is applied to both whole and detail responses.

Exner, in his comprehensive system, includes a score to describe the quality of location responses in a similar but

less elaborate manner than Friedman, and also includes a category for describing the organizational complexity of a response which is nearly identical to Beck et al.'s Organizational Activity. Although these are separate categories, labelled Developmental Quality and Organizational Activity, respectively, they contain some criteria in common. In the first category, Exner employs a set of symbols, V, 0, +/V and + to denote levels of cognitive activity on a developmental continuum from the simplistic and concrete to the richly imaginative. This system discriminates between undifferentiated, diffuse percepts (vague); single percepts which have articulated boundaries and structural features, (ordinary); percepts reflecting a synthesis of two discrete areas which represent separate objects neither of which is highly articulated (vague/synthesized); and an integration of two or more separate areas which are articulated and in a meaningful relationship to each other (synthesized). Additional information regarding the subject's ability to perceive in an organized, complex fashion is provided by the category of Organizational Activity. There is some overlap with Developmental Quality scoring in that Whole responses indicating good Developmental Quality are also scored for Organizational Activity, as is any meaningful integration of two or more blot areas. As mentioned, Exner modified only slightly the method used by Beck et al. (1961) for scoring

Organizational Activity, e.g. Exner omitted a special scoring for whole responses with adjacent detail for Rorschach cards III, VI, and VII, in favor of criteria which are consistent for all cards.

Burstein and Loucks (1989) disagree with Exner's system for scoring response clarity and complexity. Specifically, they point out that the Developmental Quality scoring category fuses together issues related to location scoring with those related to complexity of response. Additionally, they find problematic the numerical rating scale for Organizational Activity adapted by Exner from Beck which implies that a subject's response style is a quantifiable, unidimensional factor.

Cognitive Complexity Scoring

Burstein and Loucks (1989) have developed their own system for scoring response organization which they have unified into a single category labelled Cognitive Complexity. The scoring for this category is similar to that employed by Rapaport et al. (1968) in that responses are differentiated on the basis of their degree of integration and synthesis. However, their system does differ from that of Rapaport et al. (1968) in its independence from location scoring. Burstein and Louck's system is less elaborate than Friedman's Developmental Level scoring, and therefore possibly more likely to be employed

accurately. The category of Cognitive Complexity also differs from Beck's and Exner's Organizational Activity in that it is descriptive and qualitative reflecting the multifaceted nature of its underlying construct.

Essentially, the purpose of Burstein and Louck's category of Cognitive Complexity is to measure the extent to which an individual is able to "perceive and understand complex relationships" (1989, p.30), and to invest him or herself in the blot percept. Burstein and Loucks consider this ability to be a "stylistic variable which is correlated with intelligence" (p.30). Using their system, each response is assessed according to "the quantity and quality of an individual's attempts to synthesize and analyze in perceptual-cognitive interaction with the environment" (p.30). By definition, then, the category of Cognitive Complexity provides a measure of both perceptual and cognitive functioning in that it assesses how an individual makes sense of the visual stimulus of the blot in light of his experiences, thoughts, feelings, etc. The category, criteria, and symbol for scoring cognitive complexity in the Burstein-Loucks system are as follows:

Category	Symbol	Criterion
Integrated	Intg	1. More than one unit is seen. 2. The units could be seen separately, i.e. are independent of each other. 3. There is a reasonable relationship posited among the units. 4. The units are interrelated but

		do not themselves compose a larger single unit with concrete boundaries.
Articulated	Artc	1. One or more units are seen in which parts of the unit itself are identified and labeled; the elaboration of the unit must not consist merely of a description of its blot characteristics, e.g. shape or color. 2. There is no relationship posited among the units if more than one is seen. 3. The parts of the unit that are labeled are integral to the unit rather than separate from it, i.e. within the concrete boundaries of the overall unit. 4. Clothing worn on the bodies of humans is considered integral to the percept but articles of clothing carried are not.
Simple	Simp	1. One or more units are seen which have structural unity and definite physical form. 2. If more than one unit is seen, there is no relationship posited among them. 3. The unit(s) seen is not further elaborated, i.e. broken down into parts.
Diffuse	Diff	1. One or more units are seen but are not seen in relationship to each other. 2. The unit(s) is not broken into parts. 3. The unit(s) has no distinctive shape, either because it is an amorphous matter or because it can take on many different configurations.
Arbitrary	Arb	1. More than one unit was seen. 2. Relationship was posited among the units. 3. Either: a. The relationship posited is unreasonable or; b. One or more of the units themselves are not consensually validatable,

> socially appropriate percepts, and thus, are scored minus.
> c. The attempt to integrate was chaotic, fluctuating or elusive.

Cognitive Complexity and Intelligence

The degree to which cognitive organization as reflected on the Rorschach is correlated with children's intellectual level has been investigated in the literature. Paulsen (1941) reported a difference in the quality of Whole responses between children of high and low Intellectual Quotient as measured on the Stanford Binet Intelligence Test-Revised, and she stated:

> The more gifted children are apt to give clearly perceived, well defined, or combinatorial wholes, while the types of whole responses given most frequently by the duller children are the vague and definitely poor wholes. (p.28)

Kissel (1965) also reported a significant, positive relationship between Friedman's Development Level scores and intelligence for a clinical sample of children ages 11 through 16. Similarly, Ledwith (1959) found that the quality of Whole responses was better among brighter children. However, Friedman and Orgel (1964) argued that the structural aspects of Rorschach responses are considered to reflect a level of maturity which does not have a linear relationship with intellectual ability. Friedman and Orgel stated:

> The structural aspects of perceptual functioning as revealed in these scores are considered to reflect the ego's current level of differentiation and hierarchic integration, testable and convenient constructs describing a type of functioning for which the minimal requirement is maturation of the organism. (p. 425)

Because intellectual functioning in children is positively related to cognitive maturation (Piaget, 1950), Rorschach scores reflecting developmental functioning can also be expected to reflect intellectual maturity. A. Burstein and S. Loucks (Personal Communication, April 17, 1990) maintain that perceptual organization as reflected by the category of Cognitive Complexity is correlated with intelligence but also reflects stylistic differences as well. That is, unlike intelligence which is considered to reflect a continuum from poorest to progressively better, a Rorschach response reflecting articulation, for example, is not necessarily viewed as 'better', but as different from that reflecting integration. However, Integrated and Articulated responses are considered to reflect greater complexity than Simple and Diffuse responses and are of better quality than Arbitrary responses.

Developmental Theory and Cognitive Organization

The manner in which cognitive/perceptual organization develops has been examined by Werner (1948) and Piaget (1950). Specifically, Werner described the process by which perception becomes increasingly differentiated over time:

> The development from a diffuse perceptual organization characterized primarily by "qualities of the whole" into an organism in which the essential feature is a decisiveness of parts standing in clear relationship can be observed in the growth of the child's mentality. (p. 111)

Perception in its early stages, according to Werner, possesses a global quality with little articulation of details, that is, a child has "a diffusely organized homogeneous perception" (p.113). Perceptual development was considered by Werner to reflect an increasing differentiation which does not occur haphazardly, but within a hierarchical structure i.e. there is a progressively finer discrimination over time between essential and nonessential or less relevant details. This hierarchy of perceptual organization reflects the emergence of new, organizing functions, while the more primitive functions do not disappear completely but become subordinate. Reflecting this process, primitive perception which is diffuse, syncretic and rigid is gradually superseded by perceptions which are differentiated, articulated and integrated.

Piaget (1950) also made reference to a hierarchical process, emphasizing that perceptual development occurs as the child's manner of interacting with his environment changes over time. That is, beginning with "the early reflexes and global perceptions" (p. 49), the child's increasingly more complex interactions with his environment necessitate a reorganization of his perceptions. Piaget described the changes in the internal cognitive structure of

the child as follows:

> The development of perception bears witness to the existence of a perceptual activity leading to decentralization, transportation, comparisons, anticipations... (p. 84)

and Piaget continued by stating:

> This activity increases with age and it is because they <the Child> do not possess it to a sufficient degree that young children perceive in a 'syncretic' or 'global' manner or else by accumulating disconnected details. (p. 84)

Mature perceptual organization is characterized by a "progressive synthesis" (p. 85) as well as flexibility and complexity.

Although Piaget emphasized the dynamic interaction between child and environment in the development of perceptual organization, and Werner focused upon the unfolding of innate perceptual/cognitive abilities, their views are complementary and contribute to our understanding of the cognitive processes underlying the structural aspects of children's Rorschach responses. The Rorschach category of Cognitive Complexity has been formulated by Burstein and Loucks to reflect this range of cognitive organization from the diffuse and/or unelaborated to the articulated and/or integrated. Rorschach performance in terms of cognitive complexity is therefore expected to reflect age related changes consistent with the developmental theory of cognitive organization.

Rorschach Research on Perceptual Development

The relationship between Rorschach performance and the development of perceptual organization has been explored in the literature using several scoring methods. In particular, Friedman's Developmental Level category for assessing perceptual organization, described briefly in this introduction has been extensively researched. Given that this research provides considerable documentation of the perceptual/cognitive developmental processes of children as revealed on the Rorschach, it will be helpful to review his system and the research it has generated.

Friedman's (1952) original outline of his scoring system included a description of the earlier work on perceptual development by Dworetzki which will be worthwhile to discuss here. Dworetzki, influenced by the genetic psychology of Piaget, conducted a major study looking at approximately 250 children and adults using the Rorschach Test. In her analysis of these Rorschach protocols, Dworetzki described perception as evolving from the simple, passive and subjective, to the complex, active, spontaneous and objective. Within this theoretical framework, Dworetzki then divided perception into three stages. These included globalization in which there is a confused percept of the whole; analysis, in which there is a clear and analytic perception of the parts; and synthesis, i.e. a meaningful and coherent synthesis of the whole. Mieli-Dworetzki (1956)

later commented upon the inherent logic underlying the development of perceptual organization which begins with globalization:

> Globalization corresponds to the most important form of perceptive adaptation: in real life it is, first of all, necessary to see objects...and it is not immediately necessary to analyze the objects into its parts. (p.112)

Employing Dworetzki's findings as a practical foundation, Friedman examined perceptual organization on the Rorschach using normal children ages 3.0 to 5.3 and a normal and clinical adult sample. Friedman's results were consistent with those reported by Dworetzki. Specifically, Friedman reported that the child Rorschach responses were in general "predominately of a global, diffuse, syncretic, rigid and labile nature, and marked by a relative lack of differentiation and hierarchic integration" (p. 96).

In terms of specific scorings the distribution of Location scores was reported by Friedman to change with age, with proportion of Whole responses decreasing with age, and the proportion of Detail responses increasing. However, Friedman minimized the significance of using proportion of Whole's as an indicator for perceptual organization, and criticized other researchers for doing so, stating that "integrative activity as well as primitive globality may be contained within such an overall capacity for 'wholeness'", (p. 84). Friedman based his Developmental Level system upon his findings, and incorporated a method for denoting

qualitative differences in whole as well as detail responses. Specifically, he divided responses into 'genetically low types' which he reported were predominant among children, and 'genetically mature types' which he reported were predominant among adults. Among the genetically low types were included the Amorphous response, which reflects "the most diffuse global perception" (p. 86); the Minus response, which reflects "the syncretic character of primitive perceptual organization" (p. 87) and the Confabulated Whole response, which reflects "diffuse perceptual organization...the whole is perceived but only because a part carries the burden of defining and justifying it" (p. 88). The intermediary levels included the Mediocre and Vague Whole responses, which meet "minimal general form requirements", (p. 88). Lastly, the genetically mature responses indicate integrated perceptual organization in which either a broken blot is synthesized into a whole and has good form and/or a unitary blot is differentiated into discrete portions and reintegrated into a unifying whole" (p. 88).

There have been several studies employing the Developmental Level scoring system which have contributed further to our understanding of the development of cognitive organizing abilities as reflected on the Rorschach. Hemmendinger (1953) examined perceptual organization on the Rorschach using the Developmental Level score with several

additional scores to denote rare detail areas. The subjects for his study included normal school children between the ages of 3.0 and 10.11 years, and adults between the ages of 20 and 40 years. His reported findings closely replicated those of Friedman. More specifically, the Rorschach protocols of the youngest children, ages 3 to 5, consisted primarily of Whole responses which were "almost formless and partless" (p. 166). The responses of the 5 and 6-year-olds were reportedly still mostly global but also reflected a rudimentary interest in details which were perceived as separate entities. The middle children, ages 6 to 8 years, offered responses which were analytical in that there was an increasing attention to details including Dd but without a corresponding integrative capacity demonstrated. In fact, Hemmendinger stated that "it is almost as if these children were going out of their way to react to parts qua parts" (p. 169). This tendency reportedly was further exemplified in an increase in 'Hdx' responses, in which only a part of a usual detail area is identified. The Rorschach protocols of the 9-year-olds, according to Hemmendinger reflected increasing maturity in that there was "a reappearance of percepts integrating the whole of the stimulus" (p. 169). Finally, Hemmendinger reported that the Rorschach protocols of the adult subjects indicated that this integrative capacity becomes even more frequent with increasing age. Hemmendinger described these adult percepts as

"characterized by the selection from among parts and details of those that fit together or can be fitted together" (p. 170).

Interestingly, Hemmendinger (1953) reported that the development of perceptual complexity as indicated on the Rorschach does not proceed evenly with gradual increments per year; instead,"development seems to occur in leaps and bounds, with changes of different kinds taking place at different ages" (p. 167). This is consistent with Werner's orthogenetic theory and Piaget's developmental theory, both of which indicate that there may be sudden, discontinuous changes as new functions emerge.

Providing support for the developmental nature of perceptual organization as reflected on the Rorschach, the Developmental Level scoring for perceptual organization has been reported to be related to developmental stage as assessed using Piagetian tasks (Smith, 1981) and chronological age (Gerstein, Brodzinsky & Reiskind, 1976). Significant results were reported by Smith who sought to investigate the cognitive processes which are reflected in whole responses by comparing children at different developmental stages. More specifically, Smith examined the relationship between Developmental Level scores of males and females in grades 2 and 6, and their performance on a number of Piagetian tasks. Her subjects were initially divided into four groups according to their performance on the

Piagetian tasks; second graders were divided into preoperational and concrete operational groups, and the sixth graders were divided into concrete and formal operational groups. Smith hypothesized that the emergence of perceptual decentration associated with concrete operations, and abstracting ability associated with formal operational thought, would each be accompanied by an increase in complexity of whole responses. In her analysis of whole responses, Smith reported a significant, positive relationship between developmental stage and number and complexity of whole responses. This relationship was reported to be particularly relevant for the broken blots, and she stated:

> The findings suggest that the production of highly articulated W on the more complex broken blots requires the abstracting and synthesizing abilities associated with formal operational thought. (p. 18)

Interestingly, Smith also reported that the Whole responses of the second grade concrete operational children reflected greater complexity than those of their sixth grade counterparts. This unexpected difference was hypothesized by Smith to reflect the sixth graders greater exposure to parental and educational demands for conformity.

Gerstein et al. (1976) investigated perceptual organization among a clinical sample of racially mixed children between the ages of 7 and 14 years. They reported a significant positive relationship between age and level of

perceptual maturity as manifested on the Rorschach using the Developmental Level scoring system (p. 762). However, this relationship was reported only when comparing the youngest age group of 7 and 8-year-olds with the two older groups, ages 10 and 11, and 13 and 14, and not when comparing the two older age groups. Gerstein et al. commented:

> This may well reflect the lack of discriminability of developmental advances in integrative functioning on the Rorschach beyond the early adolescent years... (p. 763)

A positive relationship between complexity of responding on the Rorschach and chronological age has also been reported using the Beck system for scoring organizational complexity (Thetford, Molish & Beck, 1951). Thetford et al. reported in their analysis of Rorschach protocols of 6 to 17-year-old normal males and females that there was a significant relationship between age and quality of whole response:

> The W's presented by very young children ages 6 through 9, generally do not require the same skill in ability to form abstract relationships that is true of older children. (p. 63)

The significant correlations noted above between perceptual organization on the Rorschach and developmental stage and chronological age, are consistent with the developmental theory of perceptual/cognitive organization as discussed above, and help to elucidate age changes on the Rorschach variable of cognitive complexity.

Survey of Normative Rorschach Data

The developmental changes in perceptual organization reported in the studies cited above are largely consistent with the cross-sectional and longitudinal normative data on the Rorschach which have been collected using several different scoring systems, (Ames et al., 1952; Exner & Weiner, 1982; Hertz & Ebert, 1944; Ledwith, 1959).

Ledwith (1959) examined the Rorschach performance of 160 normal school children of average intelligence using a longitudinal design. Subjects were initially tested at age 6 and were retested yearly for five succeeding years. Although Ledwith did not examine cognitive complexity per se, she did report that the quality of Whole responses in general increased with the chronological age and intelligence of the subject.

The research by Ames et al. (1952) has contributed considerably to our knowledge concerning developmental changes as manifested on the Rorschach. In a major study, Ames et al. administered the Rorschach to 650 children between the ages of 2 and 10 years. Their subjects were normal children of above average intelligence, with the exception of a small clinical population whose psychological problems were judged to be minor. Scoring for each protocol was done according to four separate dimensions--Area, Determinants, Content, and Popularity. Although Ames et al.

did not include a category specifically for cognitive complexity, they did make reference to age changes in the organizational properties of percepts. However, Ames et al. argued against a strict linear relationship between organizational complexity and age. Relating Rorschach performance to more general aspects of children's behavior they stated that "the child does not simply grow 'better' as he grows older. Behavior does not necessarily become better integrated and better organized" (p. 289). Notwithstanding the inconsistency or fluctuation between age groups in cognitive organization, their findings do indicate a general tendency for response complexity to increase with age. For example, their description of the typical Rorschach protocol of a preschooler is as follows: "The responses of the 5-year-old is primarily global (58%) and he shows a high generalizing ability" (p. 5). This was compared to the typical Rorschach protocol of a middle school child:

> At 9 there is a definite shift in type of perceptivity, detail responses for the first time exceeding whole responses. However, there is a high drive toward the production of combinatory wholes... (p. 9)

An increase in response complexity is reflected both in changes in location of response and in the quality of the Whole responses.

The quality of whole and detail responses was also examined by Hertz and Ebert (1944) in a cross-sectional study of the Rorschach performance of primary grade school

children. Specifically, their study was comprised of 242 six-year-old and 201 eight-year-old boys and girls of high average to superior intelligence. Their findings, which were based upon differences in location responses as well as quality of response, are consistent with the developmental literature cited above. Hertz and Ebert reported that the 6-year-olds were "prone to view wholes as large sub-wholes in a broad general manner without analysis or concentrating upon the many specific parts constituting the whole" (p. 21). In contrast, at 8 years of age "the beginnings of mature patterns of mental procedure become evident" (p. 22), and this age group demonstrated "an increasing tendency on occasion to analyze the whole into parts...<there is> also more differentiation and elaboration" (p. 22). Interestingly, Hertz and Ebert extrapolated from the Rorschach protocols of subjects to the "manner of mental approach" i.e. the "typical approach to situations and everyday problems" (p. 10) employed by these two age groups. Essentially, the 6-year-olds tended to grasp "large obvious features in objective situations" (p. 23) whereas the 8-year-olds were better able to analyze a situation and also possessed "more capacity to react differentially to the different aspects of objective situations" (p. 23). Hertz and Ebert's observations nicely highlight the implications of these age differences in perceptual organization on the Rorschach. It is noted that they based their conclusions on

the tendency for 6-year-olds to give slightly more whole than detail responses in contrast to the 8-year-olds who were far more likely to give common details than wholes. Although Hertz and Ebert also analyzed the responses qualitatively, they did not report using an established method for doing so.

Developmental changes in perceptual clarity and organization on the Rorschach were also examined by Exner and Weiner (1982) in their analysis of a large body of normative data which they collected on children ages 5 through 16 years using between 100 and 150 subjects at each age interval. Specifically, in terms of Developmental Quality scoring, Vague responses were reported to decrease with age, Ordinary responses to increase slightly with age, and Synthesized responses to increase with age, reflecting a greater tendency for the older children to give more analytical and synthesized responses. Organizational Activity reflected a similar developmental trend. Although the number of responses receiving an Organizational Activity score decreased with age reflecting fewer Whole responses among the older children, the quality of Organization Activity did improve with age.

Exner and Weiner (1982) also used longitudinal data to examine the temporal consistency of Rorschach variables including Organizational Activity at different intervals, e.g. 7 days, 9 months and 2 years. They reported

considerable consistency among all Rorschach variables for all ages for brief periods, i.e. 7 days, but much less consistency for variables including Organizational Activity over longer periods particularly for the younger children. Exner stated, "The data emphasize the fact that most children do, indeed, change over time, and the younger the child, the more change may be expected" (p. 26).

Several years later Exner, Thomas and Mason (1985) compared the Rorschach protocols of subjects ages 8 through 16 at two year intervals. They reported that "it is really only between the ages of 14 and 16 that a majority of variables appear to take on consistency" (p.16); however, they cited several exceptions to this including those characteristics representing "organizing efforts" (p. 17) as reflected by the category of Organizational Activity which appear to stabilize only in adulthood.

These reported developmental changes on the Rorschach suggest that interindividual and intraindividual developmental changes in perceptual/cognitive organization do occur during the latency and adolescent years with younger children demonstrating greater temporal variability than adolescents.

A Review of Sex Differences in Cognition

The category of Cognitive Complexity describes the characteristic style or manner in which an individual's

perceptions are organized (Burstein & Loucks, 1989). Comparing the cognitive styles of individuals at different age intervals as reflected on the Rorschach is one method for examining group differences on this characteristic; another method is by comparing the cognitive styles of males and females on the Rorschach. It is surprising that, although the literature contains considerable research concerning sex differences in cognitive styles and abilities, (e.g. Liss, 1983; Maccoby & Jacklin, 1974; Sherman, 1978), there are relatively few direct references to sex differences in cognitive style as reflected on the Rorschach. This may reflect in part the fact that not all Rorschach scoring systems contain a category which describes cognitive style, although most do refer to this in some way. This dearth of information is particularly unexpected given the Rorschach's long history of providing a clinical assessment of intellectual functioning.

The research studies that have been published concerning sex differences in cognitive style on the Rorschach are not as contemporary as would be desirable; they date primarily from the early 1940's to the late 1950's, (e.g. Baughman & Guskin, 1958; Felzer, 1955; Stavrianos, 1942). However, there have been more recent normative studies published on the Rorschach which do provide some relevant information although not all of these studies include categories which are specific to cognitive

complexity (e.g. Ames et al., 1952; Amex, Metraux & Walker, 1959; Exner & Weiner, 1982).

Given the relative scarcity of Rorschach research which addresses sex differences in perceptual/cognitive organization, an overview of the general issue regarding sex differences in cognition will be included, particularly as it pertains to the developmental literature, and with a specific focus upon those abilities which may be considered most closely related to the processes underlying the structural aspects of Rorschach responses. Because sex differences in cognitive style has been the subject for considerable debate (e.g. Maccoby & Jacklin, 1974; Sherman, 1978) a brief review of the etiologies which have been proposed to account for such differences will also be included.

In a seminal review of the literature addressing sex-related differences in cognitive abilities by Maccoby and Jacklin (1974) the majority of studies cited indicated that girls perform better on verbal tasks and boys perform better on spatial and quantitative tasks. However, these differences do not appear to be consistent throughout development. Instead, sex related differences are most often cited as emerging during latency or early adolescence.

In terms of specific studies citing sex differences, Gates (1961) reported a female advantage in reading ability for normal children ages 7 through 13 years, and Achenbach

(1969) reported that among 164 eleven-year-olds, girls received higher scores than boys for the Vocabulary subtest on the Wechsler Intelligence Scale for Children. A study by Svensson (cited in Maccoby & Jacklin, 1974) using a sample of 7,694 adolescents, reported that females achieved higher verbal scores on an achievement test, and Droege (1967) reported a female advantage for verbal abilities on an aptitude test battery for high school students. In terms of quantitative and spatial abilities, McGee (1979) examined intellectual functioning in school children grades 5 through 9. He reported that on the Thurstone Primary Mental Abilities Scale males had a clear advantage on the spatial factor with females performing better on the verbal factor which included word fluency and verbal reasoning ability. In a similar vein, a study by Keating and Stanley (cited in Maccoby & Jacklin, 1974) reported that among exceptionally talented 12 and 13-year-old students, the boys performed better than the girls on the quantitative section of the Standard Achievement Test, and also on a Math Level I achievement test.

Among the areas of cognition in which sex differences have been reported, spatial abilities are most relevant in that there is a spatial component to the category of Cognitive Complexity on the Rorschach. The use of the term 'spatial abilities' has varied by author, although most definitions do include the ability to mentally manipulate a

spatial configuration (Maccoby & Jacklin, 1974). Although spatial ability incorporates several modalities, i.e. visual, auditory, etc., the visual component, i.e. visuospatial, is most relevant to performance on the Rorschach test and specifically to the category of Cognitive Complexity.

Visuospatial ability generally refers to perceptual analytic and organizing skills (Lezak, 1983). However, definitions of spatial ability have also included other visual abilities which are pertinent to the Rorschach test. For example, Cooper and Shepard (1973) include the abilities for visual search and feature detection in their definition of spatial ability, and Harshman, Hampson and Berenbaum (1983) extend the meaning of spatial ability to include 'closure' i.e. "the ability to form a correct whole percept when given only a few parts" (p. 155) and 'disembedding' i.e. "the ability to break a compelling perceptual pattern down and perceive a distinct component" (p. 155). Visuospatial ability, then, reflects perceptual organizing skills and may include a flexibility of thought processes in the organization of a visual gestalt, as well as visual scanning and searching abilities.

Although most of the research utilizes the term spatial ability, the majority of studies are actually referring to the visual modality. Thus, 'spatial' and 'visuospatial' have been used interchangeably. The common factor in these

studies is a focus upon the method by which an individual organizes a visual stimulus. Furthermore, although the measures cited in the literature in terms of sex differences have not been projective in nature, because they assess perceptual organizing abilities their findings can be extrapolated to a measure such as the Rorschach which also assesses perceptual organizing ability. Examining sex differences in spatial abilities is therefore informative in relation to the more general issue of sex differences on the category of Cognitive Complexity.

According to Maccoby and Jacklin (1974) the literature has indicated a male dominance for spatial abilities beginning in late latency/early adolescence, although specific studies (e.g. Johnson & Meade, 1987; Matthews, 1986) have suggested an earlier timetable for this male advantage. In terms of specific studies, Johnson and Meade administered a battery of spatial tests to 1,800 pupils in grades kindergarten through 12. They reported that "a male advantage in spatial ability exists at least as early as the fourth grade" (p. 735), and that possibly this difference develops earlier but is masked by other variables including earlier female verbal precocity:

> In testing young children, individual differences in verbal comprehension, attention span and motivation may influence the expression of the target ability. (p. 736)

One particular aspect of visuospatial ability, cognitive mapping or "environmental cognition" was explored

in terms of sex differences by Matthews (1986). The concept of environmental cognition was defined by Matthews as "awareness of place and capability to represent space" (p. 295). This ability was assessed in school children ages 6 to 11 by having each child draw a map of the area surrounding his or her house. On this measure of "cartographic competence' Matthews reported that "the results suggest boys acquire more rapidly the ability to depict space in a complex and integrated manner" (p. 299), and that "boys show a much better ability to arrange the elements of their maps into integrated and organized forms" (p. 301). Matthews hypothesized that this sex difference in spatial ability may be attributable to different childhood experiences in which boys are encouraged to explore their environment more than girls, and he stated:

> It would seem that the influence of gender expectation on the part of parents and other agents of socialization provides girls with a very different view of space from that acquired by young boys. (p. 301)

Another area of perceptual/spatial ability which has been studied in relation to sex differences is that of "field dependence" (Witkin, Goodenough & Karp, 1967). According to Witkin et al., perceptual field dependence is one indication of the level of differentiation of an individual's cognitive style. Because Witkin et al. were interested in examining the stability of this construct, they employed both a longitudinal approach using two groups

of subjects, ages 8 to 13, and ages 10 to 24 as well as a cross-sectional approach with subjects ages 8 to 21. A battery of tests were administered to assess perceptual field dependence including the Rod and Frame Test, and the Embedded Figures Test. Witkin et al. reported significant sex differences for both measures using cross-sectional data which was consistent with an overall tendency for females to be more field dependent on longitudinal data. Witkin et al. postulated that the field dependent mode of perceiving which was reported to be more frequent among females involves the following processes:

> In a field-dependent mode of perceiving, perception is dominated by the overall organization of the field; there is relative inability to perceive parts of a field as discrete. This global quality is indicative of limited differentiation...persons whose field-dependent perception suggests limited differentiation in their experience of the world about them also show limited differentiation in their experience of their bodies. For example, their drawings of the human figure are likely to lack articulation. (p. 291)

This description of field-dependent perception differs markedly from that for field-independent perception which was reported to be more prevalent among males:

> ...a field-independent style of perceiving in which parts of a field are experienced as discrete from organized background, rather than fused with it, is a relatively differentiated way of functioning. (p. 291)

Although Witkin et al. did not indicate the stability of this sex difference, they reported that for all subjects field dependence decreases somewhat with age but that an

individual "tends to maintain his relative position <on this measure> among his peers" (p. 292) suggesting a fairly consistent sex difference across age groups.

A sex difference was also reported by Bergan, McManis and Melchert (1971) on the Block Design subtest of the Wechsler Intelligence Scale for Children-Revised. Specifically, they reported that among a sample of 9-year-olds, the boys' performance exceeded that of the girls in terms of accuracy of design reproduction. This subtest is considered to provide a measure of the ability to recognize and organize a visual gestalt. A male advantage for this measure has also been reported for adult subjects (Matarazzo, 1972; Sarason & Minard, 1962).

The meaning of the reported male superiority for spatial abilities was explored by Bieri et al. (1958). They administered a battery of tests to subjects including the Embedded Figures Test (EFT), Rorschach, External Construct Scale (ECS) and Standard Achievement Test (SAT) Math and Verbal subtests. Although their subject sample was comprised of college coeds, the temporal consistency of the male advantage for spatial ability beginning in late latency suggests that their findings are relevant to younger children as well. Their results were consistent with the literature in that males performed significantly better on the EFT and achieved higher scores approaching the .05 significance level for the SAT Math subtests, and the

females performed significantly better on the SAT Verbal subtests. Bieri et al. examined the intercorrelations between test scores for both sexes and concluded that the males greater spatial aptitude reflected "the tendency of men to combine more effectively than women mathematical aptitude and a conceptual approach to stimuli" (p. 12).

As mentioned, the relationship between sex differences in cognition and Rorschach performance has received little attention in the literature. However, Russ (1982) did examine a related area in terms of sex differences, i.e. primary process thinking as reflected on the Rorschach and its relationship to problem solving skills. Russ reported that in a sample of third graders the Rorschach protocols of the boys contained a significantly greater percentage of primary process material and that this reflected a greater cognitive flexibility and fluidity of ideation.

These sex differences in spatial and quantitative abilities cited in the research above have been attributed to several etiological factors including sex differences in brain chemistry and organization, as well as differential childbearing practices for boys and girls. The research which has investigated sex differences in brain processes has typically employed adult rather than child subjects. It is therefore possible that the differences in brain organization and chemistry reported for the adult population are more polarized than that which might be expected for

younger subjects.

The nature of sex differences in brain organization is an issue which has received considerable attention in the literature (Maccoby & Jacklin, 1974). In particular, brain asymmetry has been hypothesized to be a factor in sex differences in cognition (e.g. Bryden, 1980; Lewis & Kamptner, 1987). Specifically, it has been hypothesized that the male brain is comparatively more asymmetrically organized than that of the female, with greater lateralization for spatial and verbal abilities. The female brain, being less lateralized, has verbal abilities represented by both hemispheres although principally by the left. The hypothesized male specialization of the right hemisphere for spatial skills has been considered beneficial in terms of visuospatial abilities (Lewis & Kamptner, 1987; McGlone & Kertesz, 1973).

In terms of specific studies, McGlone and Kertesz (1973) examined sex differences on visuospatial tasks among patients with unilateral brain damage. Among their findings, they reported that male patients with right hemisphere lesions performed poorest on visuospatial tasks, and that damage to the left hemisphere had a negative effect on visuospatial performance for females but not for males. They considered these findings to be consistent with the hypothesized greater brain asymmetry for males and as indicative of a female tendency to use verbal mediation in

performing visual/spatial tasks. They concluded that:

> If it is true that females use left hemisphere, verbal systems on tasks which involve spatial information, then clearly this mode of information processing offers little, if any advantage to spatial skills. (p. 319)

Other research techniques which have been employed to investigate sex differences in brain organization include electroencephalograph (EEG) recordings and visual half-field presentations. However, these research designs have been criticized because of the lack of evidence demonstrating that specific tasks designated as visuospatial actually provide a relatively pure measure of this ability (Butler, 1984; McGlone & Kertesz, 1973). Furthermore, Butler (1984), and others have questioned whether differences in performance on visuospatial tasks reflects actual differences in this ability or differential attention and information processing strategies:

> It may be difficult to distinguish between dimorphism with respect to the organization of cerebral function from sexual dimorphism with respect to the readiness to resort to particular cognitive strategies. (Butler, 1984, p. 447)

Sex differences in visuospatial ability have also been hypothesized to reflect biological factors including sex chromosomal constitution, hormonal milieu during development and hormone levels at the time of testing (Gordon & Lee, 1986). In terms of specific hormones which have been hypothesized to play a role in sex differences in cognition, two in particular that have received attention are Follicle

Stimulating Hormone, (FSH) (Gordon & Lee, 1985), and testosterone (Christiansen & Knussman, 1987).

Gordon and Lee (1985) reported a negative relationship between FSH and performance on visuospatial tasks for young male adults and a weaker relationship in the same direction for females. They commented that "the generally higher FSH levels for women (and girls) is the same order of magnitude as their reduced spatial ability" (p. 574) and they concluded:

> FSH explained most of the variance <among subjects> and would be the most likely candidate to be related to an underlying cerebral mechanism or neurosystem that controls visuospatial functions. (p. 573)

Christiansen and Knussman (1987) hypothesized that it is not the decreased amount of FSH, but the increased amount of testosterone in males which is indicated in their visuospatial advantage. They reported in their analysis of visuospatial abilities in young adult males that there was "a relatively high value of total testosterone... accompanying the 'male' pattern of verbal-spatial cognitive abilities" (p. 32). Furthermore, they suggested that the widening sex gap in spatial abilities during adolescence reflects the males' surge in this sex hormone at this period.

Another perspective on the issue of sex differences in brain organization was offered by Waber (1976) who hypothesized that the biological factor which accounts most

for sex differences in cognition is rate of physical maturation. Examining visual spatial skills among late latency and adolescent males and females, he reported a verbal advantage among the early maturers, and a spatial advantage among the late maturers. More specifically, he reported the following:

> Sex accounted for only a very small proportion of the variance in comparison to maturational rate. Therefore, reported sex differences in these behaviors <verbal and spatial> probably reflect the differential distribution of the sexes along a physiological continuum more than a categorical difference between male and female. (p. 573)

and he suggested:

> Sex differences in mental abilities...reflect differences in the organization of cortical functions that are related to differential rates of physical maturation. (p. 572)

Child rearing practices, sex role stereotypes and their relationship to sex differences in cognition have also been explored in the literature. The relationship between the male superiority for spatial ability and early childhood experiences was commented upon by McGuiness (1976) in her cogent review of sex differences in perceptual and cognitive organization. Specifically, she posited a relationship between the male infant and child's tendency to be more active and exploratory, as reported by Moss and also by Rubenstein (cited in McGuiness) and the adult male's spatial advantage, in light of Piagetian psychology:

> Schemata are internalized only after a great deal of exploratory and manipulative behavior...It is possible that early manipulative skill gives rise

to a high degree of spatial imagery... (p. 138)

Liss (1983) reviewed the literature concerning sex differences in cognition and their correlates in early socialization practices. According to Liss, the literature indicated some consistent sex differences in the area of children's playground games. Specifically, boys games have been described as of a "rough and tumble, exploratory, block building variety" (p. 75) whereas girls tend to engage in more passive activities such as doll playing. Liss also suggested that the quality of toys used predominantly by boys, such as airplane models and blocks, facilitates manipulative and spatial skills. Liss discussed a study by Fagot and Littman in which the amount of "masculine play" involving manipulative and exploratory skills was correlated with performance on the Embedded Figures Test for both kindergarten boys and girls; however, it was also reported that encouraging the girls to engage in masculine play resulted in greater sex equality for visuospatial performance. Based upon this and other research, Liss posited the existence of "a direct casual relationship between early conformity to sex-typed play patterns and later sex differences in visual-spatial skills" (p. 179).

In a similar vein, Borman and Kurdek (1987) examined the relationship between sex differences in the complexity of children's playground games and problem solving skills. Based upon repeated behavioral observations of second and

fifth grade school children, they reported that the boys engaged in more complex games in terms of "the dimensions of role differentiation, play interdependence, explicitness of goals, and the number and specificity of rules" (p. 242). While the boys participated in highly competitive games with complicated rules, e.g. football, etc. the girls engaged in dyadic, less competitive activities, e.g. tetherball, and watching others. Borman and Kurdek considered these differences to be consistent with the "male ethic" which is based upon an analytic approach secondary to an ability to maintain an emotional distance, and the "female ethos" with its emphasis upon intimacy and emotional closeness. Interestingly, they did not report a significant relationship between complexity of games and performance on a measure of problem solving ability.

Similar to Borman and Kurdek's discussion of the masculine and feminine ethos, Bardwick (1971) in her seminal study of the psychology of women, observed that to be masculine is to be "objective, analytical" (p. 100) whereas to be feminine is to be "subjective...impressionistic" (p. 100). Furthermore, Bardwick cited sex differences in body imagery which are relevant to differences in cognitive approach and visuospatial ability. Specifically, she stated that the body image of a woman is:

> ...a whole, diffuse, complete body image. The body image of the male...is likely to be more differentiated than the global concept characteristic of women. How well one

> discriminates between separate elements or how global ones perceptions are seems to be related to the articulation and differentiation of the self from the environment. (p. 111)

Interestingly, the sex differences in visuospatial and verbal abilities cited above have not been reported to be consistent across cultures. For example, among the middle and upper class British society, males tend to do as well on verbal tests as females (Benderley, 1987), and there are no reported sex differences in terms of spatial abilities among the Eskimo population (Benderly, 1987). Possibly, this may reflect cultural differences in male and female stereotypes (Benderley, 1987) lending some support to theories emphasizing the role of early childrearing and other sociological variables in the development of sex differences in cognition.

To summarize, the research suggests that there are sex differences for verbal and spatial abilities which have been attributed to both biological and sociological causes, or a combination of the two. Maccoby and Jacklin (1974) have suggested that these differences emerge in the latency years and increase during adolescence. According to Maccoby and Jacklin (1974):

> It is at about age 10 or 11 that girls begin to come into their own in verbal performance. From this age through the high school and college years we find them outscoring boys at a variety of verbal skills. (p. 84)

In regard to quantitative tasks, they comment, "when differences are found in the age range 9-13, they tend to

favor boys. After this age, boys move ahead" (p. 85), and specifically in terms of spatial tasks, they state:

> Visual spatial tasks that involve disembedding and those that do not have a similar developmental course. The male advantage emerges in early adolescence and is maintained in adulthood for both kinds of tasks. (p. 94)

The conclusions of Maccoby and Jacklin have not remained unchallenged. Fairweather (1976) criticize their review of the research and their conclusions on methodological grounds:

> The format here though is deceptive: good and bad studies alike get equal weight ...some areas...may fall in the gaps between the tables...methodological problems are given short shrift.... (p. 233)

Fairweather also conducted an extensive critical review of the research pertaining to sex differences in cognition, including such skills as facial recognition, motor skills, targeting and tracking, perception, learning, handedness for skills, choice reaction time, coding, spatial skills, field dependence, linguistic skills, and reading. Based upon his review, he concluded that males performed better on circumscribed spatial and mathematics tasks, but that sex differences as a whole were few.

The conclusions of Maccoby and Jacklin were also challenged by Sherman (1978) who pointed out that the majority of the research involving spatial tests have included only male subjects, thereby making definitive conclusions regarding sex differences questionable.

Additionally, Sherman reported that in those studies where background variables, in particular, academic training, were controlled for, sex differences on cognitive tasks were minimal or nonexistent. Sherman viewed this finding as indicating that different childhood experiences are crucial in perceptual development, and that sex differences on tests of intelligence may be an artifact of these different background experiences and not due to innate differences in abilities.

Although there exists some disagreement among the major authors noted above (i.e. Bardwick, 1971; Fairweather, 1976; Maccoby & Jacklin, 1974; Sherman, 1978) regarding the meaning and etiology of sex differences in cognition, they do essentially agree that the research indicates the presence of some basic sex differences on verbal, quantitative and spatial tasks. In terms of specific studies which have been cited, males have been reported to demonstrate a more "differentiated way of functioning" (Witkin et al., 1967, p. 291) with comparatively more articulated body percepts and a better ability to analyze their environment with respect to its parts (Bardwick, 1971). Males have also been reported to have a comparatively greater ability to "depict space in a complex, integrated manner" (Matthews, 1986, p. 299). In contrast, females have been described as more verbally fluent (Maccoby & Jacklin, 1974) and as more likely to exhibit a

comparatively more global, unarticulated perceptual style (Witkin et al., 1967). Furthermore, these differences are reported to become increasingly apparent beginning at approximately age 10 (Maccoby & Jacklin, 1974).

The conclusions cited above refer to sex differences in performance on general tests of verbal and spatial abilities. There has been considerably less research regarding sex differences specific to the Rorschach. This research will now be reviewed.

Survey of Rorschach Sex Differences

The relatively few studies which have explored sex differences on the Rorschach unfortunately have not included a scoring category similar to that of Cognitive Complexity. The sex differences that have been reported for other variables have generally been minimal. Because there exists so little research in this area, both adult and child research will be reviewed. All categories in which sex differences have been reported will be mentioned, with a greater emphasis upon differences in Location scorings as these structural features relate indirectly to the category of Cognitive Complexity.

Felzer (1955) conducted a statistical study of sex differences on the Rorschach using 100 male and 100 female students from an Eastern college. Subjects were matched according to age and intelligence, although males did have

more years of college. The mean age of both men and women was 20 years. The Rorschach was administered according to the Klopfer system and each protocol was scored for 20 variables including Location areas and Determinants. The data were analyzed by computing means and standard deviations for each of the variables and chi-square was used to test for significant sex differences. Felzer reported significant sex differences for only 2 out of 26 variables. Specifically, females reportedly gave significantly more Form Color (FC) responses, which Felzer interpreted as "showing a more ready control over emotional situations without loss of responsiveness" (p. 384), and males had significantly longer response times, which Felzer hypothesized to reflect

> ...either the possibility of having to give responses with greater detail or else a tendency on their part to be more cautious and guarded with their responses. (p. 384)

Felzer did qualify his results as follows: "Even though the findings were suggestive, the limitations of this study indicate that they should be interpreted with caution" (p. 384). Although he did not specify these limitations, the relative homogeneity of the sample and the use of a narrow age range of five years are potentially problematic in determining sex differences.

Only one significant finding, in the area of Movement responses, was reported by Baughman and Guskin (1958) in their statistical study of Rorschach sex differences.

Baughman and Guskin used a matched subjects design with 26 males and 26 females, all employees of an insurance company. Subjects were matched according to intelligence and age, with an age range of 25 to 55 and a median age of 33 years. The Beck scoring method was used, and males and females were compared on 17 summary scores using a chi-square statistic. Baughman and Guskin reported that males gave significantly more Animal Movement responses than females. Baughman and Guskin then conducted a second study to examine the reliability of this sex difference. Their second sample consisted of 21 males and 21 females of unspecified age who were then matched according to their productivity on the Rorschach. Only the achromatic blots were administered for reasons unspecified in their study. Statistical analysis using chi-square failed to detect any significant sex differences. Baughman and Guskin concluded from their results that "the data from both studies, however, suggest the improbability that stable differences in summary scores between adult males and females can be demonstrated" (p.401).

It is noted that the studies conducted by Baughman and Guskin contain several methodological problems. One such problem is the relatively small sample size employed. Another is the potential liability of using the chi-square statistic in that it is relatively insensitive when small samples are used; Baughman and Guskin do acknowledge that it

was the preferred statistic from a limited number of options due to the often skewed nature of Rorschach data. Lastly, the homogeneity of the subject sample decreased the possibility for obtaining significant results.

Stavrianos (1942) investigated sex differences as reflected on the Rorschach among preadolescents, ages 5 to 11. Her sample, which consisted of 67 boys and 64 girls, was divided into three age groups, 5 to 7 years, 7 to 9 years, and 9 to 11 years. The majority of subjects were public school children with a smaller percentage attending a day school connected to an Ivy League college. Subjects were administered an intelligence test and/or received a teacher's rating to provide an estimate of how well the groups were matched for intelligence. The girls in the highest age group were noted to receive higher ratings for intelligence than their male counterparts, while the other two groups were fairly equivalent on this variable. Rorschach protocols were analyzed separately for Location, Determinant and Content scorings. The data were then analyzed by obtaining the mean percentage of each variable for each age group, and sex differences were calculated by dividing the difference between the boy's mean scores and the group mean by the group mean, thereby obtaining the percentage by which the boy's scores deviated from the group mean.

In terms of Location responses, Stavrianos reported a small trend for boys to give more Whole than Detail responses except for the highest age group, and for the girls to give more Detail than Whole responses beginning with the intermediate age group. Additionally, while both sexes in the youngest age group tended to "overemphasize" the whole blot, the progression to perceiving large details occurred later for the boys than for the girls, with the boys continuing to utilize the whole blot more than the girls. Stavrianos commented on this sex difference in perceptual development as reflected on the Rorschach:

> Perception of the whole blot is a characteristic manner of perception for young children and <that> the increasing maturity of the boys may be shown by improved quality of the response and greater differentiation of the parts within a perception of the whole blot. The girls, on the other hand, may show their increasing maturity by a shift from the undifferentiated whole response to a well defined and well elaborated response to smaller sections of the blot. (p. 171)

In terms of Determinants, the girls, ages 5 to 9 gave more Human Movement responses than did the boys. The sexes differed according to Color responses as well, with the 7 to 9-year-old girls giving more Color Form responses than the boys. For ages 9 through 11 however, she reported that "both boys and girls show a fairly mature development with respect to color" (p. 173). In terms of Content, boys tended to give more anatomy and nature responses, and girls gave more human and animal responses. Stavrianos considered the boys' content to reflect less maturity than the girls

until the highest age group when the boys essentially caught-up with the girls in maturity on the Rorschach.

These sex differences on the Rorschach cited by Stavrianos, although few in number, do suggest that boys and girls differ somewhat in their development of perceptual organizing abilities. Specifically, the girls in this study tended to focus earlier on simple, large details, whereas boys tended to emphasize the whole blot with increasing differentiation over time. These differences were considered by Stavrianos to represent a differential rate of maturity, with the girls demonstrating earlier development in terms of perceptual organization as well as for Determinants and Location responses. However, for ages 9 through 11 boys began to approximate the girls in the maturity of their responses with less diffuse Wholes in favor of greater articulation of the whole blot, as well as changes in their Location and Determinant scores.

Stavrianos' conclusions regarding differential rates of maturation as reflected on the Rorschach are interesting, although her study can be criticized on methodological grounds. Specifically, her decision to use children attending either a public school or a private Day Care facility annexed to an elite college suggests that this difference in quality of institution may be a confounding factor in her results. Secondly, the statistical methods she employed do not control for variations in response

number, a factor of considerable importance when analyzing Rorschach data.

Sex differences on the Rorschach were also addressed by the literature during the late 1930's and early 1940's when normative data was first being collected. The literature reports some fairly consistent, although limited, findings which are generally confined to the categories of Color, Movement, and Location. In general, the sex differences reported have been circumscribed and fairly subtle. Specifically, in terms of Color responses, girls appear to respond to color on the Rorschach at an earlier age (Klopfer, 1939; Paulson, 1941) and maintain a higher percentage of Color responses throughout childhood and early adolescence (Hertz, 1940; Suares, 1938). The greater production by females of Color responses has been termed an 'extratensive' approach (Hertz, 1941; Paulson, 1941) and Suares (1938) suggested that this reflects the females' "richer and more varied affective life" (p. 8).

Sex differences in Movement responses have been reported by Paulson (1941) and Sunne (1937). Paulson reported that first grade boys had a "greater tendency toward <the> M response (p. 26) than did their female counterparts. Similar findings were reported by Sunne who did not analyze his data statistically.

In terms of Location scores, the literature has reported that boys give more Whole responses and girls give

more large and small detail responses (Paulson, 1941; Suares, 1938). Specifically, Paulson compared the percentage of Whole (W) and Detail (D) responses in a sample of 82 first graders, and reported that the boys gave a larger percentage of W responses, and the girls a larger percentage of D and Dd (Small Detail) responses. Similarly, Suares (1938) compared 21 boys between the ages of 15 and 18 years, with 21 girls, ages 12 to 14 years. He reported that the median number of Whole responses for boys was 6 and for girls was 5, with a difference in the opposite direction for D and Dd responses. Suares concluded, "the power of abstraction remains the prerogative of the male sex, practical sense that of the female sex" (p. 7). The only other sex difference he reported was that the girls tended to give a greater number of responses. However, Suares subjective analysis of the quality of responses favored the boys:

> The girls give a greater number of responses but we do not believe that it means that there is a larger variety of associations, for, in general, their results were rather poor, while the high-school boys, in spite of a smaller number of responses, seem to show a greater facility for association. (p. 7)

References to sex differences have also been included in the normative Rorschach data published by Ames et al. (1952) for children, and Ames et al. (1959) for adolescents, and by Exner and Weiner (1982) for children and adolescents. Specifically, Ames et al. (1952) reported that sex

differences for subjects ages 5 through 10 were "neither large nor consistent" (p. 287), although boys did tend to give slightly more Whole responses and girls slightly more small Detail responses. Notwithstanding the general trend for the boys to give a greater percentage of Whole responses than the girls, Ames et al. reported that for the 7-year-olds, the girls' responses were more global, and the boys tended to give more details and small details. Additionally, Ames et al. stated:

> Girls responses tend to be neater and more concise. Boys records are longer and more involved, their comments and explanations complicated and rambling, and their elaborations often confabulated. (p. 288)

Unlike the studies cited above (e.g. Baughman & Guskin, 1958; Felzer, 1955; Sunne, 1937) which indicated fairly subtle sex differences, Amet et al. (1959) reported more pronounced sex differences beginning at approximately age 10:

> Boys responses tend to be more global, more restricted and thus less enlivened, less precise, less full, and less variable than the girls. Girls responses, conversely, tend to be more detailed, longer, more enlivened and more precise. (p. 284)

In sum, Ames et al. (1959) reported more Whole and Dw responses (wholes built-up from separate details) for the adolescent boys, and more Detail and small Detail responses, as well as more Color responses, for the adolescent girls. These differences were reported by Ames et al. to be statistically significant according to the Median Test. In

contrast to Ames et al. study which indicated consistent sex differences beginning in adolescence, Exner and Werner (1982) reported very few sex differences among a sample of normal children and adolescent subjects. Specifically, they reported that girls, ages 5 to 7 gave more Color responses, and girls ages 12 to 14 gave more shading responses and also had a greater Ego Index. No sex differences were reported for Location scorings nor for Organizational Activity or Developmental Quality scoring.

Summary of Rorschach Age and Sex Differences

In terms of developmental changes in cognitive organization as reflected on the Rorschach, the literature indicates that there is a progression from relatively undifferentiated percepts which are often global in nature to increasing emphasis upon articulation and integration of separate details into a gestalt (e.g. Friedman, 1952; Hemmendinger, 1953). This progression in perceptual/cognitive organization is consistent with the developmental literature which has indicated that mental processes become increasingly complex with age and, more specifically, that perception in its primitive form is diffuse, syncretic and rigid, and with maturation becomes differentiated, articulated, flexible and integrated (Piaget, 1950; Werner, 1948).

In terms of sex differences in perceptual organization as reflected on the Rorschach, there are some inconsistencies in the literature. For example, Suares (1938) has indicated that males produce richer Rorschach protocols reflecting a greater number of associations, whereas Ames et al. (1959) have reported that females produce more enlivened responses. The research does suggest that the perception of males is initially global with increasing differentiation and integration of parts with increasing age, and that of females is oriented toward large and also small details with increasing definition of these details with increasing age (Ames et al., 1959; Paulsen, 1941; Stavrianos, 1942; Sunne, 1937). More consistent sex differences have been reported in the general cognitive literature (e.g. Maccoby & Jacklin, 1974; Sherman, 1978) which have indicated a male advantage for spatial ability. More specifically, males have been reported to perceive in a more differentiated, articulated and flexible manner than females (Bardwick, 1971; Matthews, 1986; Witkin et al., 1967).

The research pertaining to developmental changes as reflected on the Rorschach provides valuable information; however, it is noted that even the more recent and methodologically sound studies have typically not focused upon the variable of cognitive organizational ability. And in terms of sex differences in cognitive organization as

reflected on the Rorschach, there is a dearth of information in this area.

Given the relative lack of information pertaining to developmental and sex differences in terms of cognitive organization as reflected on the Rorschach, the need for such a study is indicated. Based upon the developmental literature, the present study proposes the following hypotheses:

Statement of Hypotheses

I. The proportion of Diffuse (Diff) responses will decrease with age.

II. The proportion of Simple (Simp) responses will decrease with age.

III. The proportion of Articulated (Artc) responses will increase with age.

IV. The proportion of Integrated (Intg) responses will increase with age.

V. The proportion of Arbitrary responses will increase with age.

VI. The proportion of Diffuse responses will be greater for females than for males.

VII. The proportion of Simple responses will be greater for females than for males.

VIII. The proportion of Articulated responses will be greater for males than for females.

IX. The proportion of Integrated responses will be greater for males than for females.

X. The proportion of Arbitrary responses will be greater for males than for females.

CHAPTER III

METHODOLOGY

Subjects

The sample consisted of well adjusted school children, ages 5 through 12. For this study data were collected from 96 subjects and were then combined with previously collected data to obtain a total of 226 subject protocols. There were approximately 30 subjects for each age group with the following exceptions: there were 20 five-year-olds, 27 six-year-olds, and 29 nine-year-olds. These exceptions were due to the unavailability of appropriate subjects for these ages.

The participants in this study were children from the Knox County School System. Due to the ages of the participants in this study, a parent or legal guardian was required to sign an informed consent form in order for the child to participate in this study.

Criteria for participation in the study were that the potential subject had no known academic, behavioral, or psychiatric problems. These criteria were established using several steps. Teachers were requested to nominate children in good academic standing with no known history of psychiatric or behavioral problems. Teachers were asked not to nominate children in resource classrooms as this was considered an indicator of academic problems. The nominated

children were then screened for psychiatric problems by requesting their parents to answer on the consent form whether or not they (the child) had been referred for psychiatric services in the past. Those children who had not been referred for psychiatric services were screened further by their teachers using the Conners Teacher Rating Scale-Revised (Conners, 1984) in order to identify potential subjects with personality disturbances. A child receiving a rating of 70 or above on any of the factor indexes for this instrument was deemed ineligible for participation in the study as this was considered to indicate serious behavioral and psychiatric disturbances (Conners, 1984).

Among the 96 subjects screened by this author, two potential subjects were eliminated from the study because they received scores of 70 or higher on one or more of the factor indexes of the Conners Rating Scale. Also, three potential subjects were eliminated due to their having been referred for psychiatric services.

The total subject pool was divided according to sex so as to select an approximately equal number of males and females. There were 123 females and 103 males. Evaluation of each subject required approximately 60 minutes. Table I presents a summary of subject characteristics.

Table I. Frequency for Sex by Age

Sex	5	6	7	8	9	10	11	12	Total
Females	10	13	15	18	14	15	20	18	123
Males	10	17	12	12	15	15	10	12	103
Total	20	30	27	30	29	30	30	30	226

Instruments

Conners Teacher Rating Scale-Revised

The Conners Teacher Rating Scale-Revised is a shortened version of the original 39 item scale, and contains a checklist of 28 items designed to identify children with personality disturbance (Conners, 1984). For a sample Conners Teacher Rating Scale-Revised, please see Appendix. The items on this scale have been grouped into 3 components reflective of maladaptive behavior. These are as follows:

1. Conduct Problem, which includes defiant and aggressive behaviors.
2. Hyperactivity, which includes "restless, excitable and troublesome behavior but lacks the aggressive component of factor 1" (Conners, 1969, p. 886).
3. Inattentive - Passive.

There is also a hyperactivity index which contains "key

items...<reflective of>...core psychopathology" (Conners, 1976, p. 2).

The Conners Teacher Rating Scale-Revised is administered by having a teacher who is acquainted with the child rate him or her in terms of each of these 28 behavioral items according to a 4 point scale. The scale includes a baseline of 0 which indicates that the target behavior is present "not at all"; a rating of 1 indicating that the behavior is present "just a little"; a rating of 2 indicating that the behavior is present "quite a bit"; and a rating of 3 indicating that the behavior is present "very much". The ratings are then summed for each factor using unit weighting for each item. The composite rating for each factor is then divided by the number of items contained in each factor, and this mean factor score is then used to derive a T-score based upon the age norm for each of the factors. A T-score of 70 or above has been suggested as demarcating the presence of behavioral disturbance.

In terms of normative data, Goyette, Conners and Ulrich (1978) have published age norms for the revised Conners Teacher Rating Scale using a sample of 570 school children ages 3 to 17. Instrument reliability coefficients have been provided for the original 39 item rating scale. Specifically, test retest reliability coefficients for the original Conners Teacher Rating Scale have been reported to range from .70 to .90 (Conners, 1973), and for interrater

reliability, coefficients have been reported by Glow (cited in Conners, 1984) to range from .38 to .66.

Rorschach Test

The Rorschach Test consists of 10 nonrepresentational inkblots, each of a unique pattern. The Rorschach has been utilized with subjects ages 2 through adulthood; there is no ceiling in terms of age for this measure. The time to administer this test typically ranges from 45 to 60 minutes.

Procedure

Each participant was administered the Rorschach Test by one of four examiners. The testing was done on an individual basis according to the instructions stated in the Burstein-Loucks manual (Burstein & Loucks, 1989). The responses of the subjects to each inkblot were written verbatim and scored according to the Burstein-Loucks method (1989).

Each Rorschach protocol was independently scored by two individuals trained in the Burstein-Loucks method. Any discrepancies among scores were then reviewed and resolved by either Dr. Burstein, Dr. Loucks or a third individual trained in the Burstein-Loucks method. Finally, the scores were entered into the computer and the entries were proofread for their accuracy.

In order to test for significant differences between age groups on the Cognitive Complexity variables, a Kruskel-

Wallis one-way analysis of variance (ANOVA) (Hull & Nie, 1981, p. 237) was performed for each of the Cognitive Complexity variables. The decision to use a nonparametric test resulted from the fact that the data for the Cognitive Complexity variables were not normally distributed as indicated by a Univariate Procedure, SAS (Statistical Analysis System) (1985). Due to the nature of clinical interpretation of the Rorschach, the response frequencies were analyzed as well as the proportions, thus providing additional information as to how children actually respond to the Rorschach. That is, a comprehensive picture for each age group in terms of response frequencies and proportions for each of the Cognitive Complexity variables has been included.

In order to allow pinpointing of specific age differences, a comparison of all pairs of mean rank coefficients for each of the significant variables was conducted using a multiple comparisons procedure for the Kruskal-Wallis one-way analysis of variance, (Conover, 1980). The multiple comparisons procedure was chosen because it is a conservative test which recognizes and accounts for the number of comparisons which are computed.

In order to test for significant sex differences on the Cognitive Complexity variables, a Mann-Whitney Test (Hull & Nie, 1981, p. 232) was performed using mean proportions as well as mean frequencies for each of the Cognitive

Complexity variables.

For purposes of comparison with previous Rorschach research cited in the literature, a parametric test, a two-way analysis of variance (ANOVA), was performed to compare mean proportions on each of the Cognitive Complexity variables for age and sex. In order to adjust for age differences in response frequency a two-way analysis of covariance using number of responses as the covariate was performed for mean frequencies. The General Linear Models provided by SAS (1985) was used due to the fact that this procedure accommodates unequal cell sizes.

CHAPTER IV

RESULTS

Cognitive Complexity and Age

The hypotheses made concerning age differences on children's Rorschachs were partially supported by these data. Descriptive data using mean proportions and mean frequencies for Cognitive Complexity variables for each age group are presented in Table II. Results of a one-way Kruskal-Wallis analysis of variance for each of the Cognitive Complexity variables using mean proportions as well as mean frequencies for age groups are presented in Table III. And results of a parametric analysis of variance using mean proportions and an analysis of covariance using adjusted mean frequencies for age groups are presented in Table IV.

Diffuse

The hypothesis that proportion of Diffuse (Diff) responses would decrease with age was not supported by these data. As indicated in Tables III and IV no significant relationship between age and proportion of Diffuse responses was found using a Kruskal-Wallis one-way ANOVA or a parametric two-way ANOVA. Also as seen in Tables III and IV no significant relationship was found between age and

Table II. Cognitive Complexity Means by Age

Age	n	Intg.	Artc.	Simp.	Diff.	Arb.
			Proportions			
5	(20)	.09	.49	.26	.08	.08
6	(30)	.12	.54	.23	.05	.06
7	(27)	.15	.58	.14	.05	.07
8	(30)	.12	.59	.16	.04	.09
9	(29)	.11	.64	.13	.04	.08
10	(30)	.15	.62	.12	.03	.08
11	(30)	.17	.65	.08	.02	.08
12	(30)	.16	.63	.05	.04	.11
			Frequencies			
5	(20)	1.40	7.65	4.30	1.20	1.20
6	(30)	1.93	9.97	4.50	0.73	1.00
7	(27)	2.93	12.52	3.59	1.15	1.33
8	(30)	2.63	12.87	4.00	1.10	2.03
9	(29)	2.59	15.86	4.03	0.90	1.62
10	(30)	2.80	13.66	3.20	0.77	1.47
11	(30)	3.33	15.33	3.07	0.43	1.70
12	(30)	2.43	11.17	1.03	0.60	1.83

Table III. Cognitive Complexity Mean Rank Scores and Kruskel-Wallis Anova Results for Age

Age	n	Intg.	Artc.	Simp.	Diff.	Arb.
			Proportions			
5	20	86.70	70.85	153.95	134.90	117.82
6	30	103.27	88.78	147.23	118.08	99.88
7	27	129.80	104.57	116.13	131.24	106.28
8	30	105.85	111.13	127.28	121.70	115.95
9	29	103.53	132.40	109.90	112.16	112.47
10	30	119.38	122.07	104.63	99.87	114.45
11	30	119.98	138.02	87.00	95.67	110.12
12	30	131.85	125.70	75.50	103.25	131.72
chi-square		9.81	21.55*	33.32*	10.82	4.40
			Frequencies			
5	20	78.75	67.22	138.15	129.57	110.32
6	30	98.35	87.60	136.07	112.45	97.10
7	27	129.24	120.72	120.06	129.50	108.41
8	30	115.83	122.02	129.47	127.53	121.33
9	29	109.25	136.40	116.97	117.28	117.29
10	30	123.65	133.82	109.90	103.67	115.65
11	30	125.03	127.67	93.37	95.40	110.93
12	30	117.75	98.62	73.02	99.68	125.52
chi-square		11.08	23.72*	23.72*	10.53	4.00

*$P < .03$

Table IV. Cognitive Complexity Parametric ANOVA and ANCOVA Results for Age[a]

	Intg.	Artc.	Simp.	Diff.	Arb.
			Proportions		
Sum of Squares =	.12	.60	.84	.05	.04
F (7,210) =	1.18	3.31*	6.11*	1.86	.63
			Frequencies		
Sum of Squares =	36.46	207.63	332.75	16.89	15.28
F (7,209) =	1.20	2.40*	5.92*	1.69	.59

[a]Reported is the mean proportion for each variable.

*$p < .03$

frequency of Diffuse responses using a Kruskal-Wallis one-way ANOVA or a parametric two-way ANCOVA.

Simple

The hypothesis that proportion of Simple (Simp) responses would decrease with age was supported by these data. As indicated in Tables III and IV, a Kruskal-Wallis one-way ANOVA indicated a significant negative relationship between age and proportion of Simple responses as did a parametric two-way ANOVA. The post hoc multiple comparisons test for the Kruskal-Wallis one-way ANOVA indicated, using a one-tailed test, that the 11-year-olds used significantly fewer Simple responses proportionately than either the 5-year-olds, $Z=3.58$, $p<.03$, or 6-year-olds, $Z=3.60$, $p<.03$; and the 12-year-olds used significantly fewer Simple responses proportionately than the 5-year-olds, $Z=4.19$, $p<.03$, 6-year-olds, $Z=4.29$, $p<.03$, or 8-year-olds, $Z=3.10$, $p<.03$.

As seen in Tables III and IV there was a significant relationship between age and frequency of Simple responses using a Kruskal-Wallis one-way ANOVA and using a parametric two-way ANCOVA. The post hoc multiple comparisons test for the Kruskal-Wallis one-way ANOVA indicated, using a one-tailed test, that the 12-year-olds used significantly fewer Simple responses than the 5-year-olds, $Z=3.51$, $p<.03$, 6-year-olds, $Z=3.79$, $p<.03$, or 8-year-olds, $Z=3.40$, $p<.03$.

Articulated

The hypothesis that proportion of Articulated (Artc) responses would increase with age was supported by these data. As indicated in Tables III and IV, a Kruskal-Wallis one-way ANOVA indicated a significant positive relationship between age and proportion of Articulated responses, as did a two-way parametric ANOVA. The post hoc multiple comparisons test for the Kruskal-Wallis one-way ANOVA indicated, using a one-tailed test, that the 5-year-olds used a significantly smaller proportion of Articulated responses than did the 9-year-olds, $Z=3.24$, $p<.03$, or 11-year-olds, $Z=3.56$, $p.03$.

Also as seen in Tables III and IV there was a significant relationship between age and frequency of Articulated responses using a Kruskal-Wallis one-way ANOVA, and using a parametric two-way ANCOVA. The post hoc multiple comparisons test for the Kruskal-Wallis one-way ANOVA indicated, using a one-tailed test, that the 5-year-olds used significantly fewer Articulated responses than the 9-year-olds, $Z=3.65$, $p<.03$, 10-year-olds, $Z=3.54$, $p<.03$, or 11-year-olds, $Z=3.21$, $p<.03$.

Integrated

The hypothesis that proportion of Integrated (Intg) responses would increase with age was not supported by these data. As indicated in Tables III and IV no significant relationship between age and proportion of Integrated

responses was found using a Kruskal-Wallis one-way ANOVA or a parametric two-way ANOVA. Also as seen in Tables III and IV no significant relationship between age and frequency of Integrated responses was found using a Kruskal-Wallis one-way ANOVA or a parametric two-way ANCOVA.

Arbitrary

The hypothesis that proportion of Arbitrary (Arb) responses would increase with age was not supported by these data. As indicated in Tables III and IV no significant relationship between age and proportion of Arbitrary responses was found using a Kruskal-Wallis one-way ANOVA or a parametric two-way ANOVA. Also as seen in Tables III and IV no significant relationship between age and frequency of Arbitrary responses was found using a Kruskal-Wallis one-way ANOVA or a parametric two-way ANCOVA.

Cognitive Complexity and Sex

The hypotheses concerning sex differences on children's Rorschachs were not supported by these data using a nonparametric statistic to compare mean proportions. A descriptive table of mean proportions and mean frequencies for Cognitive Complexity variables by sex is presented in Table V. Results of a Mann-Whitney test for Cognitive Complexity variables and sex using mean proportions and mean frequencies are presented in Table VI, and results of a parametric analysis of variance using mean proportions and

Table V. Cognitive Complexity Means by Sex

	Proportions		Frequencies	
Variables	Males[a]	Females[b]	Males[a]	Females[b]
Integrated	.12	.15	2.38	2.69
Articulate	.62	.58	14.20	11.18
Simple	.14	.15	3.68	3.21
Diffuse	.05	.04	0.90	0.79
Arbitrary	.07	.09	1.54	1.54

[a]Number of males was 103.
[b]Number of females was 123.

Table VI. Cognitive Complexity Mean Ranks and Mann-Whitney Test Results for Sex

Sex	N	Intg.	Artc.	Simp.	Diff.	Arb.
			Proportions			
Males	103	105.00	122.15	115.25	120.00	111.11
Females	123	120.62	106.26	112.04	108.06	115.50
Z =		-1.80	-1.82	-0.37	-1.49	-0.52
			Frequencies			
Males	103	108.84	125.60	117.72	121.03	113.60
Females	123	117.40	103.37	109.97	107.20	113.42
Z =		-0.99	-2.55*	-0.90	-1.75	-0.02

*$p < .03$, one-tailed.

an analysis of covariance using adjusted mean frequencies for Cognitive Complexity variables and sex are presented in Table VII.

Table VII. Cognitive Complexity Parametric ANOVA and ANCOVA Results for Sex[a]

	Intg.	Artc.	Simp.	Diff.	Arb.
			Proportions		
Sum of Squares =	.04	.13	.02	.00	.01
F (1,209) =	2.71	5.24*	1.15	.78	.78
			Frequencies		
Sum of Squares =	8.28	73.58	29.70	0.04	0.29
F (1,209) =	1.91	5.95*	3.70	0.03	0.08

[a]Reported is the mean frequency for each variable.

*$p < .03$

Diffuse

The hypothesis that proportion of Diffuse responses would be greater for females than for males was not supported by these data. As indicated in Tables VI and VII, no significant relationship was found for sex and proportion of Diffuse responses using a Mann-Whitney test or a parametric two-way ANOVA. Results of a Mann-Whitney test did approach significance for sex and frequency of Diffuse responses in the direction opposite to that hypothesized, i.e. males had an insignificantly greater number of Diffuse responses than females, $Z=-1.75$, $p<.05$. As Table VII indicates, results of a parametric two-way ANCOVA were not significant for sex and frequency of Diffuse responses.

Simple

The hypothesis that proportion of Simple responses would be greater for females than for males was not supported by these data. As indicated in Tables VI and VII no significant relationship between sex and proportion of Simple responses was found using a Mann-Whitney test or a parametric two-way ANOVA. As seen in Tables VI and VII no significant relationship between sex and frequency of Simple responses was found using a Mann-Whitney test or a parametric two-way ANCOVA.

Articulated

The hypothesis that proportion of Articulated responses

would be greater for males than for females was not supported by these data as indicated in Table VI. Results of a Mann-Whitney test did approach significance in the hypothesized direction for proportion of Articulated responses and sex, $Z=-1.82$, $p<.04$.

As seen in Table VII results of a parametric two-way ANOVA were significant for sex and proportion of Articulated responses. Tables VI and VII do indicate that there was a significant relationship in the hypothesized direction between sex and frequency of Articulated responses using a Mann-Whitney U Test and using a parametric Two-Way ANCOVA.

Integrated

The hypothesis that proportion of Integrated responses would be greater for males than for females was not supported by these data as indicated in Table VI. Results of a Mann-Whitney test did approach significance in the direction opposite to that hypothesized, i.e. females had an insignificantly greater proportion of Integrated responses than males, $Z=-1.80$ $p<.04$. As indicated in Table VII no significant relationship between sex and proportion of Integrated responses was found using a parametric two-way ANOVA. Also as seen in Tables VI and VII no significant relationship between sex and frequency of Integrated responses was found using a Mann-Whitney test or a parametric two-way ANCOVA.

Arbitrary

The hypothesis that proportion of Arbitrary responses would be greater for males than for females was not supported by these data. As Tables VI and VII indicate, no significant relationship between sex and proportion of Arbitrary responses was found using a Mann-Whitney test or a parametric two-way ANOVA. Also as Tables VI and VII indicate, no significant relationship between sex and frequency of Arbitrary responses was found using a Mann-Whitney test or a parametric two-way ANCOVA.

There was not a significant interaction between sex and age for mean proportions or mean frequencies for any of the Cognitive Complexity variables using a parametric two-way ANOVA or a two-way ANCOVA.

Due to a lack of significant findings for proportion of Cognitive Complexity variables and sex, an additional analysis was performed using only the 11 and 12-year-olds to determine whether or not a relationship exists between Cognitive Complexity and sex among older children. Table VIII presents results of a Mann-Whitney test for Cognitive Complexity variables and sex for the 11 and 12-year-olds. As seen in Table VIII there was a significant relationship in the hypothesized direction for sex and proportion of Articulated responses as well as for sex and frequency of Articulated responses. There was a trend in the direction opposite to that hypothesized for proportion of Integrated

Table VIII. Cognitive Complexity Mean Ranks and Mann-Whitney Test Results for Older Children

Sex	n	Intg.	Artc.	Simp.	Diff.	Arb.
			Proportions			
Males	22	25.59	36.43	35.25	31.93	26.70
Females	38	33.34	27.07	27.75	29.67	32.70
Z =		-1.66	-2.00*	-1.67	-.58	-1.31
			Frequencies			
Males	22	28.41	37.95	35.95	32.57	28.98
Females	38	31.71	26.18	27.34	29.30	31.38
Z =		-0.71	-2.52*	-1.94*	-0.84	-0.53

*$p < .03$, one-tailed.

responses, i.e. females had an insignificantly greater proportion of Integrated responses than males $\underline{Z}$=-1.66, $\underline{p}$<.05. There was also a trend in the direction opposite to that hypothesized for proportion of Simple responses, i.e. males had an insignificantly greater proportion of Simple responses than females, $\underline{Z}$=-1.67, $\underline{p}$<.05; there was a significant relationship between sex and frequency of Simple responses in the direction opposite to that hypothesized, i.e. males had significantly more Simple responses than females, $\underline{Z}$=-1.94 $\underline{p}$<.03. There was not a significant relationship for proportion or frequency of Arbitrary responses and sex, nor for proportion or frequency of Diffuse responses and sex.

Descriptive data using absolute response frequencies for the Cognitive Complexity variables by age and sex are presented in Tables IX and X.

Table IX. Cognitive Complexity Absolute Response Frequencies for Age

Ages	n	Intg.	Artc.	Simp.	Diff.	Arb.	Total
			Absolute Mean Frequencies				
5	(20)	1.40	7.65	4.30	1.20	1.20	15.75
6	(30)	1.93	9.97	4.50	.73	1.00	18.13
7	(27)	2.93	11.66	3.60	1.15	1.33	21.52
8	(30)	2.63	12.87	4.00	1.10	2.03	22.63
9	(29)	2.59	15.86	4.03	.90	1.62	25.00
10	(30)	2.80	13.67	3.20	.77	1.47	21.90
11	(30)	3.33	15.23	3.07	.43	1.70	23.77
12	(30)	2.43	11.17	1.03	.60	1.83	17.06
			Absolute Frequencies				
5	(20)	28	153	86	24	24	315
6	(30)	58	299	135	22	30	544
7	(27)	79	338	97	31	36	581
8	(30)	79	386	120	33	61	679
9	(29)	75	460	117	26	47	725
10	(30)	84	410	96	23	44	657
11	(30)	100	457	92	13	51	713
12	(30)	73	335	31	18	55	512
Total		576	2838	774	190	348	4726

Table X. Cognitive Complexity Absolute Response Frequencies for Sex

Sex	n	Intg.	Artc.	Simp.	Diff.	Arb.	Total
			Absolute Mean Frequencies				
Females	123	2.70	11.18	3.21	.79	1.54	19.41
Males	103	2.38	14.20	3.70	.90	1.53	22.70
			Absolute Frequencies				
Females	123	331	1375	395	97	190	2388
Males	103	245	1463	379	93	158	2338
Total	226	576	1838	774	190	348	4726

CHAPTER

DISCUSSION

Cognitive Complexity and Age

This study provided partial support for the hypothesis that there are significant developmental changes across age groups in Cognitive Complexity as reflected on the Rorschach. The categories which changed developmentally using both parametric and nonparametric statistics were Simple and Articulated.

Contrary to expectations, developmental changes were not significant across all age groups. The significant changes for Articulated responses were between the 5-year-olds and the 9 and 11-year-olds, and for Simple responses these were between the younger children, ages 5 and 6, and the 11-year-olds, and also between the 5, 6, and 8-year-olds and the 12-year-olds.

Simple

The proportion and frequency of Simple responses decreased significantly with age. In the Burstein-Loucks system (1989), Simple responses are scored when "a subject perceives a gestalt without analyzing it into parts" (p. 30). In other words, Simple responses reflect a rudimentary level of cognitive differentiation. The greater proportion of Simple responses among the younger children suggests that

cognitive activity is less complex at younger ages, supporting the general hypothesis of this study.

This finding for Simple responses is consistent with Werner's (1948) ontogenetic theory which is quite general and essentially refers to the greater simplicity of early cognitive organization:

> Evidence is accumulating that, in accordance with these concepts of development, organization is less differentiated, more homogeneous at earlier levels than at more advanced stages. (p. 56)

In terms of the Piagetian framework, these findings support his general tenet that cognitive organization is less elaborate at younger ages, but they do not indicate a developmental pattern that parallels Piaget's sequence of stages. More specifically, at ages 5 and 6 children are considered to be nearing the end of the preoperational stage of development which is characterized by egocentricity, and centration, specifically the "tendency to center...attention on a single, striking feature of the object...to the neglect of other important aspects..." (Flavell, 1963 p. 157). Beginning at approximately age 7 children enter the stage of concrete operations which includes a decrease in egocentricity, less reliance upon superficial appearances and a greater ability for decentration. These qualities are also subsumed within the next stage of formal operations beginning at approximately age 12, during which the child evidences more sophisticated problem solving skills including the abilities for abstract reasoning and logical

analysis and synthesis, i.e. "the adolescent begins his consideration of the problem at hand by trying to envisage all the possible relations which could hold true..." (Flavell, 1963, p. 204). Based upon the qualitative differences at these age-related stages, and in particular, in terms of the ability to decenter or recognize outlying details, it is not unexpected that the youngest children more often focused upon a single gestalt without analyzing its parts than did the oldest children. However, Piaget's developmental theory would also predict a difference between the 5 and 6-year-olds, and the 7, 8, 9, and 10-year-olds who theoretically should have attained concrete operational thought including the ability for decentration, as well as the possibility for a difference in Cognitive Complexity between the 9 through 11-year-olds, and the 12-year-olds in that the development of abstract thinking for the oldest children might be reflected in their producing more complex percepts.

The lack of a significant difference between the youngest and middle children is difficult to reconcile. One tentative hypothesis is that during mid-latency Simple responses are decreasing somewhat in proportion to more complex responses but their ratio does not change significantly or reach a critical level until 11 years of age. However, this hypothesis is weakened by the lack of a significant increase for either Articulated or Integrated

percepts for the 12-year-olds.

Although the finding for Simple responses does not completely support the expected pattern of development in terms of children ages 7 through 10, this finding does suggest that the presence of Rorschach percepts which are defined but unelaborated antedate more complex percepts reflecting the properties of articulation and synthesis. More specifically, the Simple response in the Burstein-Loucks system reflects the ability to distinguish one or more essential details of the Rorschach blot, and is therefore considered to represent a rudimentary level of cognitive organization which is more refined than a Diffuse percept but less sophisticated than an Articulated percept.

Consistent with this, Meili-Dworetzki (1956) described a stage in perceptual development she termed "primitive analysis" (p. 143) in which some Rorschach details are separated from the whole blot, and she reported that this stage precedes the emergence of more mature analytic and synthetic abilities. Similarly, Friedman (1952) and Exner and Weiner (1982) have reported a decrease with age in unarticulated Rorschach percepts. However, because neither the Developmental Level nor the Comprehensive system include a category which is isomorphic to that of Burstein and Loucks' Simple response, their findings do not provide information predictive of specific age differences for the Simple response.

Thus, the finding for Simple responses does indicate a developmental change although not precisely as predicted based upon Piaget's developmental stage theory.

Articulated

The proportion of Articulated responses increased significantly with age. In the Burstein-Loucks system (1989), Articulated responses are scored when a subject "perceives a single unit and then analyzes it into parts" (p. 30). Articulated responses are considered by Burstein and Loucks to reflect a cognitive style in which there is an ability to perceive a unified percept with a recognition of and attention to its parts.

The significant increase in the proportion of Articulated responses with age provides partial support for this study's general hypothesis that children's Rorschach percepts become increasingly articulated and elaborated with age. Conclusions based upon this finding are necessarily qualified due to the restricted range of significant age differences. That is, the significant differences were found only between the 5-year-olds and the 9 and 11-year-olds.

This restricted range of age differences is not consistent with Piaget's description of cognitive development in which there is a progressively more differentiated underlying organization. (Flavell, 1963; Piaget, 1950). Specifically, Piaget posited that perceptual

activity relies upon an underlying organization which is not static but develops over time by simultaneously accommodating to and assimilating new experiences. By means of these two processes, "cognitive structures are not only generalized to the new object, but are also differentiated as a consequence of its idiosyncratic structural demands" (Flavell, 1963. p. 51). This more differentiated cognitive organization should be reflected in a greater ability with age to discriminate between objects and detect their subtle differences, i.e. to attend to less obvious details and nuances. However, in the present study, the Rorschach percepts of some of the oldest children, the 10 and the 12-year-olds, did not indicate a greater ability to detect subtleties and discriminate among parts of the Rorschach blot. Nor is the restricted range of age differences consistent with the ontogenetic theory of Werner (1957) who stated:

> Perceptual development proceeds from a state of relative globality and lack of differentiation to a state of increasing differentiation, articulation and hierarchic integration. (p. 116)

The Rorschach literature contains does suggest an increase with age in Articulated percepts. More specifically, in the early Rorschach literature, Hertz and Ebert (1944) compared the perceptual abilities of 6 and 8-year-olds as reflected in their Rorschach performance and, contrary to the findings of the present study, they reported "...they <8-year-olds> pay closer attention to detail, they

become more specific" (p. 221), and they also commented in general upon the older child's <8-year-olds> and adult's "greater accuracy, organization, complexity and originality" (p. 221). Several years later, Hemmendinger (1953) reported that "children's percepts become more differentiated with age, first and rather grossly...and then more and more finely and more fragmentary" (p. 164). However, the results reported by Smith (1981) do include some unexpected age differences. More specifically, she did report a significant, positive relationship between stage of cognitive development and complexity of whole responses, and in particular that the occurrence of highly articulated whole responses was positively related to the ability for formal operational thought in early adolescence. Of interest, though, is her unpredicted result that among those children judged to be at the stage of concrete operations, the whole responses of the sixth graders were less articulated than those of their second grade counterparts.

The research by Smith suggests a partial explanation for this study's findings in that attainment of higher cognitive stages cannot be reliably predicted based solely upon age or grade. It is possible that the 9 and 11-year-olds may have attained a higher cognitive stage than the 10 and 12-year-olds. However, this does not explain the lack of discrepancy between the youngest children and the 12-year-olds in that such a large age difference would almost

certainly be accompanied by a difference in terms of cognitive stages.

The rather striking failure to obtain a significant increase in Articulated responses for the oldest children suggests the possibility that this study's sample of 12-year-olds may have been atypical due to undetected errors in terms of sampling technique, test administration, or other methodological flaws regarding this age group.

In essence, the finding for Articulated responses does indicate developmental changes, but these were not precisely as predicted. That is, there does not appear to be a blossoming in terms of cognitive complexity at the older ages. Instead, the findings suggest the possibility that the development of cognitive organizing ability is discontinuous, and raises the question as to whether there are age-specific developments. Further research employing adolescents would be necessary to determine the temporal course for Articulated responses.

Integrated

The proportion of Integrated responses did not increase significantly with age. In the Burstein-Loucks system Integrated responses are scored when an individual draws together distinct percepts into a relationship thus forming a larger, more complex percept. Integrated responses are considered by Burstein and Loucks to reflect a cognitive style in which synthetic ability predominates.

The hypothesis that proportion of Integrated responses would increase with age was based upon the developmental and Rorschach literature. More specifically, Werner (1948) described mature perception as including "a decisiveness of parts standing in clear relationship" (p. 111), and Piaget (1950) considered perceptual activity to reflect "coherence and the power of progressive synthesis" (p. 85). Similarly, the Rorschach literature has indicated that integrative ability increases with age. For example, using Friedman's Developmental Level system with children and adults, Hemmendinger (1953) reported that "the percepts of the oldest children <10 years, 11 months> and adults are composed of separate details integrated together into a larger whole," (p. 164) representing an Integrated response. The presence of "highly complex whole responses" was reported by Gerstein, et al. (1976) to be greater for children ages 11 and 12 than for their younger counterparts ages 7 and 8. Similarly, in Exner and Weiner's (1982) review of age-related changes on the Rorschach using the Comprehensive system, they indicated an increase with age in Developmental Quality '+' scores in which "a unit or discrete portions of the blot are perceptually articulated and integrated or combined into a single percept" (p. 63).

The failure of the present study to obtain significant results for Integrated responses is somewhat surprising given the previous Rorschach literature as discussed above.

The lack of significant results is also initially difficult to reconcile with the easily observable differences in cognitive sophistication between 5-year-olds and 12-year-olds. One possible explanation is that the quality, rather than the quantity of integrated cognitive activity may change with age. More specifically, one possible age-related difference may be in the nature of the relationship posited between parts of the percept. That is, there may be significant age differences in terms of the level of conceptualization represented by the integrated percept, i.e. whether the gestalt represents the additive product of concrete details representing a static object, e.g. 'a man with a hat', versus a dynamic interaction of parts whose integration reflects a greater degree of abstraction e.g. 'two women performing a Russian dance'. Another possible age-related difference might be in terms of the amount of elaboration for each of the parts. That is, the degree to which each of the details is articulated. Consistent with this second hypothesis is this study's finding that proportion of Articulated responses increased with age. In light of this finding, the noticeable difference in cognitive activity between children of different ages may reflect an increase with age in refinement, i.e. amount of articulation, of integrated cognitive activity. However, the lack of a significant increase for Articulated responses at age 12 weakens this argument. Further research is

necessary to support or disconfirm these hypotheses.

Arbitrary

The proportion of arbitrary responses did not increase significantly with age. In the Burstein-Loucks system, Arbitrary responses are considered to reflect a failed effort at integration in which the relationship posited among parts is not consensually validatable. Because Arbitrary responses are considered to reflect essentially the same processes that underlie Integrated responses but gone awry, it was predicted that Arbitrary responses would increase with age. However, because Arbitrary responses reflect distorted thinking, they should occur infrequently in the protocols of psychologically healthy individuals. This was borne out in the present study. Thus, failure to find support for this prediction may be due at least in part to the rarity of this type of response in a well-screened sample.

Diffuse

The proportion of Diffuse did not decrease significantly with age. In the Burstein-Loucks system (1989) Diffuse responses are scored for "Simple responses which inherently have no distinctive shape" (p. 30). Diffuse responses are considered by Burstein and Loucks to reflect a primitive cognitive style with relatively undeveloped abilities for concentrated attention and

analytic/synthetic thinking, (S. Loucks, personal communication, January 20, 1990).

The failure to find support for this hypothesis is somewhat surprising given the developmental and Rorschach literature. More specifically, Werner (1948) attributed to the young child "a diffusely organized homogeneous perception" (p. 113), and Piaget (1950) stated that "young children perceive in a 'syncretic' or 'global' manner" (p. 84).

The Rorschach literature also contains references to the diffuse or global nature of early perceptual organization. For example, Hertz and Ebert (1944) described the characteristic "manner of mental approach" of 6-year-olds as reflected on the Rorschach:

> Children 6-years of age are prone to view wholes or large sub-wholes in a broad general manner without analysis or concentration on the many specific parts constituting the whole...the total configuration forms the basis for early perception rather than elements of the situation. (p. 21)

Similarly, Ames et al. (1952) reported that "the <Rorschach> response of the 5-year-old is primarily global...and he shows a high generalizing ability..." (p. 291). Additionally, the diffuse Rorschach response was described by Friedman (1952) in his Developmental Level system using the Subscript 'Wa', for an amorphous whole which he considered to be "an indication of the most extremely diffuse global percept" (p. 86). The Wa score was included among the "genetically low" category and was reported by

Friedman to occur significantly more often among the protocols of children than adults. Using the Developmental level system, Hemmendinger, (1953) also referred to the "globality of the 3 to 5 year-old" (p. 104) as reflected on the Rorschach. Finally, Exner and Weiner (1982) reported in using the Comprehensive system a decrease with age in the Vague response in which "a diffuse or general impression <is> offered to the blot which avoids the necessity of articulation of specific outlines or structured features" (p. 63).

Given the above, there are two hypotheses which are inter-related and might help to explain this study's failure to obtain significant results. The first concerns the rigorous scoring for Diffuse responses. That is, a response is considered Diffuse only if it is completely lacking in detail. Even a response which includes only one gross detail may not be scored Diffuse. Due to this conservative scoring, it might be expected that Diffuse responses would be relatively rare and, in fact, in the present study these responses did occur least frequently among the category of Cognitive Complexity. Thus the relative scarcity of these responses may contribute to a lack of significant findings. Secondly, it is possible that the greatest decrease in Diffuse responses may occur earlier than the ages included within this study. That is, pure diffuse responses i.e. lacking any mention of detail, may be most prevalent among

children below the age of 5. By age 5, the decrease in diffuse percepts may become somewhat attenuated as there emerges a rudimentary capacity to perceive details. Thus, although childrens percepts may become qualitatively less global from ages 5 through 12, this would not necessarily be reflected in a significant decline in Diffuse responses using the criteria of the Burstin-Loucks system.

Cognitive Complexity and Sex

This study did not provide support for the hypothesis that there are significant sex differences in Cognitive Complexity as reflected on the Rorschach for children ages 5 through 12. There were no significant sex differences in terms of mean proportions for any of the Cognitive Complexity variables using a nonparametric statistic. In terms of mean frequencies, there was a significant sex difference using both nonparametric and parametric statistics, i.e. males gave significantly more Articulated responses than females. Using a parametric statistic, there was a significant sex difference proportionately, i.e. males gave proportionately more Articulated responses than did females.

The failure to obtain significant results for mean proportions using a nonparametric statistic suggests that the significant results for mean frequencies, and also for mean proportions using a parametric statistic, may be in

part an artifact of responsiveness. However, the result for mean frequencies does provide descriptive information regarding differences in how males and females respond on the Rorschach.

This study's failure to obtain significant results for mean proportions using a nonparametric statistic for any of the Cognitive Complexity variables suggests a need to examine closely the literature regarding sex differences in children as well as the category of Cognitive Complexity and the methodology of the present study. More specifically, the literature is somewhat equivocal in terms of the age at which sex differences become significant. For example, Johnson and Meade (1987) concluded that "a male advantage in spatial ability begins at least as early as the fourth grade" (p. 735) and that a male advantage may emerge as early as first grade but may not be evident on tasks which also reflect verbal skills. Similarly, Matthews (1986) reported significant sex differences for children ages 6 through 11 in terms of "cartographic competence" and indicated that the results of their study "suggest <that> boys acquire more rapidly the ability to depict space in a complex and integrated manner" (p. 299). Witkin et al. (1967) reported that beginning at age 8 males demonstrated a greater tendency to be "field independent", which was considered to indicate greater differentiation in terms of the way in which the environment is perceived. However, a

review of sex differences in the literature by Maccoby and Jacklin (1974) suggested that sex differences in spatial ability are not reliably present until late latency or early adolescence. It is conceivable that a sex difference in terms of visuospatial ability as reflected on the Rorschach may be present slightly for young children but may not have crystallized or become significant until later in development. Further research using older subject would be necessary to test this hypothesis.

The failure of this study to obtain significant results in light of reported sex differences for spatial ability beginning as early as 8 years (Johnson & Meade, 1987; Matthews, 1986; Witkin et al. 1967), suggests a second hypothesis. Specifically, the discrepancy between this study's results and results of previous research may reflect the nature of the instruments employed. More specifically, the studies reporting significant findings included tests which provide relatively pure measures of visuospatial ability, e.g. the Rod and Frame Test and Embedded Figures Test (Witkin et al., 1967), unlike the Rorschach which provides a measure of many facets of personality functioning. In particular, the category of Cognitive Complexity may reflect in addition to visuospatial ability, imaginative and verbal skills. Because several factors may contribute to Cognitive Complexity scoring, it is possible that Cognitive Complexity may not be discriminative for

visuospatial ability.

A related explanation for the present study's nonsignificant results concerns sex differences which have been reported in terms of verbal abilities (e.g. Johnson & Meade, 1987; Maccoby & Jacklin, 1974). More specifically, Maccoby and Jacklin reported in their comprehensive review of sex differences that "it is probably true that girl's verbal ability matures somewhat more rapidly in early life" (p. 351) and that "it is at about age 10 or 11 that girls begin to come into their own in verbal performance" (p. 84). Similarly, Johnson and Meade describe a female "verbal precocity" (p. 736) which may mask other sex differences including spatial ability. It is possible that verbal ability was a confounding factor in the present study. This possibility suggests a direction for future Rorschach research using verbal ability as a covariate.

Another consideration is that the early developmental literature contained studies using a single sex, more often male, which were used to make inferences regarding sex differences (Maccoby & Jacklin, 1974; Sherman, 1978). Maccoby and Jacklin refer to this as one of the "peculiarities of interpretation of data" (p. 6) in which differences within a sex have been considered to indicate between sex differences. Possibly this distortion of the data suggested a greater divergence between the sexes than truly exists, and additional research may be necessary to

gain a more comprehensive assessment of female cognitive and perceptual abilities.

Notwithstanding the potential persuasiveness of the explanations cited above to account for a lack of significant findings, an alternate explanation should not be dismissed. This is, these results may be a consequence of educational and cultural efforts to minimize sex differences. More specifically, much of the research concerning sex differences in spatial ability was conducted 10 or more years ago. Advances since then in providing equal educational opportunities in terms of exposure to fields related to spatial abilities such as geometry, and changes in parenting which encourage girls to be as exploratory as boys may be responsible for diminished sex differences in terms of visuospatial ability.

An additional post-hoc analysis performed for the 11 and 12-year-olds did indicate that males gave significantly more Articulated responses proportionately, as well as in frequency, than did females. This results is consistent with this study's general hypothesis that the Rorschach percepts of males will demonstrate a more differentiated organization. Although this finding is limited to the 11 and 12 year-olds, it does provide some support for the validity of the Rorschach as a measure of Cognitive Complexity. More specifically, in light of females' reported advantage for verbal skills (e.g. Maccoby &

Jacklin, 1974; Svenson, 1971) the greater proportion of Articulated responses for males is noteworthy and suggests that indeed the Rorschach test assesses perceptual and cognitive functioning and not merely verbal skills which would have been consistent with females demonstrating a greater proportion of Articulated responses. As previously suggested, a future direction for Rorschach research might involve using verbal ability as a covariate to determine its influence on Rorschach performance. There was no differential in terms of sex for any of the other Cognitive Complexity variables.

This result for the 11 and 12-year-olds, in light of the nonsignificant results for the 5 through 12-year-olds, suggests that sex differences in terms of cognitive organizing ability as reflected on the Rorschach do not emerge until relatively late in latency. However, it is possible that this sex difference is particular to 11 and 12-year-olds. Because the 11 and 12-year-olds represent the oldest ages in this study, the temporal consistency of this sex difference cannot be determined. Further research is indicated employing adolescents to investigate the temporal course of this difference and also the possibility that this sex difference may be accompanied during adolescence by other sex differences such as those which had been hypothesized for the present study.

Conclusion

The aim of the present study was to contribute to the literature on children's Rorschach performance by focusing upon the area of Cognitive Complexity using the Burstein-Loucks scoring system and comparing the responses of children on this variable according to age and sex. Additionally, this study sought to refine the methodology of previous research by carefully screening subjects for psychiatric, academic and behavioral problems which might confound the data. This study's exploration of age differences did yield results which suggest that there are significant developmental changes in children's Rorschach performance in the area of Cognitive Complexity. However, these changes do not appear to be as consistent across ages nor as pronounced as predicted.

The results for this study do not suggest that there are significant sex differences in Children's Rorschach performance in terms of Cognitive Complexity. A post-hoc test did provide limited support for sex differences in terms of articulation of percepts for 11 and 12-year-olds. Although the results of this post-hoc test are not conclusive, they do suggest that a focus for future research might be to examine Cognitive Complexity in terms of sex differences using an adolescent population. Possibly Rorschach performance may begin to diverge according to sex during adolescence. Thus, in addition to providing support

for developmental differences on children's Rorschachs, this study also suggests a direction for future research of sex differences on the Rorschach.

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APPENDIX

Teacher's Questionnaire

Name of Child _____ Grade _____

Date of Evaluation _____

Please answer all questions. Beside *each* item, indicate the degree of the problem by a check mark (✓)

	Not at all	Just a little	Pretty much	Very much
1. Restless in the "squirmy" sense.				
2. Makes inappropriate noises when he shouldn't.				
3. Demands must be met immediately.				
4. Acts "smart" (impudent or sassy).				
5. Temper outbursts and unpredictable behavior.				
6. Overly sensitive to criticism.				
7. Distractibility or attention span a problem.				
8. Disturbs other children.				
9. Daydreams.				
10. Pouts and sulks.				
11. Mood changes quickly and drastically.				
12. Quarrelsome.				
13. Submissive attitude toward authority.				
14. Restless, always "up and on the go."				
15. Excitable, impulsive.				
16. Excessive demands for teacher's attention.				
17. Appears to be unaccepted by group.				
18. Appears to be easily led by other children.				
19. No sense of fair play.				
20. Appears to lack leadership.				
21. Fails to finish things that he starts.				
22. Childish and immature.				
23. Denies mistakes or blames others.				
24. Does not get along well with other children.				
25. Uncooperative with classmates.				
26. Easily frustrated in efforts.				
27. Uncooperative with teacher.				
28. Difficulty in learning.				

FIGURE 3.11. The Conners Teacher Rating Scale. (Reprinted by permission of C. K. Conners.)

VITA

Betsy Ellen Gertz was born in Harvey, Illinois on April 17, 1958. She grew up in Oak Park, Illinois and was graduated from Oak Park-River Forest High School in June 1976. The following September she matriculated at Oberlin College, Oberlin, Ohio and was graduated with a degree in psychology in December 1981. In the fall of 1983 she entered the Graduate School of The University of Tennessee, Knoxville, and she was awarded the Master of Arts degree in June 1988.

She re-entered the Graduate School of the University of Tennessee in September 1988 and that year she completed a one year off-campus clinical internship at the West Side Veterans Administration, Chicago, Illinois. The following September she began a fellowship at Lakeshore Hospital, Birmingham, Alabama, where she is currently employed. She received the Doctor of Philosophy degree with a major in Psychology in December 1990.