EARLY WRITING DEVELOPMENT IN L1 ENGLISH-SPEAKING CHILDREN

JANETTE PELLETIER AND JENNIFER LASENBY

Abstract. This paper reports on the developmental and psychometric properties of an early writing task. The study was carried out over four years in Toronto, Canada with L1 English-speaking children. Two cohorts of children who began in Nursery School were followed to the end of their Grade 1 year. Children were administered the same writing task at four time points along with standardized measures of early reading. The early writing task required children to write words and number and word combinations; we examined how children move from understanding print as "objects" to understanding print as representation of sounds. We also examined how writing in Nursery School and Kindergarten related to later literacy skills. The methodology allowed us to examine the extent to which early writing in Nursery School (3 years old) and Junior Kindergarten (4 years old) predicted later literacy skills when children were in Grade 1 (6 years old) and were receiving formal reading instruction. Results show characteristic features of children's early writing of number and word combinations at each of the four grade levels and show that performance on the writing task in Kindergarten predicted reading skills at the end of Grade 1.

Keywords: early printing, phonological awareness, invented spelling, word identification, word attack.

Chinese

Translated by Shek Kam Tse

論文摘要： 本文報告了兒童進行一個早期寫作測驗時，發展性和心理測量上的情況。本研究在加拿大多倫多進行，維期四年，測試對象是以英文爲母語的兒童。兩組兒童自入讀托兒所開始被追踪研究，至小學一年級爲止。測試的兒童需於四個不同的年齡階段，進行相同的寫作測驗，並標準化的量度兒童的早期閱讀。寫作測驗要求兒童寫詞語、數字和詞語組合；我們測試兒童怎樣把作品由「物件」的理解，轉移至把作品理解爲代表聲音。我們還探討在托兒所、幼稚園內的寫作，對兒童後來讀寫技能的關係。本研究的研究法，讓我們可以檢視「利用兒童在托兒所（3歲）和幼兒園初班（4 歲）早期寫作，去預測兒童於小學一年級接受正式閱讀指導時的讀寫能力」的準確程度。研究結果提出了兒童早期於各個年齡階段上，寫數字和詞語組合的特色；還指出了兒童在幼稚園時的早期寫作測試表現，能預測兒童在小一學生結束時的閱讀能力。

關鍵詞： 早期作品、語音覺識、自創拼寫、詞語識別、非字但符合造字原則

Dutch

Samenvatting [Translated by Tanja Janssen]

In deze bijdrage wordt gerapporteerd over de ontwikkelings- en psychometrische eigenschappen van een vroege schrijftaak. Het onderzoek werd gedurende vier jaar uitgevoerd in Toronto, Canada, met Engelsta-

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lige kinderen. Twee cohorten van kinderen werden gevolgd vanaf het begin van de kleuterschool tot het einde van het eerste jaar van de basisschool. De kinderen kregen op vier momenten dezelfde schrijftaak voorgelegd, samen met gestandaardiseerde leestoetsen. Bij de schrijftaak werd kinderen gevraagd woorden, getallen en woordcombinaties op te schrijven. We onderzochten hoe het begrip van kinderen zich ontwikkelde, van gedrukte woorden als "objecten" naar gedrukte woorden als klankrepresentaties. We onderzochten ook hoe schrijven in de kleuterschool gerelateerd was aan latere geletterdheid. De gehanteerde methode stelde ons in staat te onderzoeken in welke mate het vroege schrijven in de kleuterschool (op drie- en vierjarige leeftijd) de latere lees- en schrijfvaardigheden van kinderen (op zesjarige leeftijd) voorspelde. De resultaten laten kenmerkende eigenschappen zien van het vroege schrijven van getallen en woordcombinaties op elk van de vier onderwijsniveaus. Prestaties van kinderen op de schrijftaak in de kleuterschool voorspelden hun leesvaardigheden aan het einde van het eerste leerjaar in de basisschool.

French

Résumé [Translated by Laurence Pasa]
Cet article rend compte des propriétés développementales et psychométriques d'une tâche d'écriture précoce. L'étude a été effectuée sur quatre ans à Toronto, (Canada) avec des enfants dont la langue maternelle est l'anglais. Deux cohortes d'enfants ont été suivies de l'entrée à l'école maternelle à la première année du primaire. La même tâche d'écriture a été soumise à quatre reprises et accompagnée de tests de lecture standardisés. La tâche d'écriture a consisté à produire des mots et des suites de nombres et de mots. Nous avons examiné comment les représentations des enfants évoluent d'une conception de l'écrit en tant qu' « objet » à une mise en correspondance avec les sons de l'oral. Nous avons également examiné le lien entre les pratiques d'écriture préscolaires et les compétences en écriture ultérieures. La méthodologie employée nous a permis de voir dans quelle mesure l'écriture au préscolaire (3 ans et 4 ans) peut prédire les compétences en langue écrite des enfants lors de la première année de l'école primaire (6 ans) au moment de l'enseignement formel de la lecture. Les résultats présentent les traits caractéristiques des productions de suites de nombres et de mots des enfants à chacun des quatre niveaux scolaires et montrent que la performance en écriture au préscolaire est un prédicteur des compétences en lecture à la fin de la première année de l'école primaire.
Mots-clés : écriture précoce, conscience phonologique, écriture inventée, identification de mot, attaque de mot.

German

Zusammenfassung [Translated by Irene Pieper]
Der Beitrag thematisiert die entwicklungsbezogenen und psychometrischen Eigenschaften einer frühen Schreibaufgabe. Die Untersuchung wurde über einen Zeitraum von vier Jahren in Toronto / Kanada mit Kindern, deren Erstsprache Englisch ist, durchgeführt. Zwei Kohorten von Kindern, die in der Vorschule begannen, wurden bis zum Ende ihres ersten Schuljahrs begleitet. Die Kinder bearbeiteten die gleiche Schreibaufgabe zu vier Zeitpunkten, und zugleich wurde eine standardisierte Messung des frühen Lesens durchgeführt. Die Schreibaufgabe erforderte, dass die Kinder Wörter, Zahlen und Wortkombinationen schrieben; wir untersuchten, wie die Kinder vom Verständnis des Gedruckten als „Objekt" zu einem Verständnis als Repräsentation von Lauten voranschritten. Wir untersuchten außerdem, wie sich das Schreiben in Vorschule und Kindergarten zu späteren Schreibfähigkeiten verhält. Die Methodologie ermöglichte es uns zu untersuchen, in welchem Ausmaß das frühe Schreiben in der Vorschule (Dreijährige) und dem Junior Kindergarten (Vierjährige) spätere Schreib- und Lesefähigkeiten bei Sechsjährigen (1. Schuljahr) und bei unterrichtlicher Instruktion vorhersagbar machte. Die Ergebnisse zeigen charakteristische Züge des frühen kindlichen Schreibens bei Zahlen und Wortkombinationen für alle vier Stufen. Die Performanz bei Schreibaufgaben im Kindergarten erlaubt Rückschlüsse auf die Lesefähigkeiten am Ende des 1. Schuljahres.

Greek

Metafrase [Translated by Panatoya Papoulia Tzelepi]
Αυτό το άρθρο αναφέρεται στην ανάπτυξη και στις ψυχομετρικές ιδιότητες ενός έργου (task) πρώιμης γραφής. Η μελέτη διήρκεσε τέσσερα έτη στο Τορόντο του Καναδά με παιδιά των οποίων η μητρική γλώσσα ήταν η Αγγλική. Δύο σειρές παιδιών που άρχισαν το Νηπιαγωγείο παρακολουθήθηκαν ως το τέλος της πρώτης τάξης. Το ίδιο έργο γραφής δόθηκε στα παιδιά τέσσερις φορές μαζί με σταθμισμένη μέτρηση πρώιμης ανάγνωσης. Το έργο της πρώιμης γραφής απαιτούσε από τα παιδιά να γράψουν λέξεις, αριθμούς και συνδυασμούς λέξεων. Εξετάσαμε πώς τα παιδιά μετακινούνται από την κατανόηση του

γραπτού ως αντικειμένου, στην κατανόησή του ως αναπαραστάσεις ήχων. Η μεθοδολογία μας επέτρεψε να εξετάσουμε την έκταση με την οποία η πρώιμη γραφή στο προνηπιαγωγείο (3 ετών) και στο Νηπιαγωγείο (4 ετών) προλέγει τις δεξιότητες γραμματισμού όταν τα παιδιά είναι στην πρώτη τάξη (6 ετών) και δέχονται τυπική διαδικασία ανάγνωσης. Τα αποτελέσματα δείχνουν χαρακτηριστικά στοιχεία της πρώιμης γραφής αριθμών και συνδυασμών λέξεων σε κάθε ένα από τα τέσσερα επίπεδα και δείχνουν ότι η επίδοση στο έργο γραφής στο Νηπιαγωγείο προλέγει τις αναγνωστικές δεξιότητες στο τέλος της πρώτης τάξης.

Polish

Streszczenie [translation Elżbieta Awramiuk]

Niniejszy artykuł relacjonuje rozwojowe i psychometryczne właściwości początkowego pisania. Badania prowadzono ponad cztery lata w Toronto (Kanada) z dziećmi, dla których pierwszym językiem był angielski. Dwie grupy dzieci, które rozpoczęły naukę w przedszkolu, obserwowano do czasu ukończenia przez nie pierwszej klasy. Dzieci cztery razy zostały poddane temu samemu zadaniu wraz ze standaryzowanym pomiarem wczesnych umiejętności czytania. Zadanie wymagało od dzieci napisania wyrazów, cyfr i kombinacji wyrazów. Badaliśmy, jak dzieci przechodzą od rozumienia druku jako obiektu do rozumienia druku jako reprezentacji dźwięków. Sprawdzaliśny także, w jaki sposób pisanie w przedszkolu jest związane z późniejszymi umiejętnościami w czytaniu i pisaniu. Przyjęta metodologia pozwoliła nam zbadać, w jakim zakresie wczesne umiejętności pisania w przedszkolu (dzieci w wieku 3-4 lat) pozwalają przewidzieć późniejsze umiejętności czytania i pisania, kiedy dzieci były w klasie pierwszej (mają 6 lat) i otrzymywały formalne instrukcje w zakresie czytania. Wyniki pokazują charakterystyczne cechy wczesnego dziecięcego pisania cyfr i kombinacji słów na każdym z czterech badanych etapów i dowodzą, że wyniki przedszkolnych zadań w pisaniu pozwalają przewidywać umiejętność czytania na koniec klasy pierwszej.

Słowa-klucze: wczesne pisanie, świadomość fonologiczna, pismo małych dzieci, rozpoznawanie wyrazów, dekodowanie wyrazów

Portuguese

Resumo [Translation Paulo Feytor Pinto].

Este texto dá conta das propriedades psicométricas e relativas ao desenvolvimento presentes numa tarefa de escrita precoce. O estudo foi levado a cabo durante quatro anos, em Toronto (Canadá) com crianças falantes nativas de inglês. Dois grupos de crianças foram acompanhados desde o infantário até ao final do 1º ano de escolaridade. Às crianças foi pedida, em quatro momentos distintos, a execução de uma mesma tarefa

concebida de acordo com escalas padronizadas de medição da leitura precoce. A tarefa de escrita precoce exigia das crianças a escrita de palavras, de números e de combinatórias de palavras; a nossa análise incidiu sobre o modo como os alunos passaram da percepção do material escrito como um "objecto" para uma percepção como representação de sons. Também foi analisada a relação entre a escrita no infantário e no jardim de infância e competências literácicas posteriores. A metodologia adoptada permitiu analisar em que medida a escrita precoce no infantário (3 anos de idade) e no início do jardim de infância (4 anos de idade) influenciava as competências literácicas das crianças quando chegavam ao 1º ano de escolaridade (6 anos de idade). Os resultados mostram as características típicas da escrita precoce de combinatórias de palavras e números em cada nível e mostram que o desempenho de tarefas de escrita no jardim de infância favorece as competências de leitura no final do 1º ano de escolaridade.

Palavras-chave: escrita precoce, consciência fonológica, ortografia inventada, identificação de palavras.

1. INTRODUCTION

Much is already known about what skills and contexts facilitate young children's literacy acquisition in English; for example, vocabulary development and verbal intelligence (Biemiller, 1999; Huba & Ramisetty-Mikler, 1995), short-term memory capacity (McDougall, 1994), speech rate (McDougall, 1994), phonological awareness and knowing the letters of the alphabet (Crain-Thoreson & Dale, 1992, Cunningham & Stanovich, 1993; Jager-Adams, 1994; Muehl & di Nello, 1976; Stano-

vich, 1999), home literacy practices (Christian, Morrison & Bryant, 1998; Haney, 2000), and demographic factors such as socio-economic status and parental education levels (Carlson, 1998; Christian et al, 1998). In addition to what is known about skills and contexts that facilitate literacy acquisition, a number of researchers (e.g., Ferreiro & Teberosky, 1982; Kress, 1997; Vernon & Ferreiro, 1999) believe that young children are able to understand and convey meaning in print even *before* they have acquired some of these skills by using whatever symbol system makes the most sense to them at the time. One such symbol system is invented spelling.

The theoretical framework that guides the research is taken from Olson's notion that print represents properties of speech (e.g., Olson, 1996; Olson & Pelletier, 2002). To become literate in English, one must learn this representational system. However, unlike speaking, reading and writing do not happen naturally, nor do they map neatly onto speech. Literacy must therefore be learned. For young children, this may mean "unlearning" what they think print represents and learning what is institutionally accepted (Olson & Pelletier, 2002). This paper attempts to show how young L1 English-speaking children do this, that is, how they move from using "whatever makes sense" to using "institutionally-accepted" forms of writing. In English, institutional acceptance means application of the alphabetic principle, that is, communicating "what is said" rather than simply "what is meant" (Olson & Pelletier, 2002). Consider that when children and adults read a book together they may have the same understanding of the text, but they arrive at the meaning of the text itself through different methods of thought (Olson & Pelletier, 2002). Adults know that the print represents the sounds of the words. However, children search for the meaning in the print by looking for identifying shapes, sizes, and other indicators. In their view, a large object should be represented by a large word. They search for a clue in the appearance of the text because they do not yet understand that the print is a representation of the sounds of the words in the story. Thus their use of writing reflects their stage of understanding – if symbols represent meaning, not "words themselves", then children's markings on a page will employ what Gunther Kress insightfully describes as being whatever children have available (Kress, 1997). As children mature, their writing moves toward adherence to an accepted system. This movement involves the changing combination of increasing phonological awareness and alphabet knowledge with use of invented spelling. As children begin to understand and apply the rules that pertain to alphabetic understanding, their early invented spellings become increasingly standardized. Theories that guide children's written communication early on begin to change as they are challenged by evidence that the phonological properties of the alphabet are what guide reading and writing. It is important to keep in mind that mapping of the English alphabet onto written representations is not consistently direct and the spellings of some words do not fit their pronunciation. As Ravid (2001) notes, the typology of a particular language affects the way in which spelling maps onto the sounds of words and there are many examples of inconsistencies in English. In essence then, children's journey toward understanding and applying the alphabetic principle is bumpy, partly because alphabetic rules are not always consistent and partly because children's early theories are strong and persistent (Ferreiro & Teberosky, 1982; Pelletier, 2002a).

2. AN EVOLUTIONARY PERSPECTIVE ON EARLY WRITING

In reporting on the origins of the writing system, Dudley (1991) tells the story of "Ziggurats in the Sand" and presents photographs of ancient Sumerian artifacts - stone tablets from Uruk. These photographs illustrate the beginnings of writing, of the purposeful record keeping of taxpayers' properties and assets. We see the use of an early symbol system, drawings of cows and oxen that signify both the number and type of object to be recorded. Three cows might be depicted as cow, cow, cow (drawings). At some point in history, it became useful and necessary to employ a more convenient system – one symbol to represent the number and another to represent the object. This movement from a tedious to a honed recording system has intrigued those of us who study writing development in young children (Ferreiro & Teberosky, 1982; Levin & Korat, 1993; Olson & Pelletier, 2002; Pelletier, 2002a/b). Harris (1986) describes this movement as one that changes from emblematic or token-iterative recording to linguistic recording. If one closely examines children's early writing in an alphabetic system such as English, it appears as though children's writing also moves from a token-iterative (e.g., drawings of cow, cow, cow) or emblematic recording, to one that is based on linguistic or alphabetic principles (3 cows). One goal of this study therefore, was to examine this movement in children's writing from Nursery School (age 3) to Grade 1 (age 6). Although this paper suggests a movement that might be characterized as stage-like (emblematic toward linguistic), Yaden and Tardibuonc (2004) caution that there may not be a particular developmental order and that stages may overlap with one another.

3. PHONOLOGICAL AWARENESS AND ALPHABET RULES

Phonological awareness begins to develop in infancy and continues through the primary school years. Reading research identifies phonological awareness as a key contributor to reading success (Hulme, 2002; Jager-Adams, 1994; Muter & Snowling, 1998; Stanovich, 1986, 1999). Phonological awareness at the beginning of kindergarten has been shown to predict Grade 1 decoding ability (Copland, 1998). There is some evidence that early phonological awareness not only predicts later reading success (MacDonald & Cornwall, 1995), but remains stable itself from Nursery school through to Grade 1 (Lonigan, Burgess & Anthony, 2000). Felton and Brown (1990) demonstrated that phonological awareness, phonetic recoding in working memory, and phonological recoding in lexical access operate quite independently; there does not appear to be a single general phonological processing ability, but rather a set or range of phonological processes.

4. INVENTED SPELLING

Another area that has received attention is the contribution of invented spelling to later reading skills (Pelletier & Lasenby, 2003; Shatil, Share & Levin, 2000). Invented spelling is a term that has come to describe early attempts at word writing before children are able to read. Invented spellings vary in skill level from random strings of letters or letter-like forms, to good letter-sound correspondence. Chil-

dren's invented spelling abilities improve incrementally from year to year and have been traced through a series of documented stages or categories, despite beliefs that there are no real stages (e.g., Yaden & Tardibuono, 2004). The specifics of the categorical distinctions used to describe these developmental changes in spelling vary among researchers; however they commonly include a scale similar to the following as outlined by McGee and Richgels (2000): 1) non-spelling or random strings of non-letters or letter-like forms, 2) early invented spelling that involves use of letters but not phonetically based, and 3) purely phonetic spelling. Children's early writing is often carried out in conjunction with drawings and/or talk (Dyson, 1988). While researchers have differed in the number of discrete stages they identify, historically it appears that children follow a similar developmental pattern (see also, Hildreth, 1936; Luria, 1978; Ferreiro, 1978, 1985).

Iris Levin's numerous studies on Hebrew-speaking children's early literacy development include children from 3-6 years, generally before they begin to use conventional letters (e.g., Tolchinsky-Landsmann & Levin, 1985; 1987). The belief that literacy should "be viewed as a system of representation of the deep lexical-morphemic levels of language from the very beginning stages of acquisition" (Tolchinsky-Landsmann & Levin, 1987, p. 322) led this group of researchers to begin with 3-year-olds. Their investigations of children's concepts of print and word understanding in Hebrew indicated that even 3-year-olds could distinguish print from drawing when *looking at* print; however, it was not clear whether these children were capable of *producing* graphic displays to show this distinction. By the time children had reached age four it appeared that they were arranging their writings in a linear string of units separated by regular blank spaces. It was also found that children did not vary in the number of characters used for longer or shorter utterances. Children first used block-letter or cursive-writing forms which captured the overall characteristics of print, but not the letters themselves. Then children began to use conventional markings (Roman numerals, arrows, etc.) mixed with writing; finally children used only Hebrew letters. Children who knew how to write their names used these same letters in different combinations for all writing, a finding that is consistent with Bloodgood's work (Bloodgood, 1999). It appeared that knowing a few letters gave the children something to work with when trying to write other words.

Tolchinsky-Landsmann and Levin (1985, 1987; also Levin, Landsman & Tolchinsky, 1989) showed that almost half the children used referential strategies when writing or reading. That is, children justified their responses based on size, shape, or color characteristics of the object the words represented, rather than on the basis of the letters composing the word (see also Olson & Pelletier, 2002). Therefore, before using a conventional literacy system to understand and use print, children used more perceptual information to guide them in their quest for meaning-making and communication.

5. IS INVENTED SPELLING JUST PHONOLOGICAL AWARENESS?

One could argue that invented spelling in English is a measure of phonological awareness alone. In order to produce invented spellings children must understand the relationship between English spoken sounds and letters. Initially understanding may not translate into accurate letter/sound relationships but gradually children learn which letter is associated with which sound. To do this, children must first segment spoken messages into words, then segment the words into phonemes, and finally decide which letter to use to represent the phonemes (McGee & Richgels, 2000). In fact, a significant amount of the variance in invented spelling tasks can be attributed to phonological awareness. For example, Liberman, Rubin, Duques and Carlisle (1985) found that a phoneme segmentation task accounted for 67% of invented spelling performance in Kindergarten. Mann (1993) also found that there was a strong correlation between phoneme segmentation scores and invented spelling in Kindergarten. If it is the case that children's invented spellings are representations of phonological awareness, then examining these invented spellings would be useful for two purposes: 1) to evaluate children's "applied" phonological awareness, and 2) as a method of training phonological awareness (Ahmed & Lombardino, 2000; Watt, 2001). Further, it can be argued that if invented spellings are considered valid measures of children's phonological awareness in print, and phonological awareness in print has been shown to be highly correlated with reading success, then measures of invented spelling may be useful as diagnostic tools for identifying children who are likely to experience reading difficulties. This information can then be used to design programs for these children at risk (Lombardino, Bedford, Fortier, Carter & Brandi, 1997).

Tangel and Blachman's (1992) Developmental Spelling Task assesses the development of children's invented spelling ability. In reviewing this scale, McBride-Chang (1998) found this task to be a stable measure, associated with phonological awareness and predictive of standardized spelling and decoding tasks over time. McBride-Chang (1998) suggests that invented spelling tasks may be more useful in predicting later decoding skills than traditional phonological awareness tasks because invented spelling tasks involve both phonological and orthographic information.

6. INVENTED SPELLING AS PREDICTIVE OF LATER LITERACY

Due to the nature of the task and its connection to phonological and orthographic awareness, early invented spelling may relate to later literacy development. However, relations such as this need to be tested through systematic research (Shatil, Share & Levin, 2000). Some investigations have examined the prediction from invented spelling. It appears that invented spelling tends to increase children's awareness of the sounds in words, and children who spend a lot of time writing both with invented and conventional spelling become superior spellers (Watt, 2001). Frost (2001) found marked differences in the later reading performance of children who perform in the high or low group of invented spelling ability. Spelling at the beginning of Grade 1 has been found to correlate with end-of-year word recognition, and

with reading comprehension (Morris & Perney, 1984). Mann (1993) found that the phonological accuracy of Kindergarten spelling correlated with Grade 1 word identification and word attack skills. Shatil, Share and Levin (2000) examined the contribution of Kindergarten writing to Grade 1 literacy. In their study, the researchers included an invented spelling task as well as a test of children's understanding of the alphabetic principle. Results indicated that invented spelling contributed to significant variance in Grade 1 reading and writing; alphabet skills likewise made a contribution. It would appear from these findings that Kindergarten invented spelling is important for Grade 1 literacy not because of the writing itself, but because of the phonological, orthographic, and/or alphabetic knowledge that it requires (Shatil, Share & Levin, 2000).

7. THE PRESENT STUDY

In the study reported here, a five-item extension of the Tangel and Blachman (1992) task was used to determine: 1) how children would represent their understanding of the written word when combined with number, and 2) earlier developmental progressions beginning at age 3. Specifically, children were asked to write the following; *one cat, two horses, Mommy has four keys, Daddy has three hockey sticks, [child's name] is [age] years old*. This task reveals at which point children begin to understand that print is not a representation of the object itself, as we alluded to in our description of the history of writing, but rather the sounds that represent the objects. For example, younger children (3 and 4 years) typically draw figures that represent the number of objects in the phrase – "one cat" is represented by one mark on the page, either a drawing or a letter-like form, suggesting that the child is encoding the object, not the word. "Daddy has three hockey sticks" is typically represented by three marks on the page (occasionally four objects, when the child includes "Daddy"). Older 4 year olds often include both pictorial and numerical representations of the numbers in their responses; for example, "D" for Daddy, "3" for three, and then drawings of three hockey sticks. This finding at the 4-year-old level appears consistent; children typically are redundant in recording the quantity both in the numeral and again in the drawing. We conclude that these children are in "transition" from understanding print in emblematic form to understanding print in linguistic form, that is, as a representation of sounds (Olson, 1996; Olson & Pelletier, 2002).

7.1 Participants

Participants in this study include 40 children from 2 cohorts that both began in Nursery School one year apart. There were 19 girls and 21 boys who were followed longitudinally. The children were all students at the Institute of Child Study Laboratory School at the University of Toronto. All children in the designated grades were included in the study. Children were 3 years of age at the beginning of the study when they were in Nursery School, and were 6 years old at the end of the study when they were in Grade 1. Nursery School is a half-day program for 3-year-olds;

Junior Kindergarten is a full-day program for 4-year-olds; Senior Kindergarten is a full-day program for 5-year-olds; Grade 1 is a full-day first grade program for 6-year-olds. The Laboratory School serves predominantly white English-speaking children; however, approximately 30% of the children are from visible minority groups. Tuition at the Laboratory School is subsidized; thus family income is representative of a middle-class population.

7.2 Design and procedures

The study employed a longitudinal design. The same children were followed over four years (from age 3 to age 6) and were given the print task each year. The print task consisted of two parts: the Developmental Spelling Task (Tangel & Blachman, 1992), designated as Part 1, and the Number and Word Task (Pelletier, 2002a; 2002b), designated as Part 2. In Grade 1, children were also given a standardized reading test, a standardized test of phonological awareness, and a standardized vocabulary test.

Both the first cohort (Year 1, *n*=22) and the second cohort (Year 2, *n*=18) of children were tested four times, that is, each year during the spring term. In Nursery School, Junior Kindergarten, and Senior Kindergarten the children were given the combined Print Task. In Grade 1 all children received the Print Task, the Woodcock Reading Mastery Word Identification subtest, the Woodcock Reading Mastery Word Attack subtest, the Peabody Picture Vocabulary Test, and the Rosner Test of Auditory Analysis (see Measures). The order of these tests varied at the discretion of the test administrator based on the child's comfort and attention level. Students were interviewed in a quiet location, near the classroom. Nursery, Junior Kindergarten, and Senior Kindergarten procedures generally took 20 minutes to complete. The longer Grade 1 procedures generally took 45 minutes to complete.

7.3 Measures

1) Print Task Parts 1 and 2 was comprised of two writing measures, described earlier, for a total of 10 items:

a) Developmental Spelling Task (Part 1) – This task was developed in order to measure children's understanding of print by asking them to write five words that were read orally to them (Tangel & Blachman, 1992). Children were given a booklet and a marker and were asked to write a different word on each page: *lap, sick, elephant, pretty, train*.

b) Number and Word Task (Part 2) – This tasks consists of five sentences combining words and numbers that the children are asked to write. This task was designed to examine how children develop an understanding of letter and number combinations in print (Pelletier, 2002a; Pelletier & Lasenby, 2003) and consisted of the following; *'one cat', 'two horses', 'Mommy has 4 keys', 'Daddy has 3 hockey sticks', '____ (child's name) is ____ years old'*.

If children represented the number (either by words or pictures) a score of 1 was given. Responses were scored according to both category of response (e.g., scrib-

bling), and level (e.g., does not look like letters). The details of the categories and levels are described below. The term "Print Task" is used to denote both Part 1 (Tangel & Blachman's Developmental Spelling Task) and Part 2 (Number and Word Task, Pelletier, 2002a; Pelletier & Lasenby, 2003).

2) Woodcock Reading Mastery Test (Woodcock, 1998) – This standardized test is designed to provide a measure of children's overall reading ability in English. The participants were all administered two subtests of this measure, Word Attack and Word Identification. The Word Attack subtest is designed to measure word-decoding abilities. In this task, children are asked to 'read' a list of increasingly difficult nonsense words. The Word Identification subtest measures sight word efficiency. Children are asked to read a list of increasingly difficult common words.

3) Rosner Test of Auditory Analysis Skills (TAAS) (Rosner, 1975) – This test was designed to measure children's English language phonological awareness through a phoneme deletion task. Children are asked to say a common word then repeat the word, deleting a single phoneme (e.g., "Say meat. Now say it again, but don't say the 'm' sound").

4) Peabody Picture Vocabulary Test III Revised (Dunn & Dunn, 1997) – This test is designed to measure children's receptive oral vocabulary by presenting children with a set of four pictures and requesting that they point to the picture that best represents the word the experimenter reads. In this study this task was used as a measure of oral vocabulary as a skill that is not normally targeted by instruction, and may be associated with general intelligence.

7.4 Coding

Print Task Part 1 (*lap, sick, elephant, pretty, train*): A coding scheme was developed to score the first part of the task. This part was derived from Tangel and Blachman's Developmental Spelling Task (1992) containing work on phonological awareness in Kindergarten children's invented spelling. Therefore, part of the coding scheme was derived from Tangel and Blachman's (1992) research, and part was also derived from Shatil, Share and Levin's (2000) work examining the contribution of Kindergarten writing to Grade 1 literacy in Hebrew. Both Tangel and Blachman (1992) and Shatil, Share and Levin (2000) examined writing progression in children older than Senior Kindergarten (5 years); therefore their scales started at a relatively sophisticated level of literacy understanding. Previous work likewise has gaps in tracking how the earlier developmental progression of writing may predict later literacy skills. We administered this task to children in Nursery school (3 years) and therefore lower levels in scoring were added to take into account the responses that these young children would produce. As well, the current coding scheme contains more levels in the 'phonologically related' category in order to gather a more discrete understanding of the exact processes that occur at this stage. The coding scheme used for the current research consisted of 11 levels within 6 categories. Scores are recorded in an ordinal scale, and the entire coding scheme is presented below.

Print Task Coding Scheme Part 1
(modified scoring of Tangel & Blachman's Developmental Spelling Task)

Category	Level	Description
1: Pre-drawing	0 No attempt	Refuses or is unable.
	1 Scribbling	Random marks, round or straight marks.
2: Drawing	2 Drawings	A drawing of something, but does not look like the object the word represents. Nothing that looks like a word.
	3 Drawings	Drawing that resembles the object the word represents.
3: Pre-writing attempts	4 Scribbling	Lines that resemble writing/script.
	5 Letter-like forms	Marks on the page resemble letters but are not clearly identifiable.
4: Letter Use	6 Letter use	Not the correct letters; Not in the correct order; May include other markings on the page.
5: Phonological Attempts	7 Letter use	First letter in the word is correct; Other letters may be incorrect or random.
	8 Consonant use only	Representative of the split in sounds/syllables; e.g., LF/LFN = elephant, PT = pretty, SC(K) = sick, TN = train, LP = lap.
	9 Phonologically related	Some letters are phonologically related to actual letters; Word is still largely unreadable; More than one letter may be correct; Word will likely be missing a sound, e.g.,'tane' (train without a marker for the 'r' sound).
	10 Phonologically related	All the letters in the word are phonologically related to the actual letters; All the sounds of the words are present; Readable even though it is not spelled correctly, e.g., trane.
6: Correct spelling	11 Correct spelling	

Print Task Coding Scheme Part 2 (Pelletier, 2002a, Number and Word Task) (*1 cat, 2 horses, Mommy has 4 keys, Daddy has 3 hockey sticks, [Child's name] is [age] years old*): The coding scheme was modified to systematically code the portion of the Print Task that required the child to combine words with numbers. This coding scheme was designed to track developmental changes in children's understanding of early print and number. It consisted of 12 levels within 6 categories. It is essentially the same scheme as that used for the first part of the task with a few additions to the fifth category to allow for phonological representation of more than one word. Scores are recorded in an ordinal scale, and the entire coding scheme is presented below.

Children's responses were scored by category (1-6) and by level. A score of 1 was added if the child correctly identified the quantity in Part 2. Level scores were used in the analyses.

Analyses were carried out separately for Part 1 and Part 2 and for the Print Task combined.

Print Task Coding Scheme Part 2: Number and Word
(modified scoring of Tangel & Blachman's Developmental Spelling

Category	Level	Description
Code first	0 = Number is not represented or is incorrect 1 = Number is represented correctly	Can be written, a numerical representation, or pictorial representation
1: Pre-Drawing	0 = No attempt	
	1 = Scribbling	Random marks, round or straight marks.
2: Drawing	2 = Drawings	A drawing of something that does not look like the object the word represents; nothing that looks like a word.
	3 = Drawings	A drawing that resembles the object the word represents, not all words represented.
3: Pre-writing attempts	4 = Scribbling/lines that resemble writing/script	
	5 = Letter-like forms	Marks on the page that resemble letters but are not identifiable
4: Letter Use	6 = Letter Use	Not the correct letters; not in the correct order; may include other markings on the page
5: Phonological Attempts	7 = First letter in some words is correct 8 = First letter in all words is correct 9 = Consonant use	
	10 = Phonologically related	Some letters are phonologically related to the actual letters Most of the words not readable Some words may be correct (e.g., name)
	11 = Phonologically related	Can read all words Some may be correct
6: Correct spelling	12 = All words are spelled correctly	

7.5 Results

To begin, we wanted to assess the extent to which the two parts of the print task (the Developmental Spelling Task and the Number and Word Task) measured the same construct, i.e., children's developing theories about print. Overall there was very little dispersion in the scores for individual items within each grade level (i.e., differences in standard deviation were generally small) and the means were also fairly similar for each item within each grade. There were some exceptions to this as particular items became easier for children in Senior Kindergarten and Grade 1 (see

Appendix A for descriptive statistics). Reliability analyses indicated that Part 1, Part 2 and the entire print task combined were internally consistent and were all likely to be measuring a similar construct at the Nursery, Junior Kindergarten, and Senior Kindergarten levels. However, these analyses indicated a lack of internal consistency at the Grade 1 level. This is likely due to these children reaching a ceiling on this measure; therefore there is very little variation in scores. Based upon these analyses it is reasonable to generate a sum score for both parts of the task as well as an aggregate score for the entire measure in all grade levels except for Grade 1.

Comparisons of means for the total print score showed consistent and predictable developmental differences. The highest score that could be achieved for one item was 11 for Part 1 and 12 for Part 2). There were 5 items altogether for Part 1 and 5 for Part 2, for a highest score of 55 for Part 1 and 60 for Part 2, or a highest total score of 115. A one-way Analysis of Variance revealed no significant gender differences at any grade level; gender was not included in further analyses. Figure 1 shows the total print scores for girls and boys in Nursery, Junior Kindergarten, Senior Kindergarten and Grade 1.

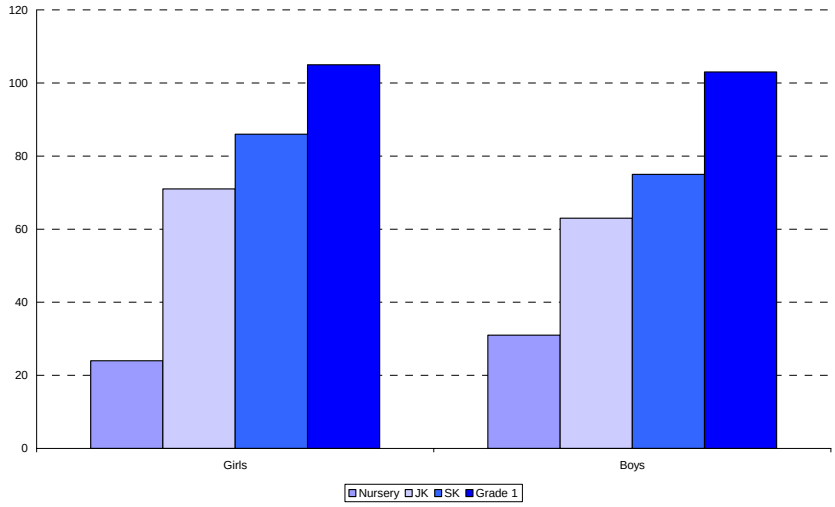

Figure 1: Print total mean scores, Nursery to Grade 1.

Correlations were carried out to examine individual differences in children's invented spelling performance as measured by the total print task score over the four years of the study. Table 1 presents means and standard deviations at each grade level. Nursery School performance was not correlated with performance at other levels. However, performance in Junior Kindergarten was highly correlated with performance in Senior Kindergarten (r=.65, p<.001) and in Grade 1 (r=.57, p<.001). Similarly performance in SK was highly correlated with performance in Grade 1 (r=.58, p<.001).

Table 1. Means and standard deviations on total print task performance

Grade	*Mean*	*Standard Deviation*
Nursery	26.87	14.02
Junior Kindergarten	66.35	15.03
Senior Kindergarten	86.03	15.17
Grade 1	105.68	6.05

The next analyses examined the extent to which the early print task administered in Nursery school, Junior Kindergarten, and Senior Kindergarten predicted Grade 1 reading. To answer this, separate regression analyses were run on the print total score at each grade level with each of the reading assessments administered in Grade 1.

A stepwise linear regression analysis was conducted on Grade 1 sight word efficiency. The Woodcock Reading Mastery Word Identification raw score was the dependent variable. The total print score in Senior Kindergarten and Grade 1 predicted a significant amount of the variance in Grade 1 sight word efficiency (see Table 2).

Table 2: Regression analysis of print task on WRMT Word Identification in Grade 1

Predictor	*R Squared*	*Significance*
Print Total SK	.415	$p < .005$
Print Total Gr 1	.214	$p < .05$

A stepwise linear regression analysis was conducted on Grade 1 decoding skills. The Woodcock Reading Mastery Word Attack raw score was the dependent variable. The total Print Task score in SK and Grade 1 predicted decoding in Grade 1 (see Table 4). Interestingly, Part 2 of the print task (number and word) in Nursery also predicted performance on the Word Attack subtest four years later (R Squared = .21, $p < .05$). However Part 2 did not predict independently in the other grade levels (see Table 3).

A stepwise linear regression analysis was conducted on the factor of Grade 1 auditory analysis. The score on the Rosner Test of Auditory Analysis Skills was the dependent variable. Only Total Print score in Grade 1 predicted Grade 1 auditory analysis ($R^2 = .410$, $p < .001$).

Table 3: Regression analysis of print task on WRMT Word Attack in Grade 1

Predictor	*R Squared*	*Significance*
Print Total SK	.375	$p < .005$
Print Total Gr 1	.401	$p < .05$

7.6 Descriptive Results

The most interesting findings of the study were descriptive, that is, the ways in which children employed their "clever misconceptions" (Pelletier, 2002a) to make meaning. According to Harris (1986) and Olson (1996), writing moves from emblematic to linguistic representation, that is, from print as representing objects or emblems to print as representing words or sounds. Three-year-olds typically used random marks such as lines or scribbles to depict either words or numbers. For example, to write "Daddy has three hockey sticks," 3-year-olds might draw three lines. Was this meant to represent three "objects" such as hockey sticks? Typically, 4-year-olds would draw one circle or "D", a numeral "3" and three lines. It appeared that 4-year-olds were *beginning* to use a linguistic code to convey "Daddy" but simultaneously used an emblematic code to convey "hockey sticks," suggesting a stage of transition in their writing. Their use of both the numeral and the correct number of drawings suggests a redundancy, a desire to ensure that the message is conveyed. As they begin to understand that the numeral represents the quantity and the word (or drawing) represents the object, they are able to resist this tendency toward redundancy. By age 5 and 6 years, children increasingly employ the linguistic or alphabetic system exclusively and understand that the number or quantity may be represented in the written word or in the numeral. While 5-year-olds often attempted to write using a linguistic code, their limited knowledge of letter-sound correspondence limited their ability to use strings of correct letters. When unsure of what letter to use, many children opted to use the letters in their name, a phenomenon reported elsewhere (e.g., Bloodgood, 1999; Tolchinsky-Landsmann & Levin, 1987). By age 6 years, most children wrote out the word rather than employed the numeral and spelling became increasingly correct or closely phonologically related. See Appendix B for examples of this transition from emblematic to linguistic writing in children's production of "Daddy has three hockey sticks".

8. DISCUSSION

This paper addresses transitions in young English L1 children's early writing by following two cohorts of 40 children from age 3 years when they were in Nursery School to age 6 years when they were in Grade 1.

Descriptive results showed characteristic features of children's early writing at each of the four grade levels. In Nursery School the most typical response across

items was random scribbling that frequently indicated the appropriate number of items (e.g., two scribbles for two horses); in Junior Kindergarten the most common response was a combination of letter use with number represented in both the numeral and in the number of "words"; in Senior Kindergarten the most common response was use of phonological cues exclusively and often the correct numeral, although when unsure of which letter to use, children often used the letters in their names; in Grade 1 the most common response was based on phonological cues with a mix of correct and close approximations of correct spellings as well as the correct numeral. The descriptive results were interpreted within a framework put forth by Harris (1986) and Olson (1996) (see also Olson & Pelletier, 2002; Pelletier, 2002a). This framework considers that early writing in the time of the ancient Sumerians moved from emblematic to linguistic representation. This move was necessary in order to reduce the arduousness of inscribing tablets with multiple iterations of the same object such as "one hundred cows." Learning to use one symbol for number (100) and one symbol for the object (cow) meant that recording possessions or communicating messages became significantly less laborious. It is fascinating to consider that the natural evolution seen in ancient writing is paralleled in the evolution of L1 English children's writing, as they move from emblematic to linguistic representation of words.

Beyond entertaining the fascinating proposition that children's writing development recapitulates ontogenetic patterns, this paper also addressed psychometric properties of a task that could 1) reliably measure developmental differences in children's writing and 2) predict later performance in reading. It was found that the coding scheme for Part 2 that included the representation of number (Pelletier, 2002a; Pelletier & Lasenby, 2003) and for the entire print task as a whole, revealed systematic change in children's understanding of print at different ages. Significant developmental differences were observed on Part 1, Part 2, and total print performance across grades. Therefore, it is assumed that the coding scheme developed for this study effectively maps the development of early writing. Scores increased significantly by grade. If success on this task depends heavily on phonological awareness, then these findings are consistent with research that indicates that phonological awareness begins to develop rapidly prior to school entry and may reach ceiling by Grade 1.

For Nursery School students, only Part 2 of the print task differentiated later literacy development in predicting children's later performance on the word attack skills in Grade 1. This lack of more predictability from Nursery School is likely due to the general lack of variability in these 3-year-olds' responses. In Senior Kindergarten, the total print score predicted a significant amount of the variance in the Grade 1 Word Attack and Word Identification tasks. This replicates the results of Shatil, Share and Levin (2000) from their study in Hebrew and adds the finding that children learning both vowels and consonants in English are able to convey their growing understanding by writing.

A potential limitation of this study is number and socioeconomic composition of the participants. Participant children were generally middle class and attended a university laboratory school that charges partial tuition for attendance. If a more heterogeneous population had been used for this research the predictions from the writ-

ing may have been even stronger, as there would have been more variability in children's responses. However, there are noted benefits to a relatively homogeneous population. Literacy success has been shown to be influenced by 'home literacy' factors such as parental education, amount of time spent reading with children, exposure to literacy, etc. (Alexander & Entwisle, 1988; Bus, van Ijzendoorn, & Pellegrini, 1995; Morrison, Griffith & Williamson, 1993; Scarborough & Dobrich, 1994). Home literacy factors varied less in this population than they would in a more diverse population. This more homogeneous population meant that possibility of random error was reduced; however the possibility for systematic error may be increased. In this case, achievement scores may be significantly higher than the general population, and developmental and achievement markers are likely found at younger ages than in the general population.

There were two cohorts of children who had different teachers in Grade 1. In order to determine if a significant difference existed between the two cohorts of children at Grade 1, a simple comparison of means was conducted. Vocabulary (PPVT-III) scores for both groups were compared. As noted by Biemiller (1999), vocabulary, as measured by instruments such as the PPVT-III, is generally *not* affected by instruction: "Current school practices typically have little effect on oral language development during the primary years" (Biemiller, 1999, p. 1). Similarly, Cantalini (1987) found no evidence of any instructional effect on receptive oral vocabulary (PPVT-III). As a result, significant differences in PPVT-III scores would normally be attributed to within-student factors, rather than to instructional effects. In the current study, PPVT-III scores were somewhat higher for 'Cohort 1' students. This finding suggests that any differences between the two groups in achievement scores may be a result of a simple cohort effect, rather than teacher effects. In fact, although mean scores on the print task were somewhat higher for Cohort 1, analyses of variance confirmed that these differences were not statistically significant.

Research in the area of reading has established that phonological awareness is a strong, stable predictor of later reading ability. It is also well established that invented spelling is largely a test of phonological awareness. However, there are other factors that contribute to successful invented spelling other than phonological awareness. Some of these factors include alphabet knowledge, fine motor abilities, directionality and orthographic knowledge. It is clear that phonological awareness accounts for a significant amount of the variance in invented spelling; however it is not clear whether other factors also contribute a significant amount of the variance. Future research needs to examine this by conducting a longitudinal study investigating the relative contribution of the other components involved in invented spelling to Grade 1 reading skills.

9. IMPLICATIONS OF THIS RESEARCH

It is important for educators to have an understanding of developmental markers that characterize children's early literacy development. This study provides educators with a reliable measure of invented spelling that taps into alphabet knowledge and phonological awareness. The print task can be administered easily and scored rela-

tively quickly in order to determine the developmental level at which individual children understand print, and this information can be used to determine if the child is performing similarly to other children his/her age. This task is also useful for general programming purposes. It provides teachers with discrete developmental levels of print understanding through which 'typical' children proceed. Therefore, educators can program their literacy instruction to match children's theories and skills. The task was found to be predictive of Grade 1 literacy skills which illustrates the importance of the development of early invented spelling to successful reading development. Many children experience difficulty learning how to read, and often these difficulties are discovered after the child has struggled for a number of years and has fallen behind and grown frustrated with reading. If it is possible for measures such as the print task to serve as a means for assessing children's early understandings of print, they may be remediated early, thereby facilitating children's readiness for more formal reading instruction.

We view the use of this print task (which includes Tangel & Blachman's Developmental Spelling Task) in a context of a literacy-rich early childhood classroom where children are encouraged to experiment with writing. Children's spontaneous writing samples may be used as ongoing documentation of literacy growth (for example, in literacy portfolios). Use of this task in one-on-one interactions with children during free play activities or during more structured follow-up to instruction, will provide teachers with useful information about children's developing understanding of print and readiness for book reading at appropriate developmental levels.

Currently Part 2 of the print task is being used with groups of preschool and Kindergarten children from close to a dozen language groups, including Chinese, Vietnamese, Urdu, Punjabi, Hindi, Gujarati, Tamil, Arabic, French and several Eastern European languages (Zhang & Pelletier, 2005). One question we have pertains to the influence of the script itself, that is, alphabetic or pictographic, on children's developing understanding and use of print for communicative purpose. In addition, it will be of interest to compare these children's drawings with their early writing development to assess similarities and differences in these different communicative media. These studies will further help to track the early pathways to literacy.

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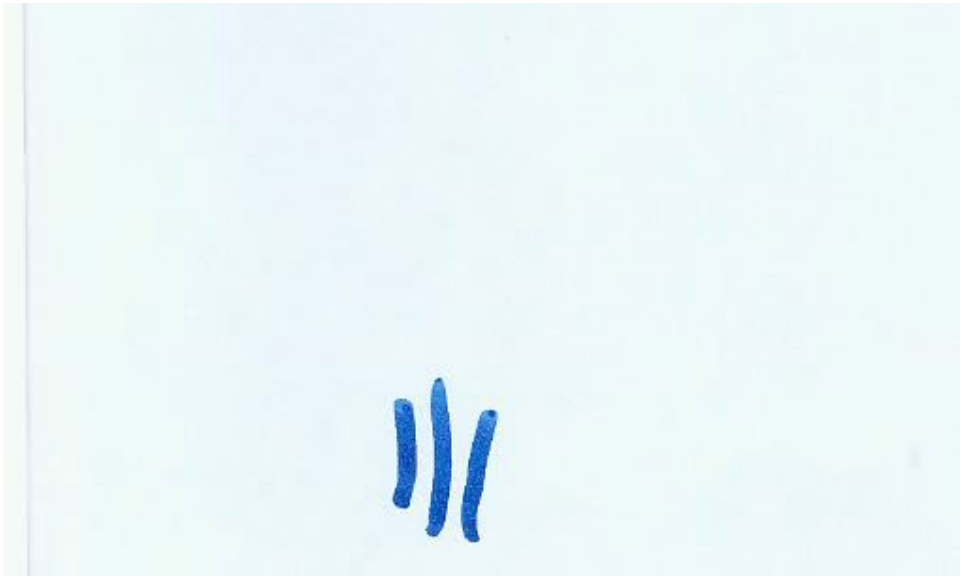
APPENDIX A: DESCRIPTIVE STATISTICS

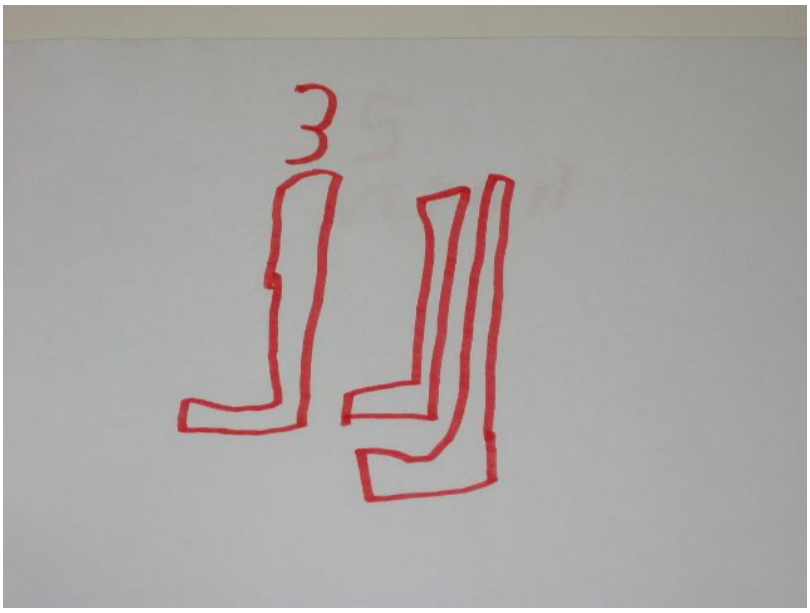
	N	*Range*	*Minimum*	*Maximum*	*Mean*	*Std. Dev.*
Part One of the Early Writing Task; Nursery School						
Lap	24	4.00	1.00	5.00	2.63	1.71
Sick	24	5.00	1.00	6.00	2.79	1.77
Elephant	24	6.00	.00	6.00	2.91	1.69
Pretty	24	6.00	.00	6.00	2.54	1.69
Train	24	6.00	.00	6.00	2.67	1.74
Part Two of the Early Writing Task; Nursery School						
Cat	24	5.00	1.00	6.00	2.63	1.64
Horse	24	6.00	1.00	7.00	2.83	1.69
Mom keys	24	6.00	.00	6.00	2.38	1.64
Dad hockey	24	6.00	.00	6.00	2.42	1.69
Old	24	9.00	1.00	10.00	3.08	2.32
Part One of the Early Writing Task; Junior Kindergarten						
Lap	34	10.00	1.00	11.00	6.65	1.89
Sick	34	5.00	4.00	9.00	6.15	.99
Elephant	34	7.00	2.00	9.00	6.50	1.48
Pretty	34	9.00	.00	9.00	6.35	2.03
Train	34	7.00	2.00	9.00	6.29	1.40
Part Two of the Early Writing Task; Junior Kindergarten						
Cat	34	12.00	1.00	13.00	7.82	3.42
Horse	34	10.00	1.00	11.00	6.12	2.09
Mom keys	34	9.00	2.00	11.00	6.44	1.84
Dad hockey	34	9.00	2.00	11.00	6.44	1.85
Old	34	10.00	1.00	11.00	7.56	2.15
Part One of the Early Writing Task; Senior Kindergarten						
Lap	36	6.00	5.00	11.00	9.50	2.04
Sick	36	4.00	6.00	10.00	8.28	1.20
Elephant	36	4.00	6.00	10.00	8.06	1.33
Pretty	36	5.00	6.00	11.00	8.33	1.24
Train	36	5.00	6.00	11.00	7.89	1.32
Part Two of the Early Writing Task; Senior Kindergarten						
Cat	36	13.00	.00	13.00	10.28	3.40
Horse	36	13.00	.00	13.00	8.28	2.72
Mom keys	36	12.00	.00	12.00	8.56	2.45
Dad hockey	36	12.00	.00	12.00	8.25	2.60
Old	36	9.00	3.00	12.00	8.61	1.89
Part One of the Early Writing Task; Grade One						
Lap	40	.00	11.00	11.00	11.00	.00
Sick	40	3.00	8.00	11.00	10.20	.82
Elephant	40	2.00	9.00	11.00	9.45	.60

Pretty	40	5.00	6.00	11.00	9.55	.88
Train	40	5.00	6.00	11.00	9.35	1.03
	Part Two of the Early Writing Task; Grade One					
Cat	40	1.00	12.00	13.00	12.53	.51
Horse	40	10.00	3.00	13.00	10.88	1.79
Mom keys	40	6.00	7.00	13.00	10.98	1.31
Dad hockey	40	10.00	3.00	13.00	10.60	1.57
Old	40	7.00	6.00	13.00	11.15	1.31

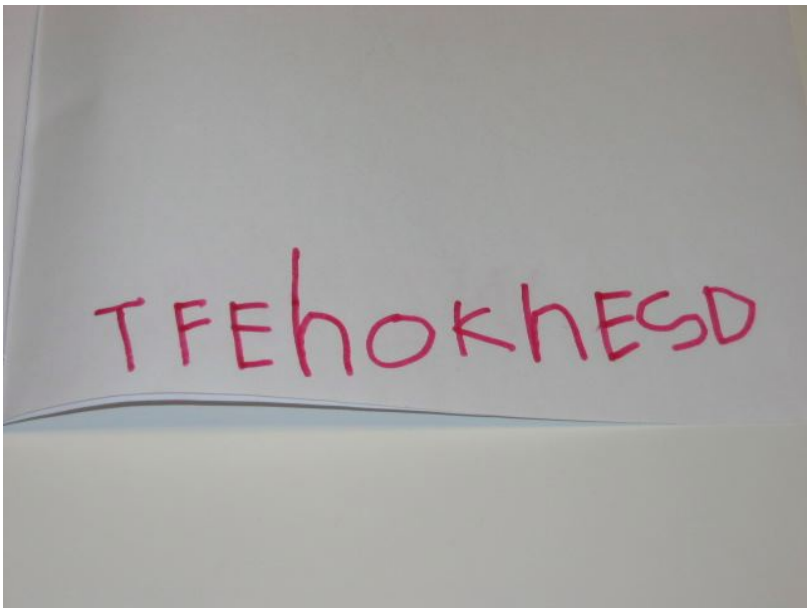
APPENDIX B: EXAMPLES OF EARLY WRITING
("DADDY HAS THREE HOCKEY STICKS")



3-year-old



4-year-old



5-year-old

6-year-old