

University of Nevada, Reno

**Children's Perceptions of the Graphic Features They Use to
Differentiate Writing from Drawing**

A thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science in Human Development
and Family Studies

by

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prepared under our supervision by

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Abstract

This project examined preschool children's understanding of the graphic features they use in their emergent writing, differentiating it from a drawing of the same referent. The graphic features they could express through speech and communication were examined, as well as the graphic features they used in their emergent writing. The frequency of graphic feature identification was examined, as well as significant differences and the congruency between graphic feature use and graphic feature identification. The most frequently used graphic features used were linearity, unidirectionality, and small size of units. The most frequently identified graphic feature was conventional letters. Overall, children use significantly more graphic features than they were able to identify. Significant relationships comparing the 2-year-old group and 4-year-old group's usage and identification were also found.

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Chapter One: Introduction

Background

The development of writing in young children is a long and complicated process. Learning to translate spoken sounds into graphic symbols is not as natural as spoken language, but mastering this cultural tool creates changes in the way children interact with the environment, stimulating change and growth in cognitive thought (Vygotsky, 1978). The very beginnings of writing, and other forms of notation, such as drawing, begin with marks on paper. Opportunities to experiment with mark-making are prevalent in early childhood classrooms, providing children with important pre-writing and pre-literacy experiences, as well as acting as an outlet for children's natural mark-making curiosities (Love, Burns, & Buell, 2007). Early attempts at writing, referred to as emergent writing, are pre-literacy experiences that contribute to children's eventual mastery of the writing system, as well as overall literacy development (Whitehurst & Lonigan, 1998).

Not only is the process of emergent writing closely tied to literacy development, it is also related to the process of drawing; both begin as similar graphic products (i.e., scribbles), lacking representational meaning (Levin & Bus, 2003). Preschool children initially produce indistinguishable marks during the writing and drawing process, but over time, they begin to use specific graphic features to differentiate their emergent writing from drawing (Gibson & Levin, 1975). Graphic features are "features of form which distinguish a written display from a drawing of the same referent" (Tolchinsky-Landsmann & Levin, 1985, p. 320). The graphic features children use in their own writing have been the subject of a large body of research (Brenneman, Massey, Machado,

& Gelman, 1996; Ferreiro & Teberosky, 1982; Gibson & Levin; Gombert & Fayol, 1992; Hildreth, 1936; Levin & Bus; Sulzby, Barnhart, & Heishima, 1988; Tolchinsky-Landsmann & Levin). Researchers have also examined what children know about the graphic differences between writing and drawing through sorting and classification tasks (Akita, Padakannaya, Prathibha, Panah, & Rao, 2007; Gombert & Fayol; Lavine, 1977; Levin & Bus; Tolchinsky-Landsmann & Karmiloff-Smith, 1992; Tolchinsky-Landsmann & Levin). It is unknown what children can express about the graphic differences between writing and drawing through conversation.

The purpose of this project was to explore what children know about the graphic features they use in their own writing, in terms of what they can express through conversation. Specifically, this project tried to find which graphic features children could verbally identify when comparing examples of their own writing and drawing. This project also examined the congruency between the number of graphic features children could verbally identify, and the number of graphic features actually present in their emergent writing. A greater understanding of this aspect of emergent writing provides insight into the thoughts of children who are actively involved in this developmental and cultural process. Understanding children's perceptions of the differentiation between drawing and writing provides early childhood educators with a deeper understanding of mark-making in early childhood, and the importance of facilitating mark-making and emergent writing experiences in the early childhood classroom.

Writing Systems

Writing and literacy are essential to modern societies. As Olson (1994) appropriately states, "almost no event of significance, ranging from declarations of war to

simple birthday greetings, passes without appropriate written documentation” (p. 1). The Roman alphabetic script currently used in Western society is the result of thousands of years of evolution and multiple reinventions of representing the sounds of language (Olson). Producing literate members of society is one of the primary goals of education in the United States, a process that begins in early childhood. Before children can attribute meaning to written letters and words, they must become familiar with the graphic characteristics that govern the writing script of their culture.

Each writing script is governed by the rules of the corresponding orthography. The orthography of a written language dictates how marks must “look” in order for meaningful interpretation to take place. Writing “looks” a certain way because of features at the graphic level. According to Gibson and Levin (1975), describing writing at the graphic level highlights multiple vital characteristics. For example, writing is linear in form and moves in one direction. Letters can be combined to make different graphic patterns, resulting in words and sentences; however, letters are fixed in their orientation and shape. Increasingly large spaces separate letters, words, and paragraphs. Creating writing that complies with the orthography of the spoken language facilitates the mapping of speech sounds onto written marks, resulting in interpretation and communication (Read, 1983).

Graphic features of all orthographies can be classified as either superordinate or ordinate (Gibson & Levin, 1975). Superordinate graphic features include overarching characteristics of all orthographies, such as linearity, distinct units, regular blanks, and unidirectionality (Tolchinsky, 2003). Ordinate features of writing are orthography-specific and include features such as the specific type of linearity (horizontal or vertical),

direction (left-to-right, right-to-left, top-to-bottom), and specific shape of symbols (alphabet) (Tolchinsky). For example, the orthography used to represent the English language is horizontally linear, left-to-right directional, and is comprised of the twenty-six symbols of the Roman alphabet (Read, 1983). Children's understanding of orthographic rules of writing, in terms of what they can express through speech, was the main focus on this project.

Before children can write, they are aware of writing in the social world (Freeman & Sanders, 1989). In societies that rely heavily on print, such as the United States, early literacy experiences in the home provide children with opportunities to learn about literacy materials, behaviors, and observe family members' literacy behaviors (DeBaryshe, Binder, & Buell, 2000). Exposure to writing begins as early as infancy with letter characters printed on blocks, magnets, puzzles, and countless other play materials (Read, 1983). Opportunities such as these expose children to the features of their language's orthography long before they have the ability to read and print communicatively.

Differentiation of Writing

Before children produce any marks that resemble writing, they experiment with mark-making through the act of scribbling (Kellogg, 1969). Gardner (1980) describes scribbling as analogous to babbling during language development. Children are experimenting with mark-making through scribbling as a baby experiments with speech sounds through babbling. Some researchers label the act of scribbling as a simple motor activity reflecting natural movements (e.g., using a finger to trace a shape in the sand)

(Kellogg). However, some research has shown that children as young as 2 can attribute meaning to the scribbles they make (Adi-Japha, Levin, & Solomon, 1998).

At approximately age 4, the scribbles children use for writing begin to graphically differentiate from the scribbles used for drawing (Tolchinsky-Landsmann & Levin, 1985), and adults can consistently recognize the difference between children's productions (Levin & Bus, 2003). Writing marks become linear, move in one direction, and are comprised of small units and spaces (Tolchinsky-Landsmann & Levin). Features such as wavy lines, circles, and pseudo-letters (letter-like approximations) are also commonly observed in children's emergent writing (Gombert & Fayol, 1992; Levin & Bus; Sulzby et al., 1988). Children use these graphic features to imitate the "look" of writing. For example, children may create a series of small, segmented circles along a horizontal line, or long, wavy, linear scribbles. As mentioned previously, the graphic features children use in their emergent writing have been studied extensively, but the graphic features children can verbally identify when examining their own writing had not yet been explored. Consequently, the graphic features children actually use in their emergent writing had never been compared to the graphic features children are capable of verbally identifying. The purpose of this project was to explore the graphic features children can verbally identify when examining their own writing, and how they compare to the graphic features children actually use in their writing.

Notational Systems

Writing and drawing are separate notational systems, meaning they are each comprised of unique marks and rules, and have distinct communicative purposes. According to Tolchinsky-Landsmann and Karmiloff-Smith (1992), two types of

understanding are acquired for each notational system: (1) understanding of the notational system as a communicative tool and (2) understanding of the notational system as a domain of knowledge. When writing is understood as a referential-communicative tool, children understand how to appropriately use writing to communicate an idea (e.g., a child writes a letter to a friend). Understanding the communicative aspect of writing in relation to other notational systems (e.g., drawing or numbers) does not take place until approximately age 6 (Tolchinsky-Landsmann & Karmiloff-Smith).

Alternatively, when writing is understood as a domain of knowledge, children understand that writing is a system that has unique rules, is comprised of certain marks, and has accompanying action plans and vocabulary (Brenneman et al., 1996).

Understanding writing as a domain of knowledge is seen in children at age 4 (Tolchinsky-Landsmann & Karmiloff-Smith, 1992), and sometimes as young as age 2 (Yamagata, 2007). This project examined children's understanding of the graphic features of writing, one aspect of understanding of writing as a domain of knowledge. Understanding children's knowledge in this area is especially important within the context of early childhood education because early childhood professionals facilitate scribbling and emergent writing experiences in the classroom.

Early Childhood Education

The number of children spending time in early childhood classrooms is rising. According to government statistics, in 1993, of families with employed mothers, over 2 million children experienced some form of child care arrangement, with 30% experiencing center-based care (Casper, 1995). In 2005, of families with employed mothers, over 11 million children experienced some form of child care arrangement, with

35% experiencing center-based care (U.S. Census Bureau, 2005). As more children enter center-based child care, the need for quality early childhood classrooms increases. The experiences that take place in the child care context are an important influence on children's development (National Institute of Child Health and Human Development [NICHD], 1998). With more and more children experiencing center-based care, it is important that professionals working in early childhood classrooms are well informed about children's developmental progression and acquisition of new physical, social, and cognitive skills.

Emergent literacy is a major developmental focus within the early childhood education profession. Emergent literacy experiences during early childhood contribute to the foundation of literacy success in elementary school (Whitehurst & Lonigan, 1998). Literacy experiences during early childhood have traditionally been viewed as fundamentally different from the "real" reading skills formally taught in elementary school. From this perspective, children were thought to be "ready" to learn about reading and writing at a specific moment in time, usually once a certain level of maturity was reached (Teale, 1995). "Such perspectives create a boundary between the 'prereading' behaviors of children and the 'real' reading that children are taught in educational settings" (Whitehurst & Lonigan, p. 848). The "prereading" behaviors Whitehurst and Lonigan refer to include the natural curiosities and experiences children have concerning reading, writing, and print. Handling books, listening to someone read a book, playing with pencils, paper, toy letters (e.g., letter-shaped puzzle pieces), and pretending to write are types of "prereading" behaviors seen during early childhood.

A surge of developmental research in recent decades opposed the “readiness” perspective, instead labeling the “prereading” behaviors seen during early childhood as “emergent literacy” (Teale, 1995). The emergent literacy perspective describes the acquisition of literacy knowledge as a developmental process. From this perspective, the early literacy experiences that take place during early childhood are inseparable from later literacy development. This perspective also accounts for children’s experiences with print that are a natural result of interacting with the social world (e.g., recognizing the letter “A” on a cereal box at the grocery store) (Whitehurst & Lonigan, 1998). From the emergent literacy perspective, the literacy experiences that take place in children’s social contexts, such as the early childhood classroom, are an important component to literacy development in more formalized education settings.

Emergent writing is the aspect of emergent literacy concerning children’s early experiences with writing. Children who create lines of scribbles and declare it a shopping list, or create a series of scribbles and ask an adult to read what they have written, are demonstrating emergent writing. Whitehurst and Lonigan (1998) succinctly describe emergent writing as the process by which “the child is indicating that he or she knows print has meaning without yet knowing how to write” (p. 853). From an emergent writing perspective, learning about writing begins long before children are able to actually create replications of conventional writing. Experiences with writing during early childhood contribute to knowledge of letter-sound-symbol relationships, print, and functions of writing, each an important component to overall literacy development (Teale, 1995). An interest in experimentation with letters and symbols in preschool may even be related to future interest in literacy activities (Martlew & Sorsby, 1995).

The early childhood classroom provides a context for these types of experiences and experimentation. In societies that rely heavily on print, such as the United States, writing is a crucial part of culture, and as such, print is incorporated into the early childhood classroom environment and curriculum (Love et al., 2007). Teachers in early childhood classrooms can encourage writing through the physical arrangement of the classroom and the materials available (e.g., paper, pencils, pens, clipboards) (Mayer, 2007). Teachers are also encouraged to use writing in multiple areas of the classroom and provide unique writing opportunities such as writing on chalkboards, dry-erase boards, and outside with pavement chalk (Mayer). Early childhood classrooms that provide such materials are creating a setting where children can have the time, space, and materials necessary to explore mark-making, drawing, and writing. The ultimate goal of this project was to contribute to the emergent writing literature by providing insight into what children think about their own emergent writing. Understanding how children interpret the developmental process of learning to write can inform emergent writing practices and instruction in early childhood classrooms.

Summary

The cultural and developmental process of learning to write begins with literacy experiences in early childhood. The first marks children make are scribbles, and initially writing and drawing are indistinguishable (Levin & Bus, 2003). Through interactions with the social world, children learn about the graphic features specific to the orthography of their language. Children begin to use the graphic features of writing to make their writing marks “look” like writing before they fully understand the communicative function of the marks, demonstrating their understanding of writing as a

domain of knowledge (Tolchinsky-Landsmann & Karmiloff-Smith, 1992). Professionals in the field of early childhood education can facilitate emergent writing experiences based on this knowledge. Print is an integral part of society in the United States, thus writing is incorporated heavily in early childhood classrooms. Emergent writing experiences in these classrooms contribute to children's overall emergent literacy development and future literacy skills (Whitehurst & Lonigan, 1998).

Understanding the emergent writing process is vital to facilitate meaningful learning experiences in early childhood classrooms. This project examined children's perceptions of their own emergent writing, in terms of what they understand about writing as a domain of knowledge. Examining which graphic features children can verbally identify when they examine examples of their own work contributes to the overall understanding of the emergent writing process.

Theoretical Perspective

The framework and purpose of this study can best be understood if examined from Lev Vygotsky's sociocultural perspective. This section will first review the main propositions of sociocultural theory then discuss its relation to the present study.

According to sociocultural theory, the individual cannot be understood without examining the cultural context with which the individual interacts (Wertsch, 1985). Symbolic systems such as language and writing connect the individual to the cultural world, contributing to individuals' knowledge construction and development (John-Steiner & Mahn, 1996). Individuals use these symbolic systems to help internalize the social world (Vygotsky, 1978).

To Vygotsky (1978), children's development is characterized by natural maturation, and by the "degree of mastery" (p. 21) of psychological signs. For Vygotsky, psychological signs (or tools) include symbolic systems such as language and writing. Using and mastering psychological signs organizes behavior differently, altering relationships with the environment (Vygotsky). Mastering a sign changes the way children organize their behavior while interacting in the environment, influencing cognitive functioning (Wertsch, 1985). According to sociocultural theory the most influential psychological sign is speech (Vygotsky). For example, before children have the ability to use speech to express a want or need, they are limited in how they can interact with the environment. However, the use of speech changes what children are capable of eliciting from the environment (e.g., a child says "more" and a caregiver brings the child more food), thus the relationship with the environment changes.

According to Vygotsky (1978), when a psychological sign is integrated into any action, the action itself is changed because now a sign is involved, changing the entire process. Vygotsky referred to this process as semiotic mediation. For example, semiotic mediation occurs when children talk aloud to work out a difficult problem. The use of language is influencing, or mediating, the behavior. Sign and tool use becomes a "regulatory function" in shaping development (Mahn, 1999, p. 343).

Vygotsky and his student A. R. Luria were some of the first psychologists to examine writing as a psychological sign. "It is not understanding that generates the act, but far more the act that gives birth to understanding" (Luria, 1929, p. 193). From this perspective, learning about writing provides individuals with another psychological sign, or tool, to use to help internalize the social world. Vygotsky and Luria describe writing as

a culturally mediated function; it requires a relationship with and understanding of the social world and the use of cultural tools.

Sociocultural theory can be applied to the framework of the present study.

Writing is a symbolic system comprised of characters and rules, which transmits culture, stories, and history over time. The evolution of a writing system over multiple centuries represents the linguistic, historical, and cultural context of the place the writing system developed (Read, 1983). The present study aimed to gain a better understanding of children who are actively in the process of “mastering” writing, a symbolic system deeply rooted in cultural context. For Luria and Vygotsky, learning how to “employ complex cultural devices,” such as writing, produces change in the child (Luria, 1929, p. 193). When people are internalizing the social world, they are not just replicating it or copying it, they are using it to build “an internal plane of consciousness” (Wertsch, 1985, p. 66). The present study examined children who are in the process of learning about a symbolic system within a cultural context. Children’s use of graphic features in their emergent writing contributes to their eventual use of writing as a symbolic system, helping them internalize the social world and culture of which they are a part.

Tools, and psychological signs such as language, connect the individual to the social world (John-Steiner & Mahn, 1996). It was the goal of the present study to assess what children know about the graphic features they use in their own writing, through the speech they use. Previous research in this area has focused on what children know about the graphic features of writing through examples of their writing and sorting and classification tasks. It was speculated that assessing which graphic features of writing children understand through use of their speech would provide alternative results.

The ultimate goal of this study was to contribute to the understanding of emergent writing, informing emergent literacy practices in early childhood classrooms. Within the framework of sociocultural theory, the social interactions that take place in early childhood classrooms are sources of development; the learner internalizes experiences that take place in social settings (John-Steiner & Mahn, 1996). In early childhood classrooms that facilitate literacy experiences, children use language to talk with each other and actively engage in literacy experimentation, as well as use the entire social setting to learn about literacy (Neuman & Roskos, 1991). Providing literacy “tools” (e.g., pens, markers, paper, books) in the classroom mediates learning (Neuman & Roskos, 1991). From a sociocultural perspective, the interactions that teachers help facilitate in these classrooms can play an important role in emergent writing development.

Research Questions

The following research questions were designed to reflect the purpose of this project. The research questions addressed the frequency of graphic feature identification and the difference between graphic feature identification and graphic feature use. Additionally, the congruence of graph feature identification and graphic feature use was explored.

Research question 1. When children examine their own work, defined as their own “writing” versus “drawing,” which graphic features do they most frequently identify as necessary to differentiate their writing from drawing?

Research question 2. When the data are separated by age group (2, 3, and 4), which graphic features do children of different ages most frequently identify as necessary to differentiate their writing from drawing?

Research question 3. When children examine their own work to identify graphic features necessary to differentiate writing from drawing, is there a significant difference between the mean number of total graphic features identified and the mean number of total graphic features used?

Research question 4. When the data are separated by age group (2, 3, and 4), is there a significant difference between the mean number of total graphic features identified and the mean number of total graphic features used?

Research question 5. When children examine their own work to identify graphic features necessary to differentiate writing from drawing, does the level of congruence, defined as total graphic features used subtracted from total graphic features identified, vary by child?

Research question 6. When the data are separated by age group (2, 3, and 4), does the level of congruence, defined as total graphic features used subtracted from total graphic features identified, vary by age group?

Definitions of Terms

Differentiation. The process children go through where writing becomes different than other notational systems (drawing, numbers). Differentiation occurs in terms of understanding the communicative differences between notational systems, and understanding the differences of each notational system as a domain of knowledge (including knowledge and use of graphic features) (Tolchinsky-Landsmann & Karmiloff-Smith, 1992).

Emergent writing. The marks children make prior to conventional writing. Emergent writing experiences are experiences children have with print and writing

beginning in infancy. Emergent writing knowledge refers to the knowledge children have about print and writing beginning in infancy.

Graphic feature. A characteristic at the graphic level that creates a visual distinction between writing and other notational systems. The graphic features highlighted in this study include linearity, unidirectionality, segmentation, small size of units, pseudo-letters, and conventional letters. These features are discussed in detail in the *Description of Data Collection Materials* section in Chapter Three.

Notational system. A system of unique marks, rules, with distinct communicative purposes. Writing, drawing, and numbers are each a separate notational system.

Orthography. The rules that govern the graphic characteristics of a writing script. Creating writing that complies with the orthography of the spoken language facilitates the mapping of speech sounds onto written marks, resulting in interpretation and communication (Read, 1983).

Scribbles. Any marks children create that are unidentifiable as either writing or drawing, and lack any representational meaning to an outside observer.

Assumptions

For the purposes of this study, it was assumed that young children have thoughts about the strategies they use to make their writing graphically different than their drawing, and that what children say is an accurate reflection of their knowledge. It was assumed that young children would be able to verbalize these thoughts in a way that the graphic feature they referred to was identifiable. It was assumed that children would not verbally identify every single graphic feature they use in their writing. Children may focus on one graphic feature, despite the presence of many. To account for this, actual

graphic features present in their work were examined in addition to their verbal responses. It was assumed that children would not always produce conventional examples of the graphic features of writing, but would produce developmentally appropriate approximations that would be identifiable.

Chapter Two: Literature Review

This literature review will begin with an overview of scribbles. The differentiation of scribbles to writing and drawing will be discussed in terms of children's understanding and abilities within each domain. Children's perceptions of the graphic features of writing and their use of specific graphic features will also be examined. Finally, a discussion of what children can express about their writing through their speech will be presented.

Scribbles

Children have a large repertoire of scribbling marks they are able to use. Based on the classification of thousands of scribbles, Kellogg (1969) identified twenty basic scribbles used by children ages 2 and younger. These include: dot, single vertical line, single horizontal line, single diagonal line, single curved line, multiple vertical line, multiple horizontal line, multiple diagonal line, multiple curved line, roving open line, roving enclosed line, zigzag or waving line, single loop line, multiple loop line, spiral line, multiple-line overlaid circle, multiple-line circumference circle, circular line spread out, single crossed circle, and imperfect circle. Recently, a small study based on Kellogg's classifications, found that children ages 4 and 5 most frequently use single vertical, single horizontal, single curved, and single diagonal in their own spontaneous drawing (Yang & Noel, 2006). The representational possibilities of scribbles have been debated by researchers. Scribbles have been referred to as undifferentiated marks, useless to children as a representational tool (Luria, 1929), and the natural result of different types of muscle movement in young children, merely recorded with a writing instrument (Kellogg).

New research suggests scribbles do have meaning to the children that create them (Adi-Japha et al., 1998; Freeman, 1993; Lancaster, 2007). Children as young as age 2 use scribbles to represent the movement of an object on paper (e.g., a child moves a pencil across the paper in a straight line to indicate a bird flying) (Freeman). Qualitative research observed children under the age of 3 intentionally using various types of scribbles, page placement and mark organization to represent different objects (Lancaster). Using a digital drawing pad, Adi-Japha et al. tracked the speed and curvature of children's (ages 2 and 3) hand movements (i.e., kinematics) during scribbling. They determined that smooth, curved scribbles tended to be labeled by children as non-representational, and angular scribbles tended to be treated as representational. Children may attribute meaning to their own scribbles; however, scribbles are non-representational to the outside observer when they "represent neither the graphic features typical of writing (e.g., separation into units, linearity, directionality) nor the referent (i.e., the word's meaning)" (Levin, Korat, & Amsterdamer, 1996, p. 399).

Differentiation

Scribbles that are unidentifiable as either writing or drawing are referred to as undifferentiated scribbles (Levin et al., 1996). Differentiation is the process of distinguishing between notational systems (e.g., drawing and writing), both mentally and graphically. Based on research with children in Argentina, Ferreiro and Teberosky (1982) viewed writing and drawing as originating from one all encompassing domain of graphic representation. Vygotsky (1978) and Luria (1929) shared this view that drawing and writing originate from the same place within the individual; drawing emerges first, then writing evolves from it. Recently, researchers have taken a different approach to

understanding the differentiation between writing and drawing, suggesting that children understand each notational system as its own domain from the very beginning (Karmiloff-Smith, 1992). Undifferentiated scribbles seen in very young children merely indicate that children cannot graphically differentiate writing; they do not indicate a lack of understanding writing as a domain (Levin et al.). Understanding a domain includes the ability “to generate plans that honor the constraints dictated by the domain...as well as the constraints dictated by the task and setting” (Gelman & Greeno, 1989, p. 128). Considerable research pertaining to the differentiation of writing and drawing supports the position that children understand both writing and drawing as separate domains from very early in life.

Differentiation of drawing. Children use the same non-representational scribbles for both drawing and writing until approximately age 4. Tolchinsky-Landsmann and Levin (1985) asked children ages 3 to 5 to draw then write dictated words. Adults and other children were asked to classify their productions as either writing or drawing. Both children and adults made more errors when classifying the productions of 3-year-old children than classifying the productions of children ages 4 and 5. By approximately age 4, children’s drawings and writings “look” different enough that adults can differentiate between the two notational systems. Similarly, Yamagata (2007) found that the rate of adults correctly classifying children’s writings and drawings increased as the age of the child who produced the examples increased (the specific graphic features children use to accomplish this is discussed in the *Graphic Features* section below).

Children can use drawing as a communicative tool before writing. According to Levin and Bus (2003), adults and children can accurately interpret 4-year-old children’s

drawings more frequently than their writings. As a result, children sometimes choose to use drawing instead of writing when communication is the goal (Tolchinsky-Landsmann & Karmiloff-Smith, 1992). For example, Sulzby et al. (1989) assessed 5-year-old children's writing ability in the context of writing a story (a context that implies communication). The most frequently used form of writing was drawing. Conversely, Gombert and Fayol (1992) assessed children ages 3 to 6 by asking them to write dictated words. Only two children in the sample (0.04%) used drawing as a form of writing. Levin and Korat (1996) also failed to observe a drawing phase when children were asked to write dictated words. It seems that drawing may appear in children's writing when children perceive it to be more important "to communicate a meaning rather than to produce a graphic image that looks like writing" (Levin et al., 1996, p. 401). Using drawing to communicate in place of writing does not indicate a lack of knowledge of the domain of writing.

Differentiation of writing. When children's understanding of writing is assessed as a domain of knowledge (not as a communicative tool), different knowledge is revealed (Tolchinsky-Landsmann & Karmiloff-Smith, 1992). Research provides evidence of children's understanding of writing as a domain of knowledge in terms of the constraints they place on writing marks, the organized behaviors they demonstrate when approaching the task of writing, and refusing to write upon request (Brenneman et al., 1996; Gombert & Fayol, 1992; Hildreth, 1936; Luria, 1929; Sulzby et al., 1989; Tolchinsky-Landsmann and Karmiloff-Smith; Tolchinsky-Landsmann & Levin, 1985; Yamagata, 2007).

Tolchinsky-Landsmann and Karmiloff-Smith (1992) devised a series of sorting tasks to determine what constraints children impose on writing and number notational

systems. Children sorted cards that displayed variations in iconicity, linearity, identical elements, variety elements, separate units, cursively-linked units, and many others. Some cards represented conventional examples (e.g., “metro”) and others were non-conventional (e.g. “prlcst”). The majority of children ages 5 and 6 applied very specific constraints when determining which cards were “good for writing” versus “not good for writing.” These children were even able to violate these constraints when researchers asked them to make up nonsense words, demonstrating children’s implicit understanding of the domain of the writing notational system. For example, one child wrote “rulu” as a real word, and “ttttt” as a nonsense-word, demonstrating knowledge that writing must contain a variety of elements. Tolchinsky-Landsmann and Karmiloff-Smith concluded that, “very early on children are sensitive to the domain-specific constraints operating on each notational system” (p. 299).

Brenneman et al. (1996) examined children’s action plans during the tasks of writing and drawing, observing children’s “implicit knowledge of the distinctive features of each notational system as a domain of knowledge” (p. 412). Children ages 4 to 6 were presented with paper, one pencil, and six colored markers. They were shown a picture of an object and asked to draw the object, then write the name of the object. Brenneman et al. observed children using different action plans when approaching the tasks of writing and drawing. While writing, children used linear and directional marks and discussed the length of words and letters. While drawing, children created boundaries, filled in areas, used the colored markers more frequently and discussed the physical characteristics of the object. Adults who viewed video recordings of the children during the experiment were able to identify which action the children were carrying out with 90% accuracy

(Brenneman et al.). They cited behaviors such as, “leaning over the paper,” “short strokes,” and “thinking behavior” as signs of writing (Brenneman et al., p. 415). They cited “pen switching/color use,” “filling in,” and “covers a large surface area” as signs of drawing (Brenneman et al., p. 415). According to these findings, it appears that children generate different action plans for writing and drawing, reflecting their understanding of writing as a domain of knowledge.

Many research studies have observed an interesting phenomenon that lends support to the theory that children understand writing as a domain of knowledge before they can use it as a communicative tool. Children often refuse to write upon request by an adult. In his work with children, Luria (1929) reported that children were “bewildered” (p. 149) when researchers asked them to write as a way to help them remember a series of utterances. The children stated that they did not know how to write. Similarly, Hildreth (1936) found it helpful to tell her child participants “just pretend you can write” (p. 292) if they refused. In Brenneman et al.’s (1996) study, 50% of the sample of children ages 4 to 6 initially denied knowing how to write. Yamagata (2007) reported that almost the entire sample would draw upon request, but 60% of children at age 1 ½, 27% of children at age 2, and 14% at age 3 said they could not produce writing.

Children show similar behaviors when asked to make judgments about their own writing. Gombert and Fayol (1992) found that children consistently select conventional writing as superior to their own writing. When asked to reread their writing, the response “I don’t know” increased with age among children ages 3 to 5 (Tolchinsky-Landsmann & Levin, 1985). Based on their work with children ages 5 and 6, Sulzby et al. (1989) classified the response “I didn’t write” as a form of rereading children commonly use.

These results indicate that children recognize their incapacity to produce writing properly. Children are demonstrating understanding of writing as a domain of knowledge when they acknowledge writing as a system with specific rules and marks.

During early childhood, children demonstrate their understanding of writing as a domain of knowledge by the constraints they place on what qualifies as writing, the verbal and physical actions they use during each task, and by refusing to write. Research studies that have children approach the task of writing in the least contextual way possible (i.e., simple dictation) seem to elicit more writing responses from children than studies that have contextualized the writing process. The present study examined children's understanding of writing from the perspective of writing as a domain of knowledge. The decontextualized writing procedures used in previous research guided the methodology of the present study in an attempt to elicit as many writing responses from children as possible. A review of this research demonstrates that during early childhood, there are great advances in children's abilities to differentiate between writing and drawing notational systems when writing is examined as a domain of knowledge.

Graphic Features

Understanding graphic features. When children observe print in the outside world, they are sensitive to the graphic features of writing. Children at very young ages can distinguish between writing and drawing, are sensitive to superordinate and ordinate graphic features of writing, and consonant-vowel combinations (Ferreiro & Teberosky, 1982; Lavine, 1977; Pick, Unze, Brownell, Drozdal, & Hopmann, 1978; Tolchinsky-Landsmann & Karmiloff-Smith, 1992; Treiman, Cohen, Mulqueeny, Kessler, & Schechtman, 2007; Yamagata, 2007). The methodology of research on this topic is

similar across studies, assessing children's knowledge through classification and sorting tasks.

Lavine (1977) conducted one of the first classification studies to examine what children perceive to be the important features in writing. English-speaking children were presented with different cards that contained pictures of conventional line drawings, conventional writing, and alternative print and symbols that varied in degree of similarity to conventional print (e.g., variations in linearity, variety of symbols, and number of symbols). Children were asked to decide which cards showed writing. Children ages 3 to 5 almost unanimously recognized that drawings were not writing. Children also easily recognized conventional writing. Eighty-six percent of children age 3 and 96% of children age 5 recognized conventional writing as writing (Lavine).

Tolchinsky-Landsmann and Karmiloff-Smith (1992) conducted a similar study with Catalan-speaking children from Spain. They were presented with cards showing various strings of letters, numbers, or small drawings. Children were asked to select which cards were "good for writing" or "not good for writing." Ninety-five percent of children at all ages classified strings of drawings as not good for writing. Eighty-five percent of children of all ages selected cards of mixed notations (e.g., RA45T) as not good for writing. Yamagata (2007) found similar results with children in Japan. Children were asked to classify different cards as writing, drawing, or numbers. Recognition of each notational system increased with age, with most children being able to distinguish between each system by age 3 years 6 months (Yamagata).

Children are sensitive to superordinate and ordinate graphic features of writing. In Lavine's (1977) study, children showed a preference for cards that demonstrated

horizontal linearity. Similarly, English-speaking children ages 3 and 4 are more likely to state that their name is written properly if letters are along a horizontal line rather than a vertical or diagonal line (Treiman et al., 2007). By age 5, children believe that writing should be made up of multiple units that vary in shape. Ninety-two percent of 5 to 6 year olds classify “P” as not good for writing (Tolchinsky-Landsmann & Karmiloff-Smith, 1992). Over 50% of children age 4, and 75% of children age 5 classify strings of repeated letters (e.g., TTTTT or AAAA) as a poor example of writing, even if the letter is unfamiliar to the child (Ferreiro & Teberosky, 1982).

Children also show preference for the alphabet of their culture and understand possible versus impossible consonant-vowel combinations. In Lavine’s (1977) study, at age 3, the majority of the children classified strings of nonconventional, nonsense symbols (i.e., symbols that varied greatly from Roman letters), as poor examples of writing. Similarly, Treiman et al. (2007) found that at age 3, English-speaking children select Roman letters over non-Roman letters when asked how writing “should” look. Pick et al. (1978) found that children as young as 3 recognize the difference between possible consonant-vowel combinations (i.e., super, labor) and impossible combinations (i.e., prbs, aieu). Tolchinsky-Landsmann and Karmiloff-Smith (1992) found similar results. At age 4, 28% of children selected “prlcst” as not good for writing, and by age 5, 55% selected it as not good for writing.

Young children who are not yet competent writers themselves have considerable knowledge concerning writing as a domain of knowledge, and the graphic features of writing. Children place constraints on what writing must look like, approach the task of writing with certain organized behaviors and vocabulary, and sometimes refuse to write

when they know it to be beyond their ability (Brenneman et al., 1996; Hildreth, 1936; Luria, 1929; Sulzby et al., 1989; Tolchinsky-Landsmann and Karmiloff-Smith, 1992; Tolchinsky-Landsmann & Levin, 1985; Yamagata, 2007). By age 3, children have a large range of practical knowledge concerning the graphic features of writing. Children are able to easily visually differentiate writing from drawing and decide what constitutes writing based on numerous characteristics including linearity, variety and number of marks, types of symbols or letters, and within-word consonant-vowel combinations. The similarity of results across English (Lavine, 1977; Pick et al., 1978; Treiman et al., 2007), Catalan (Tolchinsky-Landsmann & Levin), Spanish (Ferreiro & Teberosky, 1982) and Japanese (Yamagata) writing systems indicates that children's acquisition of knowledge about writing systems and graphic features of writing is similar across cultures.

Use of graphic features. Any time preschool age children are asked to write they will “face an irreconcilable dilemma – to represent the meaning of the word or to represent ‘print’” (Levin & Bus, 2003, p. 904). The need to represent meaning may lead some children to choose drawing over writing, but children can “represent print” through use of the graphic features of writing (Tolchinsky-Landsmann & Karmiloff-Smith, 1992). Representing print at the graphic level is unrelated to letter-sound correspondence, a skill that develops later (Ferreiro & Teberosky, 1982). Very few children under the age of 4 can produce writing at the symbolic level (Akita et al., 2007; Levin & Bus, 2003).

Children between the ages 2 and 6 use graphic features in their writing. In Japan, Yamagata (2007) studied children ages 21 months to 4 years. Children as young as 2 could produce some marks that were recognizable to adults as writing; adults classified their writings correctly 20% of the time. With few exceptions, the majority of children

ages 3 to 6 can produce writings that are different from drawings (Gombert & Fayol, 1992). Children show consistent use of graphic features by age 4 (Tolchinsky-Landsmann & Levin, 1985). Children's use of graphic features generally increases with age (Akita et al., 2007; Levin & Bus, 2003). Levin and Bus created a writing scale to score children's emergent writing ability, based on the types of graphic features children use. Scores on the writing scale significantly increased with age based on these researchers' work with children from Israel and the Netherlands. Akita et al. found similar results using the same scale to score the writing productions of children from India, who were learning English and Kannada. The majority of the children sampled in both studies produced writings that were considered "graphic" or "writing-like." Graphic writings included scribbles, controlled scribbles, and smaller controlled scribbles. Writing-like writings, included use of linearity, segmentation, complexity (circles), and variety of marks.

Overarching superordinate features found in all orthographies (i.e., linearity, unidirectionality, segmentation) appear in children's writings before orthography-specific ordinate features (Gibson & Levin, 1975; Tolchinsky-Landsmann & Levin, 1985). Hildreth (1936) conducted the first study that specifically examined children's use of graphic features.

Linearity. Hildreth, influenced by Vygotsky, was interested in writing as a developmental process that began long before formal school training. Hildreth observed children using horizontal linearity by age 4. Between the ages 3 and 4, Tolchinsky-Landsmann and Levin (1985) reported a great increase in the use of linearity. Brenneman et al. (1996) reported that at ages 4 to 5, 70% of written words displayed linearity, and at ages 5 to 6 this number jumped to 96%. Additionally, 75% of the sample used linearity

on a consistent basis, at an above chance level (Brenneman et al.). Ferreiro and Teberosky (1982) also reported consistent use of linearity during in-depth, qualitative interviews with children ages 4 to 6. They described the first attempts at writing as “continuous wavy lines” (Ferreiro and Teberosky, p. 178).

Unidirectionality. Children as young as age 3, use the superordinate feature of unidirectionality in their writing, but confuse the specific type of directionality (e.g., right-to-left versus left-to-right) until about age 5 (Tolchinsky-Landsmann & Levin, 1985). In their work with Hebrew-speaking children, right-to-left directionality was common by age 5 (Tolchinsky-Landsmann & Levin). In Brenneman et al.’s (1996) study of English-speaking children, 62% of children ages 4 to 5 wrote using left-to-right directionality, while 95% of children ages 5 to 6 wrote using left-to-right directionality. Children’s emergent writing transforms from wavy horizontal scribbles to separate scribbles around age 4 (Hildreth, 1936). Tolchinsky-Landsmann and Levin (1985) reported a great increase in the use of segmentation between the ages of 3 and 4. Similarly, Ferreiro and Teberosky (1982) observed scribbles start as linear wavy lines and separate to individual graphic units at age 4 and 5. Based on their in-depth interviews with the participants, the researchers speculated that continuous lines were representative of cursive writing, and segmented writing was representative of print.

Small size of units. Tolchinsky-Landsmann & Levin (1985) were the first researchers to use the method of asking children to draw then write dictated words. Asking children to draw then write the same referent provided the researchers with a comparison between drawings and writings. They found that between 3 and 4, the marks

children used for writing were smaller in size compared to the marks made for drawing (Tolchinsky-Landsmann & Levin).

Circles, pseudo letters, and conventional letters. Gombert and Fayol (1992), observed features such as circles, pseudo-letters, letters from their own name, and other conventional letters in children's writing. Children use circles and pseudo letters in their writing before the use of conventional letters; however, there is some overlap between the use of pseudo letters and conventional letters. In Tolchinsky-Landsmann and Levin's (1985) study, 3-year-olds used undifferentiated units and some pseudo-letters, 4-year-olds used pseudo letters and some conventional letters, and 5-year-olds used almost all conventional letters. Sulzby et al. (1989) reported pseudo letters as still common among 5-year-olds. Other studies report a shift in pseudo letter use to conventional letter use occurring between 4 and 6 (Levin & Bus, 2003; Levin & Korat, 1993).

Through sorting and classification tasks, research has shown that children have an impressive understanding of the graphic features of writing. They easily visually discriminate between drawing and writing and are sensitive to violations of conventional graphic characteristics within the domain of writing. Young children show preference for the graphic characteristics of the orthography and alphabet of their language. Children as young as age 2 can create writing that is graphically different from drawing, with the use of linearity, unidirectionality, segmentation, small size of marks, circles, pseudo letters and conventional letters generally increasing with age.

What Children Say

Assessing children's knowledge about writing through their verbal responses is "designed to elicit from children their understandings of the written language as an

artifact of culture as well as the processes used to gain mastery over its forms, structures, and purposes” (Yaden & Tardibuono, 2004, p. 30). Research does provide evidence that children are capable of talking about their thoughts concerning writing. When used in combination with the research methods discussed above, a more complete understanding of writing is presented when children express their thoughts. Treiman et al. (2007) presented children with conventional and unconventional printed versions of their name and asked them to select which versions displayed how their “name should look” (p. 1464). When unconventional “ab” and “aB” capitalization patterns (e.g., michael, mICHAEL) were displayed, children spoke about the shape and size of the letters as reasons for rejecting the versions. When children’s names were presented with unconventional linear orientation (e.g., diagonal), children provided verbal explanations concerning the orientation (e.g., “It’s a staircase”).

When interviewed about their own writing and drawing, children show clear understanding of their notational abilities. Ferreiro and Teberosky (1982) conducted in-depth interviews with Argentinean children to learn about children’s thinking during writing and drawing. Yaden and Tardibuono (2004) sought to reproduce their qualitative interview methods with urban Spanish-speaking children in the United States, and found similar results. According to the conversations published in Ferreiro and Teberosky’s research, children can communicate when they are writing or drawing and seem to show the beginning understanding that writing “says” something, whereas drawing “is” something. For example, one 4-year-old girl drew a picture and called it a “little toy.” The interviewer asked, “It says little toy or it is a little toy?” The girl replied, “It is a little toy.” The interviewer stated, “Write so it says little toy.” The girl added wavy linear lines

under the picture (Ferreiro & Teberosky, p. 186). Some children do not believe they can write, or cannot reread anything they have produced; other children attribute different meaning to marks that look different (Ferreiro & Teberosky; Yaden & Tardibuono). Research like this demonstrates that children have thoughts concerning their writing and drawing and are able to express them through speech.

Summary

A review of the literature demonstrates that after children progress beyond basic scribbling, writing and drawing progress along two paths of development when examined from the perspective of writing as a domain of knowledge (Tolchinsky-Landsmann & Karmiloff-Smith, 1992). Research indicates that children are able to differentiate between writing and drawing visually and through their actions. Children as young as 2 are able to differentiate their writing from drawing, with the use of graphic features generally increasing with age. Graphic features such as linearity, unidirectionality, and segmentation are common in young children's writing; however the specifics of features such as unidirectionality are confusing until children are older (Brenneman et al., 1996; Tolchinsky-Landsmann & Levin, 1985). Additionally, as children get older the use of pseudo letters gives way to conventional letters (Levin & Bus, 2003). Studies that ask children to write then draw the same referent provide a basis for comparing the two notational systems and highlight such features as small size of writing marks compared to drawing marks (Tolchinsky-Landsmann & Levin, 1985). Finally, a review of the literature demonstrates that young children are capable of using their speech to discuss the process of writing and features in conventional examples (Ferreiro & Teberosky,

1982; Yaden & Tardibono, 2004), but what children can verbally express about the graphic features they use in their own writing has yet to be explored.

Chapter Three: Methodology

The purpose of this project was to explore which graphic features of writing children verbally identify as important when differentiating their own writing from drawing, as well as to compare their identification of graphic features to the actual presence of these features in their writing. This chapter includes a description of the sample, recruitment procedures, and data collection procedures and methods. A description of the statistical plan for analysis of each research question is also presented.

Sample

The sample for this project was comprised of children attending an accredited child care center on a university campus in Northern Nevada. All families of typically developing children between the ages of 2 and 4 were invited to participate. The original sample consisted of 39 children whose families consented to participate. Three children were selected to be pilot participants to test the data collection procedure and make final adjustments (discussed in detail below). Despite family consent, two children refused to assent to participate in the data collection meeting, eliminating them from the study.

Of the remaining 34 children (21 female, 13 male), there were 8 2-year-olds, 14 3-year-olds, and 12 4-year-olds. The mean age of the children was 3.12 years, with a *SD* of .769. Of the 34 participants, 32 families returned complete family information and background forms to assess family demographic characteristics (see Appendix A). Seventy-nine percent of the families of the participating children were currently married, and 82% percent of them were Caucasian. Ninety-six percent of children had families with college degrees or higher, and 72% lived in households with an income of \$75,000 per year or more. The mothers' mean current age was 36.84 (*SD* = 6.47) and the fathers'

mean current age was 37.19 ($SD = 6.10$). Six participants (17%) spoke a language other than English at home; however, English was primarily used within the child care center. At the child care center, the children were exposed to books and other forms of print, as well as a variety of writing materials. Writing was not formally taught in these classrooms, but was encouraged and supported through an emergent curriculum. The English orthography was the primary orthography children were exposed to in these classrooms.

Recruitment Procedures

Approval for this project was obtained from the Office of Human Research Protection and the Child and Family Research Center Research Committee. Information concerning the study, and a copy of all study materials, were distributed to the lead teachers in four classrooms within the child care center. Information packets containing a description of the study and consent form were distributed to the parents or legal guardians of possible participants via the children's classroom cubbies. Upon completion of the consent form, the parent or legal guardian of the child was asked to complete a family information and background form (see Appendix A). Each child was issued an identification number to keep all questionnaire information and obtained data confidential. All identifying information was kept in the researcher's office in a locked file cabinet.

Data Collection

Before data were collected, 3 participants were selected to be pilot participants. The researcher carried out the proposed data collection procedure with each pilot participant to assess the children's responses to the meeting procedure. After working

with the pilot participants, it was determined that the meeting procedure was too long; the pilot participants had trouble staying focused for the entire duration, and answers to the interview questions became repetitive. Consequently, the proposed meeting procedure was shortened and condensed to a more developmentally appropriate length. Some questions in the meeting procedure script were restructured to help the children focus their attention on the specific marks they made with their pen, rather than talking about writing in an abstract manner.

After final adjustments were made, the researcher met once with each participant. The data collected during the meeting yielded two groups of graphic features for each child: (1) graphic features used and (2) graphic features identified. The graphic features children used were assessed through writing and drawing examples they created during the meeting. The graphic features children identified were assessed through the child's oral and body language used to discuss their writing examples. Based on previous research of the common features children use to differentiate their emergent writing from drawing, certain graphic features were selected as the focus for this project (Gibson & Levin, 1975; Gombert & Fayol, 1992; Levin & Bus, 2003; Sulzby et al., 1998; Tolchinsky-Landsmann & Levin, 1985). Possible graphic features included: linearity, unidirectionality, segmentation, small size of units, pseudo-letters, conventional letters, and other. Additionally, the refusal to write response was included (an operationalization of each feature is provided below in the section, *Description of Data Collection Materials*).

The meeting with each participant took place in a private, quiet room next to the child's classroom. The researcher and the child sat together at a table. Four blank 5x8

inch index cards and a pencil were in front of the researcher. To eliminate any influence of color or type of medium on the differentiation of writing and drawing (e.g., colored markers, crayons, pencils), three black Sharpie pens were the only instruments available to use. Additionally, a digital video recorder was set up on the table to record the entire meeting. The video recorder displayed the child sitting at the table and the area of the table the child used to draw and write upon.

During the course of the meeting, the researcher asked the child to use the pens and index cards to draw then write two referents: (1) house and (2) flower. After the child completed a drawing and writing example of the first referent, the researcher asked the child to explain the differences between the marks used in the writing example versus the drawing example (see Appendix B). The same procedure was repeated for the next referent. Each index card was discretely marked either “writing” or “drawing” on the back of the index card. This method of drawing then writing a referent was adapted from Tolchinsky-Landsmann & Levin (1985). Drawing the referent before writing provided children with a comparison; with the drawing and writing examples next to each other, children could examine any differences between their two productions. The drawings also provided the researcher with a comparison for coding some of the graphic features.

The researcher followed the interview procedure outlined in the meeting procedure script (see Appendix B). The researcher began by explaining the purpose of the meeting then prompted the child to think about the upcoming referent. Next the researcher asked the child to draw the referent on one card, and then write the name of the referent on a different card. Multiple prompts were included if the child refused to write. It was expected that some children would refuse to write (Brenneman et al., 1996;

Sulzby et al., 1988; Tolchinsky-Landsmann & Levin, 1985). If after two prompts the child still refused to write, the researcher started the procedure over with the next referent. If the child did produce a writing example the researcher continued the interview by asking a series of questions about the differences between the marks used for drawing and the marks used for writing. In some cases, the researcher asked the child to elaborate on his or her response, if clarification was needed.

After the researcher collected each set of examples, the directionality of the child's writing was indicated with a light arrow (in pencil) along the bottom of the writing marks (Tolchinsky-Landsmann & Levin, 1985). The arrow indicated the direction in which the child created the marks from start to finish. This was later used to code for a presence of or lack of unidirectionality.

Recording Data

At a later time, the writing and drawing examples produced by the children were analyzed and coded for graphic features used. Using the graphic features checklist (see Appendix C), the number of times each graphic feature was used was recorded. Each graphic feature (or refusal to write) was coded as 0 (used in neither referent), 1 (used in one referent but not the other), or 2 (used in both referents). In order to assure reliability of coding, a blind and independent rater (rater #2) was utilized. Rater #2 analyzed half of the writing and drawing examples and coded all graphic features used on separate checklists. The percent agreement between rater #1 (the researcher) and rater #2, on the number of times each graphic feature was used (per child), was 96%, which was considered acceptable.

The play-backs of the digital video recordings of the meetings were analyzed and coded for graphic features identified. Using the same graphic features checklist (see Appendix C), the number of times each graphic feature was identified was recorded. To account for the possibility that children might talk about graphic features that were not actually present, all graphic features identified were coded (whether or not they were actually present in the writing examples). Each graphic feature was coded as 0 (identified in neither referent), 1 (identified in one referent but not the other), or 2 (identified in both referents). Rater #2 analyzed half of the video recordings and coded all graphic features identified on separate checklists. The percent agreement between Rater #1 and Rater #2, on the number of times each graphic feature was identified (per child), was 95%, which was considered acceptable.

Description of Data Collection Materials

Family information and background form. The family information and background form (see Appendix A) was a self-administered questionnaire concerning basic demographic information of the children and families participating in this study. Items included, child's age (in years), child's gender, age of mother, age of father, sibling information, marital status, racial/ethnic background, level of education, and household income. The data from the form were used to provide a descriptive analysis of the sample.

Meeting procedure script. The meeting procedure script (see Appendix B) outlined the procedure to be followed with participants during the data collection meetings. Based on the responses of the pilot participants, the number of referents was

reduced from 4 to 2, and some questions were restructured. The overall length of the meeting procedure script was also reduced to a more developmentally appropriate level.

Graphic features checklist. The graphic features checklist (see Appendix C) was used to code: (1) graphic features used and (2) graphic features identified. The graphic features selected for use in the checklists were shown by previous research to be common features children use to differentiate their emergent writing from drawing (Gibson & Levin, 1975; Gombert & Fayol, 1992; Levin & Bus, 2003; Sulzby et al., 1988; Tolchinsky-Landsmann & Levin, 1985). The graphic features included: linearity, unidirectionality, segmentation, small size of units, pseudo-letters, conventional letters, other, and the refusal to write response. Based on previous research, each feature was operationalized for the purpose of this study. Linearity was considered *used* if a single, straight line could be drawn through at least half of the marks, so that each mark was touching the line at some point. The marks did not have to be created in direct succession, but the end product had to demonstrate linearity. Use of the English orthographic ordinate feature of horizontal linearity (Gibson & Levin, 1975) was expected, but because of the young age of the participants, marks in a straight line at any angle indicated linearity. Linearity was considered *identified* by children if they stated that the marks were in a line, lined-up, were along a line, or were next to each other. Linearity was also considered identified if children traced a line(s) with their finger either in the air or across the paper (e.g., the child states, “It goes like this,” and moved finger in a line). If the line(s) children traced moved in various directions, only linearity was present. If the line(s) children traced with their finger (in the air or on paper) moved in one direction, this also indicated the graphic feature unidirectionality.

During the data collection meeting, after each writing sample was completed, the researcher indicated the directionality of the marks by drawing an arrow in the direction the child moved his or her hand to create the marks (Tolchinsky-Landsmann & Levin, 1985). Unidirectionality was considered *used* if the arrow indicated movement in a single direction (for at least half of the marks), meaning that the marks were made in direct succession of one another. Because of the young age of the participants, unidirectional movement was not restricted to the English orthographic ordinate feature of left-to-right directionality (Gibson & Levin, 1975). Movement in any single direction indicated unidirectionality. Unidirectionality was considered *identified* by children if they stated that the writing moved from one side to the other, or started in one place and ended in a different place. Unidirectionality was also considered identified by children if they used their finger to trace a line(s) moving in a single direction along the paper or in the air (e.g., the child states, “It goes like this,” and moves finger in single direction line). If the line(s) children trace with their finger (in the air or on paper) moved in one direction, this indicated the graphic feature unidirectionality. If the line(s) children trace moved in various directions, only linearity was present.

Segmentation was considered *used* if at least half of the marks were comprised of individual units with blank space surrounding them; no line from one unit could connect to another unit. The individual units could be comprised of any type or size of marks. A minimum of two distinct units was necessary for segmentation to be present. The blank spaces surrounding the units could be any size. Segmentation was considered *identified* by children if they referred to spaces, marks that are by themselves, alone, separate, or

used their finger to indicate each mark as its own unit (e.g., “It goes like this, this, this” pointing to each unit).

Small size of units was considered *used* if at least half of the marks were smaller in size relative to the marks made in the drawing example of the same referent. Small size of units was considered *identified* by children if they referred to the writing marks as small, little, or decreased in size compared to drawing.

Pseudo-letters were considered *used* if at least one pseudo-letter was present. Pseudo-letters were considered small forms or letter-like approximations that closely resemble conventional letters; pseudo-letters were not compact scribbles. Pseudo-letters also had to contain segmentation. Circles are common in children’s emergent writing (Gombert & Fayol, 1992) and were considered a pseudo-letter. Pseudo-letters were not to be confused with misshapen conventional letters (e.g., a letter E that is formed backwards was not a pseudo-letter) (Sulzby et al., 1988). Pseudo-letters were considered *identified* by children if they referred to shapes that looked like letters, were make-believe letters, or pointed to a pseudo-letter and indicated it as evidence that their writing was different from drawing.

Conventional letters were considered *used* if at least one conventional letter was present. Conventional letters are ordinate features from the English orthography, from the Roman alphabet (Read, 1983). Conventional letters also contained the graphic feature segmentation and could be upper or lower case. Conventional letters could appear slightly misshapen, rotated, or inverted, but were recognizable as a conventional letter. Conventional letters were considered *identified* by children if they stated anything about recognizing a letter, stated a letter name, stated that there were “real” letters in the writing

sample, or pointed to a conventional letter and indicated it as evidence that their writing is different from drawing.

Other was considered *used* if children used a feature that was not included on the checklist. The type of feature was recorded. Other was considered *identified* by children if they identified a feature that was not included in the checklist. The type of feature identified was recorded.

The refusal to write response was indicated when a child stated that they did not know how to write. Refusal to write was indicated when, after multiple prompts, the child still refused to write. It was possible for participants to refuse to write one referent but not the other. In this case, the graphic features used and identified for one referent were noted, as well as a refusal to write. Participants who refused to write for both referents were excluded from the research question analyses.

Data Analyses

Data from the family information and background form and the graphic features checklist were entered into the Statistical Package for the Social Sciences (SPSS), version 16.0. The data were first analyzed to provide descriptive statistics including the number of participants in the sample, the children's mean age, the gender of the children, and family demographic information. The graphic features children used in their writing were analyzed first. A possible relationship between gender and the graphic feature variables was also explored. Specific procedures and statistical analyses were then carried out to analyze each research question. For all statistical analyses, an alpha level of .05 was used.

Research question 1. The frequency with which each graphic feature was identified and used was recorded on the graphic features checklists and entered in SPSS

as ratio data. Research question 1 examined which graphic features children most frequently identified when examining their own work. To analyze this research question, a frequency distribution was created. The frequency distribution displayed the total number of graphic features identified by the entire sample (determined by simple count), and the number of times each graphic feature was identified by the entire sample (determined by simple count). The percentage with which each graphic feature was identified out of the total identified was also calculated.

Research question 2. Research question 2 examined how the graphic features children most frequently identify when examining their own work, differed by age group (2, 3, and 4). To analyze this research question, a frequency distribution was created for each age group. Each frequency distribution displayed the total number of graphic features identified by the entire age group (determined by simple count), and the number of times each graphic feature was identified by the entire age group (determined by simple count). The percentage with which each graphic feature was identified out of the total identified for the age group was also calculated.

Research question 3. Research question 3 examined the difference between the mean number of total graphic features identified and the mean number of total graphic features used when children create and examine their own work. To analyze this research question, a *t*-test was used to compare the mean number of total graphic features identified and the mean number of total graphic features used.

Research question 4. Research question 4 examined the difference between the mean number of total graphic features identified and the mean number of total graphic features used when the data were separated by age group. To analyze this research

question, a one-way ANOVA test was used to compare the mean number of total graphic features identified and the mean number of total graphic features used by each age group.

Research question 5. Research question 5 examined how the level of congruence between total graphic features used and total graphic features identified varied by child. To analyze this research question, each child's total number of graphic features used was subtracted from the total number of graphic features identified. The resulting number was considered the level of congruence (LC) between graphic features used and graphic features identified. For example, a child who identified a total of 2 graphic features and used 3 received a LC of -1. A LC less than or equal to -1 indicated that the child identified fewer features than he or she used. A LC of 0 indicated that graphic feature identification was equal to usage. A LC greater than or equal to +1 indicated identification of features was greater than usage.

A frequency distribution was created to analyze the LC scores. The frequency distribution displayed the number and percentage of children who received a LC score less than or equal to -1, a LC score equal to 0, and a LC score greater than or equal to +1. This displayed how many (and the percentage) of children who identified fewer graphic features than used, identified all of the graphic features used, and identified more graphic features than used.

Research question 6. Research question 6 examined how the level of congruence between total graphic features used and total graphic features identified varied by age group (2, 3, and 4). To analyze this research question, the mean number of total graphic features used was subtracted from the mean number of total graphic features identified for each 2-, 3-, and 4-year-old age group. The resulting number indicated the level of

congruence (LC) between the mean number of graphic features identified and mean number of graphic features used for each age group. Each age group received one LC score of either less than or equal to -1, equal to 0, or greater than or equal to +1, indicating that, on average, the age group identified fewer graphic features than used, identified all of the graphic features used, or identified more graphic features than used.

Chapter Four: Results

Out of the total sample ($N = 34$), three participants refused to write. Two participants from the 3-year-old group (1 male, 1 female), and one participant from the 4-year-old group (1 female) responded with refuse to write for both referents. This left a remaining sample size of $n = 31$ for the descriptive statistics concerning graphic features used and graphic features identified. The sample $n = 31$ was also used to examine the relationship of the variables of interest with demographic variables and the research question analyses.

Descriptive Statistics

Graphic features used. Participants used a total of 210 graphic features, with an average use of 6.77 ($SD = 3.48$) features per participant. The minimum value for graphic features used was 0 and the maximum value was 12. The 2-year-old group ($n = 8$) used an average of 3.63 ($SD = 1.85$) graphic features. The 3-year-old group ($n = 12$) used an average of 6.25 ($SD = 3.52$) graphic features, and the 4-year-old group ($n = 11$) used an average of 9.63 ($SD = 1.75$) graphic features. The frequencies with which the graphic features were used are reported in Table 1. For the total sample, the most frequently used graphic features included linearity, unidirectionality, and small size of units. Linearity was the most frequently used graphic feature for each age group as well.

Graphic features identified. In terms of graphic features identified, participants identified a total of 64 graphic features, with an average of 2.06 ($SD = 2.46$) graphic features per participant. The minimum value was 0 and the maximum value was 9. The 2-year-old group identified a total of 3 graphic features ($M = .38$, $SD = .74$). The 3-year-old group identified a total of 26 graphic features ($M = 2.17$, $SD = 2.82$), and the 4-year-

old group identified a total of 35 graphic features ($M = 3.18$, $SD = 2.32$). The frequencies of graphic feature identification (see Table 1) are described in the *Findings* section below.

Relationship of Demographic Variables

Before the research questions were analyzed, possible relationships between the demographic variables and variables of interest were explored. Due to the homogeneity of the sample in characteristics such as family member education, ethnicity, and household income, child's gender was selected as the only demographic variable to compare with the variables of interest. An independent samples *t*-test was used to test for a meaningful relationship between the mean number of graphic features used and gender. Results indicated no significant relationship exists between gender and graphic features used. An independent samples *t*-test was used to test for a meaningful relationship

Table 1
Frequency of Graphic Feature Use and Identification (ID)

Graphic Feature	2-yr <i>n</i> = 8		3-yr <i>n</i> = 12		4-yr <i>n</i> = 11		Total <i>n</i> = 31	
	Use	ID	Use	ID	Use	ID	Use	ID
Linearity	7	0	17	7	21	6	45	13
Unidirectionality	5	0	17	7	21	5	43	12
Segmentation	6	0	13	3	19	6	38	9
Small size of units	6	1	13	1	20	4	39	6
Pseudo letters	5	0	6	2	11	0	22	2
Conventional letters	0	2	9	6	14	14	23	22
Total	29	3	75	26	106	35	210	64

Note. $N = 34$. Three participants refused to write, leaving $n = 31$.

between the mean number of graphic features identified and gender. Results indicated no significant relationship exists between gender and graphic features identified.

Findings

Research question 1. When children examine their own work, defined as their own writing versus drawing, which graphic features do they most frequently identify as necessary to differentiate their writing from drawing?

To analyze this research question, a frequency distribution was created to display the number of times each graphic feature was identified. The frequencies are reported in Table 1. The most frequently identified graphic features included conventional letters, linearity, and unidirectionality. Conventional letters were identified 22 times, comprising 34.4% of the total features identified. Linearity was identified 13 times (20.3%). Unidirectionality was identified 12 times (18.9%).

Research question 2. When the data are separated by age group (2, 3, and 4), which graphic features do children of different ages most frequently identify as necessary to differentiate their writing from drawing?

To analyze this research question, a frequency distribution was created for each age group to display the number of times each graphic feature was identified per age group. The frequencies are reported in Table 1. Results indicated that of the 3 features the 2-year-old group identified, 2 were conventional letters. The 3-year-old group identified linearity and unidirectionality 7 times each, with each comprising 26.9% of the total features identified for the age group. The 4-year-old group identified conventional letters 14 times, comprising 40.0% of the total features identified for the age group. The 4-year-

old group also identified linearity and segmentation 6 times each (each comprising 17.1% of the total features identified for the group).

Research question 3. When children examine their own work to identify graphic features necessary to differentiate writing from drawing, is there a significant difference between the mean number of total graphic features identified and the mean number of total graphic features used?

To determine if a meaningful relationship existed a *t*-test was used. A paired-samples *t*-test revealed that children used significantly more graphic features ($M = 6.77$, $SD = 3.48$) than they identified ($M = 2.06$, $SD = 2.46$; $t(30) = 8.80$, $p < .05$).

Research question 4. When the data are separated by age group (2, 3, and 4), is there a significant difference between the mean number of total graphic features identified and the mean number of total graphic features used?

Results of a one-way ANOVA comparing the relationship between graphic features used and age revealed that, the mean number of total graphic features used significantly differed by age, $F(2, 28) = 12.68$, $p < .05$. Post hoc comparisons using the Tukey HSD test indicated that the mean score for the 2-year-old group ($M = 3.62$, $SD = 1.85$) was significantly lower than mean score for the 4-year-old group ($M = 9.64$, $SD = 1.75$). The mean score of the 3-year-old group ($M = 6.25$, $SD = 3.52$) was also significantly lower than the mean score of the 4-year-old group. Results of a one-way ANOVA comparing the relationship between graphic features identified and age revealed a significant relationship, $F(2, 28) = 3.54$, $p < .05$. Post hoc comparisons using the Tukey HSD test indicated that the only significant relationship was between the mean score for the 2-year-old group ($M = .38$, $SD = .74$) and 4-year-old group ($M = 3.18$, $SD = 2.32$).

Research question 5. When children examine their own work to identify graphic features necessary to differentiate writing from drawing, does the level of congruence (LC), defined as total graphic features used subtracted from total graphic features identified, vary by child?

To analyze this research question, a frequency distribution was created to display the number and percentage of children who identified fewer graphic features than used, identified the same number of graphic features used, and identified more graphic features than used. The results of the frequency distribution revealed that 29 participants (93.6%) used more graphic features than identified ($LC \leq -1$), 1 participant (3.2%) used and identified the same number graphic features ($LC = 0$), and 1 participant (3.2%) identified more graphic features than used ($LC \geq +1$).

Research question 6. When the data are separated by age group (2, 3, and 4), does the LC, defined as total graphic features used subtracted from total graphic features identified, vary by age group?

To analyze this research question, the mean number of total graphic features used was subtracted from the mean number of total graphic features identified for each 2-, 3-, and 4-year-old age group, to identify the average LC of each age group. Results indicated that, on average, every age group used more graphic features than identified ($LC \leq -1$).

Chapter Five: Discussion

The conceptualization of this study utilized Vygotsky's sociocultural theory, which emphasizes the connections between social learning, the internalization of culture-specific symbolic systems, and human understanding. Vygotsky (1978) discusses sign and tool use as important in shaping development. From a sociocultural perspective, the understanding of writing requires a relationship with and understanding of the social world. Children's mastery of the orthography of their culture is a piece of this process. The use and understanding of graphic features is another small piece of this process. The purpose of this project was to examine children's knowledge of the graphic features they used to differentiate their writing from drawing, in terms of what they could express through conversation. Six research questions were developed to explore different frequencies and relationships between the graphic features participants used and the graphic features they were able to identify. A summary of research question findings and findings regarding graphic feature use, is presented. Additionally, limitations to this study, future research possibilities, and implications are discussed.

Summary of Findings

Based on the review of the literature, it was expected that most children would use graphic features to differentiate their writing from drawing. The participants' writing examples confirmed this assumption. Of the 31 participants who produced a writing example, 30 used at least one graphic feature in their writing. Within the sample, the most frequently used graphic feature was linearity (see Table 1). Linearity is a basic superordinate feature, present in all orthographies (Gibson & Levin, 1975). Within the 2-year-old group, linearity was most frequently used. Within the 3- and 4-year-old groups,

linearity and unidirectionality were most frequently used. These results are not surprising, since superordinate features such as linearity and unidirectionality generally appear in children's writing before the more complex ordinate features, such as conventional letters (Tolchinsky-Landsmann & Levin, 1985). The only age group with a frequency of 0 was the 2-year-old group for the conventional letter graphic feature. This is also not surprising, as conventional letters do not usually appear in children's writing until age 4 (Levin & Bus, 2003; Levin & Korat, 1993).

Based on the writing samples of these participants, linearity appears to be a prominent feature that children include in their own writing (Figure 1 illustrates an example of linearity use by a 3-year-old participant). The frequent use of linearity is consistent with previous research. For example, Brenneman et al.'s (1996) study reported that linearity was present in 70% of writing examples created by 4- to 5-year-olds. Perhaps the simplicity of linearity is relatively easy for children to translate to their own writing marks, as opposed to the more detailed and controlled features such as small size of units, pseudo letters and conventional letters. It also seems possible that children's



Figure 1. Example a three-year-old participant's drawing of a house (left) and writing the word house (right).

degree of fine motor development may influence which graphic features children are physically capable of producing. Children at age 2 would presumably have poorer fine motor control than children at age 4, influencing their mark-making abilities. Perhaps features such as linearity and unidirectionality are relatively simple in terms of fine motor control.

A one-way ANOVA test revealed that children's use of graphic features significantly increased between the 2- and 4-year-old groups, and the 3- and 4-year-old groups; however, there was no meaningful relationship between the 2- and 3-year-old groups. Although it was not originally stated, it was expected that graphic feature usage would increase with age. These findings suggest that, for these participants, graphic feature usage changes significantly between the ages of 2 and 4. Past research on children's use of graphic features indicates that many graphic features become regularly used in writing by approximately age 4 (Akita et al., 2007; Tolchinsky-Landsmann & Levin, 1985).

It was expected that the oldest children in the sample would use the most graphic features, but it was surprising that no difference existed between the 2- and 3-year-olds.

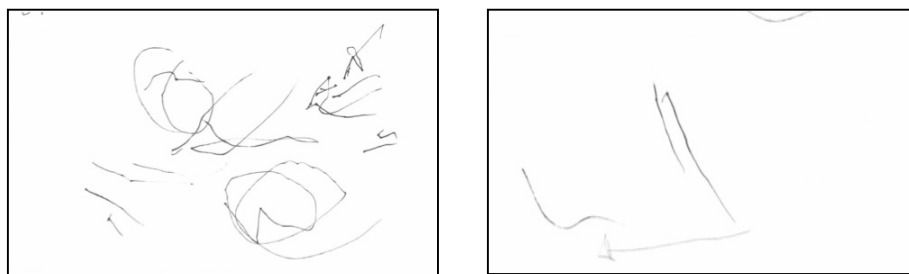


Figure 2. Example a two-year-old participant's drawing of a flower (left) and writing the word flower (right).

Perhaps before the age of 4 it is typical for graphic feature usage to be more sporadic, with an increase in usage occurring around age 4. However, this is purely speculative; it is not possible to make this conclusion from the present study. A larger study would be needed to more closely examine the effect of age on graphic feature usage in the youngest participants.

In terms of graphic features identified, the frequencies showed that conventional letters was the most frequently identified graphic feature for the entire sample (see Table 1). One explanation for this may be that conventional letters are a more familiar concept to children than the other graphic features, and thus easier to identify in conversation. For example, previous research indicates that children demonstrate a preference for the characteristics of their language's orthography and alphabet (Treiman et al., 2007). They recognize violations in letter combinations, as well as impossible consonant-vowel combinations (Ferreiro & Teberosky, 1982; Tolchinsky-Landsmann & Karmiloff-Smith, 1992). Perhaps conventional letters are one of the most obvious features of writing that stand out to children. The 2-year-old group even identified conventional letters twice despite a complete lack of conventional letters in their writing. This is a very limited example because it is based on the responses of 8 children, but perhaps this indicates that even very young children perceive letters to be defining characteristics; more investigation in this area with a larger sample of 2-year-olds would help clarify this idea.

When the frequency of identification for each graphic feature was examined by age (see Table 1), conventional letters remained one of the most frequently identified graphic features in each age group. It is interesting that participants used the superordinate feature of linearity the most frequently, but identified the orthography-

specific ordinate feature of conventional letters most frequently. Perhaps the superordinate features such as linearity are such overarching characteristics of writing systems, that children use them naturally, with little conscious effort (thus making them hard to identify). Linearity is probably easier to use than orthography-specific conventional letters, which take time and skill to learn. In terms of identifying features, perhaps the orthography-specific features are more obvious to children than the superordinate features. Using conventional letters may be a more conscious effort (thus making them harder to use, but easier to identify). This, combined with the fact that letter names and letter sounds are commonly discussed with children, may make conventional letters easier for children to identify.

Sociocultural theory can help frame this idea. Vygotsky (1978) describes the concept of semiotic mediation as using a tool, such as language, to mediate thoughts and behavior. These participants likely use language to discuss letters in their classrooms, creating a difference in the way they think about letters compared to a feature such as linearity or unidirectionality, which they are probably less likely to discuss regularly. Perhaps making certain features explicit, via conversation, influences the way children perceive important graphic characteristics of writing. If language is a mediating function (Vygotsky), then it would make sense that explicit features of writing are more obvious to children.

A significant relationship between graphic features used and graphic features identified was found for the sample as a whole. The participants used significantly more graphic features in their writing than they were able to identify through communication. There are many possible explanations for this finding. Children attending child care

generally have many opportunities to practice writing within the classroom; discussions about the physical characteristics of writing may have been unfamiliar to the children. When the participants were asked if their writing and drawing looked different, almost every child responded “yes.” When asked how they were different, children often had difficulty verbalizing an answer. A review of the literature indicated that children are visually aware of different graphic features (Tolchinsky-Landsmann & Karmiloff-Smith, 1992; Treiman et al., 2007); perhaps these participants noticed the differences between their writing and drawing marks, they were just unable to verbalize their thoughts. It would be interesting to see if rates of identification could be increased with experience discussing writing at the graphic level. Using language to discuss many different graphic features of writing may influence the way children perceive the strategies they use in their own writing.

A one-way ANOVA test showed a significant increase in graphic feature identification between the 2- and 4-year-old groups only. There are several possible explanations for this. For these participants, the understanding of new graphic features may vary so much during early childhood that the subtle changes occurring between ages 2 and 4 are not identifiable. The current study showed no significant increase between the 2- and 3-year-old group and the 3- and 4-year-old group. As discussed previously, perhaps there is a large increase in graphic feature knowledge that occurs around age 4. Again, this is purely speculative; a larger study with a larger sample size would be needed to clarify this idea. For the present study, making comparisons between the age groups is limited; meaningful differences for graphic feature identification between age groups may be found in a larger sample. Two research questions were developed to

examine the level of congruence (LC) between the participants' graphic feature usage and graphic feature identification. The majority of the participants identified fewer graphic features than they used (one participant used the same number of features as identified; however, further investigation revealed that this participant used 0 and identified 0). On average, each age group identified fewer graphic features than used. This finding is consistent with the finding that participants used significantly more graphic features than they identified. For the participants in this study, usage greatly outweighed identification.

Limitations and Future Research

A major limitation of this study is that it examined a very small portion of the population of children and families involved in child care in Northern Nevada. This study is only generalizable to the children and families from which the sample was selected. In terms of marital status, ethnicity, family education, and household income, the population showed very little variability. This study should be considered as a starting point to generate ideas for research on a larger, more diverse population. Utilizing a larger, more diverse population would help identify family demographic characteristics that are related to this topic.

Participation was voluntary, thus, some children and families from the target population did not participate. Despite parental consent, some participants refused to assent to participate as well. There may be characteristics about those families and children who consented and assented to participate that are unique, reducing the generalizability of this project.

This study only examined children in child care, which may have influenced the findings. Children in child care may have more opportunities to practice emergent writing

and discuss features of emergent writing (such as letters) with teachers; as well as opportunities to learn from peers. From a sociocultural perspective, children learn in a social context; the context of a child care classroom varies greatly from the context of the home. A larger study that examines the effect of the home or child care context on knowledge about one's own emergent writing could be a future possibility. Additionally, nationally accredited child care centers are regulated by higher standards of quality and developmentally appropriate practices than non-accredited child care centers, further affecting the generalizability of this project.

Another major limitation of the present study was small sample size. Comparing results across age groups would be more accurate if this study was replicated with a larger sample. This would provide clearer trends in which graphic features children most frequently use and identify in their own emergent writing. A larger sample would help identify changes that occur in graphic feature use and identification across age groups, and may reveal more statistically significant differences between the age groups than was possible for the current project.

This study is limited in generalizability, but some of the findings can be discussed in terms of possible practical application to early childhood education. The participants in this study did discuss some of the graphic features they used in their writing, indicating that the children were capable of examining their writing at the graphic level. Future research may want to examine how this can be utilized in early childhood classrooms. Perhaps engaging children in conversations about their emergent writing can enhance children's understanding of the marks they make. Conventional letters are commonly discussed, but perhaps it would be beneficial to discuss the other features as well.

Bringing the other features to a more conscious level through language may provide children with a different view of their own emergent writing. Making some of the implicit features of writing explicit could be explored as a possible teaching tool for young students. Students who struggle with graphic aspects of writing may benefit from approaching writing feature by feature. Making the graphic characteristics more explicit may alter the way they perceive writing and influence their mark-making abilities. Using sociocultural theory as a framework, the social interaction and conversations used in this process may influence how children understand writing.

Future research in this area may want to examine how graphic feature usage and identification fits in with larger developmental models of emergent writing. Levin and Bus (2003) developed an emergent writing scale that consisted of three schemes: graphic, writing-like, and symbolic. Early scribbles and small forms made up the graphic scheme; the majority of graphic features that were the focus of the current project were included within the writing-like scheme. More complex developments such as phonetic representation and invented spelling comprised the symbolic scheme. It may be beneficial to examine how graphic feature identification fits with these types of models, and how these types of models fit with models of emergent writing that extend to elementary school-aged children. If young children were capable of examining writing at the graphic level, perhaps including their perceptions would enhance models that solely examine their actual writing productions. Mastering many of the graphic characteristics of writing are necessary before writing can be used communicatively; children's understanding of this process may be an important piece to consider when examining emergent writing.

Conclusion

The purpose of this project was to examine children's understanding of the graphic features they use to differentiate their emergent writing from drawing. Examining this topic in terms of what children can express through conversation provided a different way of viewing children's perceptions of their own mark-making abilities. This project explored which features of writing children can express and highlighted potential relationships between the features children can express and the features they use. The findings from this project will hopefully help generate new ideas for larger, more comprehensive studies.

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Appendix A

FAMILY INFORMATION AND BACKGROUND FORM

ID#: _____

Please answer the following questions. If there are any questions that you do not feel comfortable answering, leave them blank. Thank you!

1. Child's age (years): _____
2. Child's gender: Male
 Female
3. Mother's current age in years: _____
4. Father's current age in years: _____
5. Does your child have any siblings? Yes
 No
6. If yes, please indicate the siblings' ages:
7. Please indicate your current marital status: Currently married
 Separated or divorced
 Widowed
 Never married
 Living with partner
8. Does your child speak a language other than English at home? Yes
 No
9. If yes, what language? _____
10. Please indicate your primary racial/ethnic background: American Indian or Alaska Native
 Asian
 Black or African American
 Native Hawaiian or other Pacific Islander
 White, non-Hispanic
 Hispanic origin
 Other (please indicate: _____)

11. Thinking of your household, what is the highest level of education completed by any member of this household?
- Some high school
 - High school graduate/GED
 - Some college
 - College graduate
 - Advanced degree
 - Other (please indicate: _____)
12. What is your household's current yearly income?
- Less than \$50,000
 - \$50,000 to \$74,999
 - \$75,000 to \$99,999
 - \$100,000 or more

Appendix B

MEETING PROCEDURE SCRIPT

Repeat Steps 2 - 7 with each object: (1) house (2) flower

Step 1: Hello [*child's name*]. My name is Jennifer and today I would like you to help me learn about the way children your age draw and write. We are going to draw some pictures and write some words on different cards. I know that children write differently than adults, so write the best way you know how.

Step 2: Think in your head about what a _____ looks like. [*pause*]

Step 3: This card is just for drawing [*hand the child a card*]. On this card please draw a _____. [*pause*]

Step 4: Thank you! Now this card is just for writing [*hand the child a card*]. On this card please write the word _____. [*pause*]

Step 4a: Please try to write _____ the best way you know how. We are learning about the way you write, not the way adults write. [*pause*]

Step 4b: If you were pretending to write _____, what marks would you make? [*pause*]

Step 4c: Ok, lets move on to a different picture. [*start at Step 2 with next object. Indicate "refusal to write" on graphic feature checklist*]

[Ask child steps 5-13. Pause and ask for clarification or elaboration if necessary. If child does not respond, move to the next question until all questions are asked.]

Step 5: Thank you! [*place both examples side-by-side, in front of the child*] Now lets look closely at your writing and your drawing. On this card you drew _____ and on this card you wrote _____.

Step 6: Do these look different to you? How are they different [*pause*]

Step 7: Look at the marks you made with your pen here [*point to drawing*]. Why does this look like a drawing of a _____? [*pause*]

Step 8: Look at the marks you made with your pen here [*point to writing marks*]. Why does this look the writing of the word _____? [*pause*]

- Step 9: When you made these drawing marks with your pen, what did you do to make them look like a picture? *[pause]*
- Step 10: When you made these writing marks with your pen, what did you do to make them look like a word? *[pause]*
- Step 11: Tell me anything you want about your writing and drawing *[pause]*
- Step 12: Thank you for your help! Let's do the same thing again with something different.
- Step 13: *[Collect both examples. Record the directionality of the child's writing with a light arrow along the bottom of the writing marks, indicating the direction in which the child created the marks.]*
- Step 14: Thank you for your help *[child's name]*.

Appendix C

GRAPHIC FEATURES CHECKLIST

ID#: _____

GRAPHIC FEATURES IDENTIFIED

 Linearity Directionality Segmentation Small size of units Pseudo-letters Conventional letters Other:

GRAPHIC FEATURES USED

 Linearity Directionality Segmentation Small size of units Pseudo-letters Conventional letters Refusal to write Other:

NOTES: