

A Study of the Evolution of Handwriting from Grades Three to Six

Sandra L. Ramsey

B.A., Bureau of Alcohol, Tobacco and Firearms, 355 North Wiget Lane, Walnut Creek, California 94598

There are several complex factors that contribute to the uniqueness of one's writing. A research project was conducted to evaluate the validity of three long accepted premises of handwriting identification. Specimens of handwriting were obtained from one third grade class of students in the 1993–1994 school year, followed by additional handwriting specimens from these same students in grades four, five, and six. These writings were examined with regard to frequency of specific features, styles of writing, variation, and individuality. The findings support the premises of handwriting identification: (1) no one can write above their skill level; (2) no writer can write the same text exactly the same way twice; and (3) no two writers write exactly alike.

The examination of handwriting is the most common aspect of the forensic document examiner's work. Useful to the examination process is the knowledge of how one's handwriting develops from childhood through adulthood. Conway wrote: "In approaching the basis and method of handwriting identification, it is essential that some consideration be directed to the beginning and evolution of one's handwriting" (Conway, 1978). To assist in this endeavor, the examiner reviews the available research and possibly conducts independent research.

Handwriting Development

Handwriting awareness, which precedes actual handwriting development, evolves from scribbling (Lucas, 1993). Writing, known as encoding, incorporates motor and visual skills, thinking skills, and language experiences. Young children learning to write are also learning to listen, speak, read, and spell (Hackney, 1993). Research suggests that literary skills begin early and are ongoing, developing from environmental factors (Lamme, 1984).

In the United States, when children enter kindergarten or first grade, they are introduced to manuscript writing. Currently, most educators agree that manuscript (also known as hand printing) is best for introducing cursive writing to children (Lamme, 1984).

Generally, students begin to learn cursive or script writing in the third grade (Ramsey, 1995). Various systems or styles of cursive writing have been taught through the years. Early document examiners placed great emphasis on national systems of writing. However, Hilton wrote: "The influence of the system of an individual's writing may serve as a fairly accurate gauge of . . . age. This influence must be interpreted loosely, since there is not a sharp line of demarcation when one system stopped and another was adopted" (Hilton, 1984).

Today, the method or methods teachers use to teach cursive writing appear so varied that it would be difficult indeed to identify a particular system of writing a young writer was taught (Morgan, 1985).

According to the 1988 *Steck-Vaughn Handwriting Teacher's Guide*, as "students build their handwriting skills, each of them will develop a unique style" (Martin, 1988) of writing. It is an accepted premise that each individual's handwriting is as unique as their fingerprints; i.e., no two writers write exactly alike. Although there are several complex factors that contribute to the uniqueness of one's writing, this research project was conducted to gain an understanding of the evolution of handwriting in the young and to evaluate the validity of accepted premises regarding handwriting identification. Also, specific questions were asked relating to the evolution of one's early learning of cursive writing.

1. When exactly does "bubble gum" or "baby doll" writing occur and is it exclusively a female trait?
2. Is the writing of young males less skilled than the writing of young females?
3. Is there a "comparative uniformity" (Osborne, 1946) in the writing of young school children that conforms to the alphabet copy being taught?
4. Can individuality be discerned in the handwriting of young cursive writers?
5. Are writing changes "numerous" and "pronounced" (Conway, 1978) as the student progresses through elementary grades?

Methods and Materials

For four years, specimens of handwriting were obtained from one class of students. To collect these specimens, permission was first obtained from the head of the school district, followed by the principal of the school, the teacher of the class, and then

written consent from the parents. The school parameters for agreeing to participate in the study were that no student could be identified and only one specimen of writing each year would be obtained.

Initially, 25 handwriting specimens were obtained from one third grade class in the 1992–1993 school year, the year the students were first learning to write cursive. Each student was given an identifying number from 1 through 25, and asked to write as much as they could of a paragraph of text, which was printed on a classroom wall board.

Do you ever think about your name? In the story "Blue-Wings-Flying," it was very important to find a name for the new baby. To "Blue-Wings-Flying" and his family, the name had a special meaning. Did you know that almost all names have a meaning? The meanings of some names seem hidden because they come from old words or words from another language.

The students used pencils and wrote on lined paper with one-half inch spacing between each line and a dashed center guide line. The cursive alphabet used by the teacher was from the *HBJ Handwriting Book 6* (Figure 1).

Dictated specimens of the same text were again taken from the students in school years 1993–1994, 1994–1995, and 1995–1996. As expected, each year yielded fewer specimens due to moving and transferring of some of the students. In the final 1995–1996 year, after which the students would be promoted to one of three middle schools, 14 of the original students remained to give writing samples. These students are identified as: #3, #4, #7, #9, #10, #11, #13, #15, #16, #17, #18, #19, #21, and #24. The findings of this research project will focus on them.

Of the 14 student participants who completed four years of writing samples, nine were male and five were female. The first samples were collected when the students were 7, 8, or 9 years of age. Most of the participants were right-handed. One male (#24) and one female (#17) were left-handed.

Related studies

In recent years, three studies have been conducted by forensic document examiners involving the handwriting of young school children and/or adolescents. In 1987, Masson obtained handwriting samples from 171 writers between the ages of 13 and 19 (Masson, 1987). The writing samples were rated according to

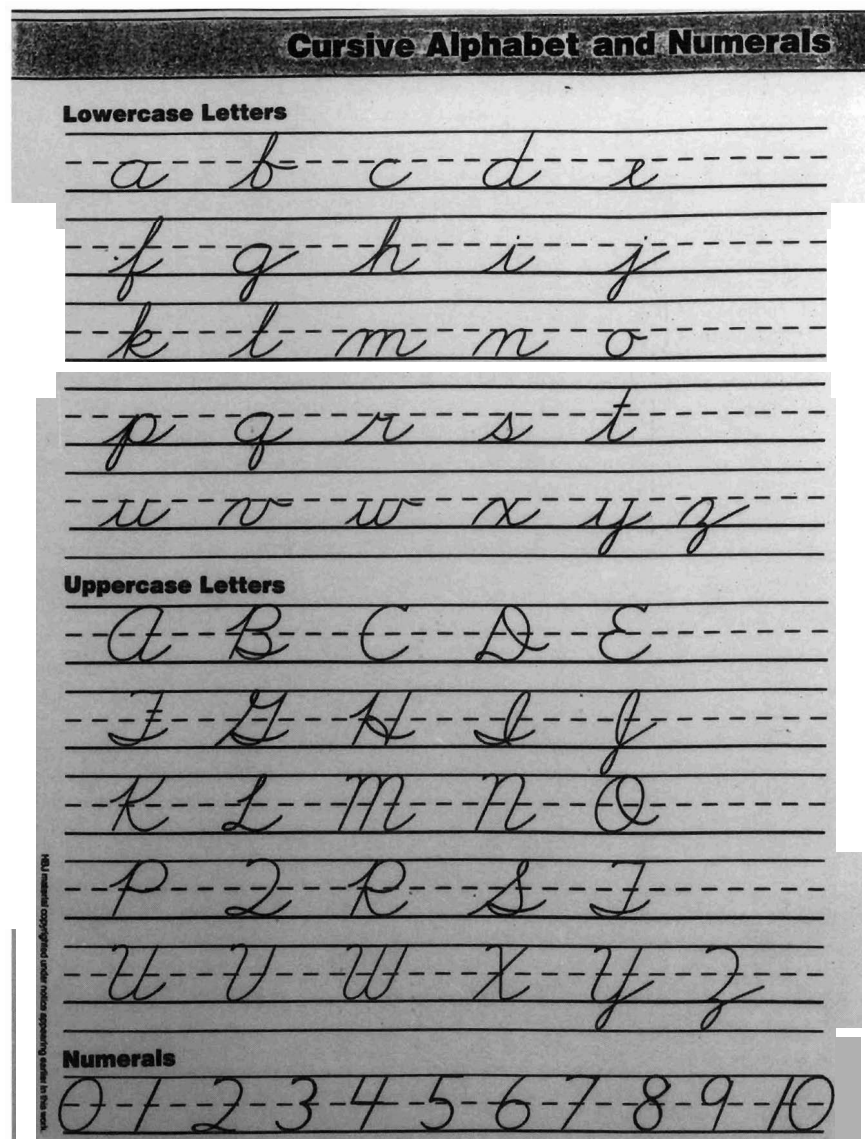


Figure 1. Example of cursive alphabet.

size, slant, and angularity. The samples were then examined for the presence or absence of specific features.

1. Use of "8" made with two separate circles.
2. Use of circle "i" dot.
3. Use of circles for punctuation.
4. Extra beginning strokes on letters "n" or "m."
5. Unusually short staff on the letter "d."
6. Making lower-case letters almost as tall as upper-case letters.
7. Use of the printed form of lower-case letter "b" within words containing cursive letter forms.
8. Combined use of printed letter forms with cursive letter forms.
9. All hand printing rather than cursive writing.
10. Unusual amount of variation in the writing.

Masson found "a great deal of variety" in the handwriting samples, and that "almost every unusual letter formation found in the writing of one person was also found in the writing of at least one other person." Probably the most significant aspect of this study was the discussion and definition of the "rounded" style of writing, which was classified further as "classic rounded" and "modified rounded."

Rounded style of writing was described by Masson as, "large, upright (perpendicular to the baseline) and very rounded" with words "written compactly" and "letters often touching or overlapping." Masson reported that 40% of the female survey participants used either classic rounded or modified rounded style of writing. All of the classic rounded writers were female and 15 of the 18 modified rounded writers were female.

Following the Masson study was the Cusack and Hargett study in 1988 (Cusack and Hargett, 1987). In this study, handwriting samples were obtained from 150 students between the ages of 14 and 18. The first seven features outlined in the Masson study were also examined with the addition of two more features.

8. Failure to execute a connecting stroke between the letter "w" and the letter "r."
9. Use of rounded writing.

Similar to the Masson study, it was determined that all nine features "pervaded the writing of a significant number of adolescents" and that these "features are in essence class characteristics and have little value for identification purposes." In addition, the participants using the rounded style of writing were found to be all female.

The third study was conducted by Tolliver (1990). This study consisted of an examination of Tolliver's signature from age 6 through age 35 using basically the same criterion as used in the previous two studies. Again, there appeared to be an emphasis on the rounded style of writing and its particular features. Tolliver confirmed Hilton's 1963 statement: "In early maturity, a person's writing is developing its true individuality."

Cusack/Hargett and Tolliver used the term "round-hand" in place of "rounded" style of writing preferred by Masson. It should be noted "round-hand" does not refer to the American Round Hand system of writing, which was used between 1700 and 1840, or the Modified Round Hand system, which was used between 1840 and 1865 (Morgan, 1985). Although, the *American Heritage Dictionary* (1985) defines "round hand" as "a style of handwriting in which the letters are rounded and full rather than angular," for clarity, this researcher will use the term "round" writing.

Terms such as "bubble gum" and "baby doll" writing have been used by document examiners to describe round writing.

These terms denote a female writer or adolescent and will be abandoned in favor of the more appropriate term "round" writing.

Results and Discussion

Frequency of specific features

Using most of the list of features in the Masson study, a review was made of the four years of specimens from this study's participants. The number "8" was included in the writings of the participants when in the fifth and sixth grades. Of these specimens, only one contained the use of an "8" made with two separate circles. The writer, #26, was a sixth grade female.

Circle "i" dots were noted in the writing of two fifth graders, #11, a male, and #15, a female. The female continued the use of the circle "i" dot in the sixth grade.

More common was the use of the circle punctuation, which was first noted in the period of one third grade writer, #9. However, this male writer did not repeat the feature in subsequent writings. Three third grade writers used circle punctuation, #15 and #21, both females, and #11, a male. Writer #11 continued the use of circle punctuation in the fourth grade, writers #15 and #21 did not. Writer #16, a male, also began using the circle punctuation in the fourth grade. The use of solid (or filled in) circle punctuation was noted but was not included in these figures.

It was interesting to note that the writers who used an extra stroke at the beginning of an "n" or "m" were all male (#10, #11, #13, and #24). This feature was found in writer #11's third grade specimen and writer #13's fourth grade specimen. Writer #10 used this feature in grades five and six, while writer #24 continued its use in grades four through six.

The feature of lower-case letters that are almost as tall as upper-case letters was found in just one specimen. The writer, #15, was a fifth grade female.

Unusually short staff's on the letter "d" was a feature found in the writing of three females in the sixth grade, #15, #17, and #21. Writer #15 began its use in the fourth grade and continued through the sixth grade.

One writer, #10, was found to use the printed form of the lower-case letter "b." This male writer began using the feature in the fourth grade and continued with its use through the sixth grade.

The use of one or more printed letters was noted in one third grade student's writing, #9. This male used the printed upper-case "I" once. One fourth grade writer, #15, used the printed upper-case "D." Writer #10 used the printed upper-case letters "B," "F," "I," "T," and "W" in the fifth grade and the same upper-case printed letters, with the exception of "I," in the sixth grade. In addition, writer #10 used several lower-case printed letter forms in the sixth grade. Also in the sixth grade, #19 and #21 were found to have used a number of printed letter forms.

All of the participants in this study were asked to write in cursive; therefore, no specimens were completely hand printed.

Examination of the first eight features (Figure 2), originally identified by Masson, result in the conclusion that although these particular features are class characteristics and not uncommon, their frequency of use ranges from a low of 4.5% (with the use of the two circles for an "8" in the Masson study) to a high of 39% (with the use of the printed "b" in the Cusack/Hargett study). Disparity between surveys can be attributed to any number of factors: age of writer, amount of specimens in each survey, location, or other influences effecting the writer: physical, psychological, neurological, environmental, or behavioral (Sassoon, 1983). Of particular note is the lack of disparity between the percentages for the frequency use of the circle "i" dot: 14 %, 17 %, and 14 %, respectively, with an average of 15 %.

Style of writing

The ability to judge the sex of a writer based upon the style of writing was examined. Each specimen was categorized according to a style it most resembled: angular, round, vertical, or any combination of two. As in the Masson study, angular represented a style of writing with a definite right slant. Round style of writing referred to writings with very rounded letter forms. Vertical style of writing referred to nonround letter forms, which did not slant to the right or left and appeared vertically aligned. Consistent backward or left slanted writing was not observed in the writing of the research participants.

All five females in the study (Figure 3) eventually adopted the round style of writing. One female, #7, began with the round style of writing in the third grade. The remaining females adopted round writing in later grades. One male, #10, used a combination of round and vertical writing in the third grade and one male used round writing in the third and fourth grades, but abandoned this style of writing in the fifth and sixth grades.

The evidence is clear from this study and previous studies, round writing is predominately a female trait, although not an exclusive one. Its use can begin when

the writer first learns cursive writing in the third grade and can continue through adolescence into adulthood. The reasons are unclear why females are more likely to adopt the round style of writing.

One theory explains that as a young male matures, the size of his hands inhibit the finger, hand, wrist, or arm movements necessary to produce the round connected letters. However, no research material was found to support this physiological theory. According to Sassoon, a specialist in the remedial teaching of children and adults with handwriting problems, when a child first learns disconnected writing, round letters are easier. As the child begins to join the letters, perfectly round letters become more difficult to write. However, Sassoon did not attribute this difficulty to the sex of the writer (Sassoon, 1983).

Other theories proffered are that young male writers prefer the ease and speed associated with the angular style of writing and young female writers like to imitate the round style of writing used by friends, a family member, or a teacher. Masson observed "extra time, effort and attention were usually required to complete several pages of writing" in the "classic" round style. Perhaps the male writers do not want to take the time required to write the round style.

The explanation for this phenomenon might simply involve the personal preference of the writer, which has little to do with ease, speed, or the ability of the writer. It should be noted that not one female was found to use the vertical style of writing and that all study participants who used a combination of writing styles, did so in the third grade.

Now the question can be asked, "Is the young female writer a better writer than the young male?" First, beauty is in the eye of the beholder. With that said, this researcher found the female specimens neater and more pleasing to the eye. The male writings contained more erasures than the female writings. However, the female writings were not necessarily more skilled than the male writings. In fact, the third grade teacher of the study participants stated many of her male students were better writers than her female students (Ramsey, 1995). It is interesting to note Sassoon's caution: "(U)ntidy handwriting should not be equated with low intelligence; it often indicates a mind moving too quickly for the hand,

	MASSON Ages 13-19	CUSACK/HARGETT Ages 14-18+ (Averaged)	RAMSEY Ages 7-12
(1) 8	4.5%	26%	7%
(2) 9	14%	17%	14%
(3) 8.?	13%	27%	36%
(4) m, mm	4.5%	5%	29%
(5) d	18.5%	30%	7%
(6) eech	10.5%	6%	21%
(7) b	20.5%	39%	7%
(8) about	Not Evaluated	20%	36%

Figure 2. Indicates frequency of use for each specific feature. Disparity between surveys can be attributed to any number of factors: age, amount of specimens, location, or other writing influences effecting the writer: physical, psychological, neurological, environmental, or behavioral. Noteworthy is the lack of disparity between the percentages for use of the circle "i" dot.

SEX	ANGULAR	A-R COMBINATION	ROUND	R-V COMBINATION	VERTICAL
#3M	5, 6	3			4
#4M	3, 5, 6				4
#7F			3, 4, 5, 6		
#9M					3, 4, 5, 6
#10M	4, 5, 6			3	
#11M	3		4, 5, 6		
#13M	4, 5, 6				3
#16F	3, 4		5, 6		
#15F			4, 5, 6	3	
#17F(L)	3, 4, 5		6		
#18M	3, 4, 5, 6				
#19M	5, 6		3, 4		
#21F	4	3	5, 6		
#24M(L)		3			4, 5, 6

Figure 3. Indicates the style of writing used by each student participant and the grade the student was in at the time of the writing. Some students used a combination of Angular and Round (A-R) or Round and Vertical (R-V). No student was found to use a back slant (or left slant) writing style. All of the students using a combination style were in the third grade at the time.

although an inability to form letters may be the result of some form of retardation" (Sassoon, 1983).

Variation and individuality

Osborn wrote in 1910: "Only young school children write with comparative uniformity" adding that "even they do not learn to write *exactly* alike" (Osborne, 1946) Harrison seemed not to agree with Osborn when he wrote in 1958: "The departure from the copy book [sic] standard of perfection begins at the very outset of the learning process. . . . It might well be thought that at this early stage, the work of the class would present a substantial degree of uniformity, but experience shows that this is rarely the case" (Harrison, 1958).

A comparison was made between the writings of each individual research participant. Divergences from the workbook (or copybook) standard were apparent in the third grade specimens. Referencing just one letter, the standard "t" as shown in Figure 1 is made with an approach stroke beginning at the baseline and a short cross stroke above the center guide line. In the writing of the study participants, deviations of this standard "t" were found in the "t" crossings and approach strokes, which vary from writer to writer (Figures 4 and 5).

Almost half of the third graders crossed their "t" at the center line. One writer crossed his "t" slightly below the line and two writers neglected to consistently cross their "t." Approach strokes varied in length and starting points. If a writer crossed the "t" above the line, they generally did so each time. If the writer crossed the "t" at the line, they did so each time. If the writer hooked the approach stroke to the "t," they did so each time, and so on.

Borrowing from Harrison, the word "the" in Figure 4

and Figure 5 represents the often slight but perceptible variation found within a writer's set of writings and differences noted between writers (Harrison, 1958). The "th" combination at the beginning of a word was repeated seven times in the paragraph text used in this study (one "Th" was capitalized). Of 28 possible "th" combinations for each writer (totaling 392 combinations in the study), not one "th" was so much like another "th," that it could not be distinguished. Yet, within each writers set of writings, an internal consistency exists; i.e., variation.

Pictorially, one might argue the third grade specimens were written with "comparative uniformity" in the size of the lettering. However, upon close inspection, differences can be discerned even in this area. This study supports Harrison's view that basically, there is no uniformity in the early writing of young children. Individuality begins as soon as writing begins and can be discerned in the handwriting of early cursive writers.

In defense of Osborn, his view was probably correct for his time. Teachers of the Victorian age (1819-1901) and the first part of the 20th Century, taught children to write the same way with constant repetition. Over the last 40 years, no priority has been placed on the teaching of handwriting (Sassoon, 1983).

After the third grade, the variation or changes within each student participant's writing were often found to be gradual. Certain features or letter forms can be observed year after year. For example, writer #17 used a distinctive hooked approach stroke to the letter "t" in the third grade and continued this habit through to the sixth grade. After the third grade, writer #18 ceased looping the upstroke of the "h" and continued this practice through the sixth. Writer #10 preferred to lift his pen or hesitate between the "t" and "h" in all four years of writing. Of particular note was the rather unusual ex-

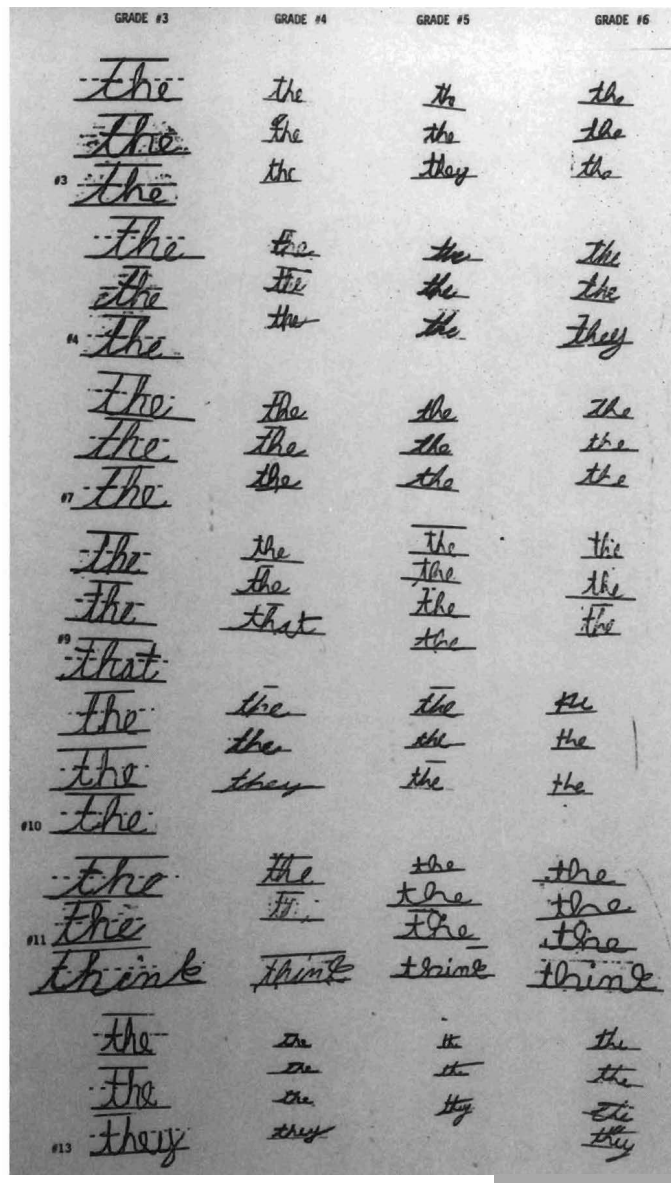


Figure 4. Example of execution of the letter "k" as observed in grade 3 through grade 6.

ecution of the letter "k" made by writer #11 each year (see Figure 4).

Size, spacing, spelling, height ratios, pen lifts, word placement, and indentations were other components found to be habits within a student's writing. These components can be used to differentiate between writers.

The findings in this study are in contrast with Conway's: "Writing changes are usually numerous and quite pronounced as the student writer progresses through elementary and high school" (Conway, 1978). Again, times have changed. The fine art of handwriting is not taught in schools today. One unanticipated consequence of the lack of priority placed on the instruction of handwriting is the individuality found in the writing of the young. Often, mistakes are not corrected and early writing habits appear to be retained year to year. Today, if handwrit-

ing specimens are contemporaneous and of sufficient amount and type, the document examiner can conduct examinations involving the writings of the young.

Conclusion

Frequency of specific handwriting features should be a consideration for future research. This study and previous studies, however, demonstrate the value of class characteristics when sorting writings and eliminating writers. One feature, the circle "i" dot, was found to occur in approximately 15 % of the writers in three separate studies involving students from age 7 through age 19—Masson, Cusack/Hargett, and Ramsey. These studies downplay the role of possible "individual" characteristics and emphasize the importance of individuality as a whole in the identification of handwriting.

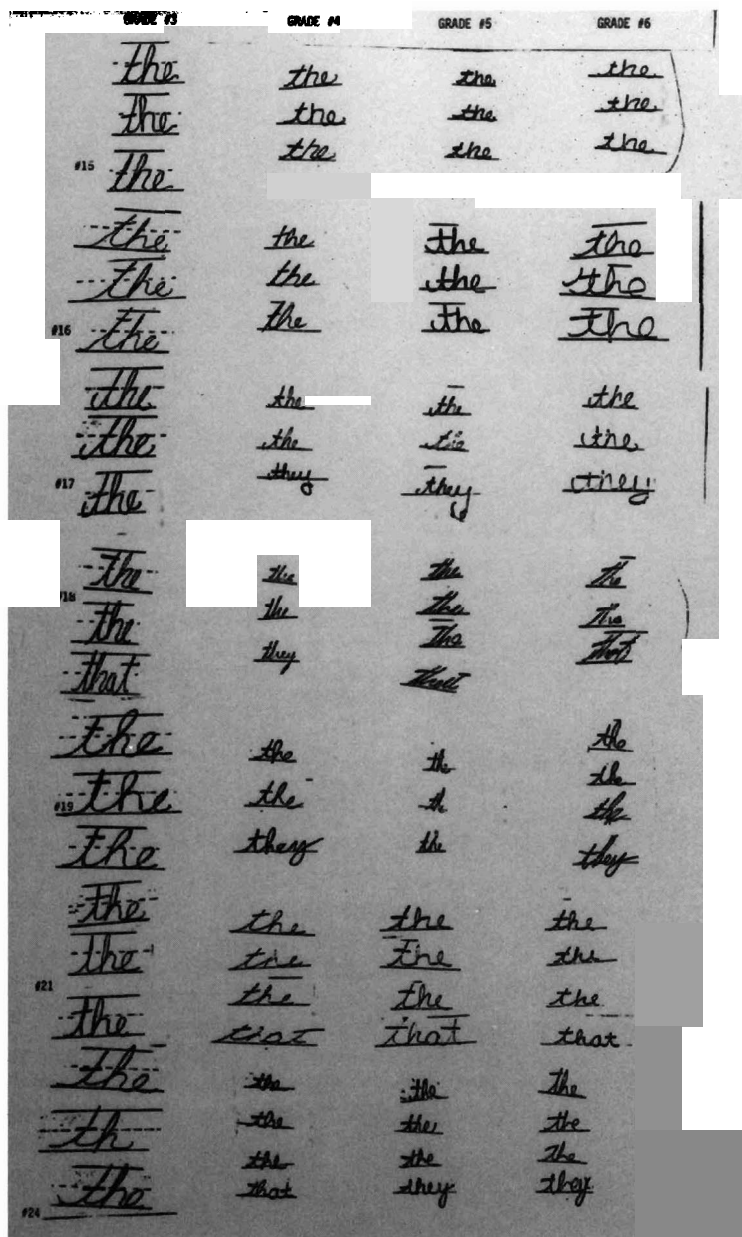


Figure 5. Example of execution of the letter combination "th" as observed in grade 3 through grade 6.

Evidence in this present study confirms previous studies involving the use of the round style of writing by mostly female writers. Although the use of the round style of writing is not exclusively female, it is an indicator of the writer's sex. Round writing can begin as early as the third grade, when a writer first learns to write cursive, and continue through adolescence into adulthood.

The writing of the female participants in this research project appeared more aesthetic than the male writing, but not necessarily more skilled. Male students did tend to erase more.

Individuality in writing can be discerned in the writing of the very young as evidenced by the third grade specimens. Examination of the same or similar words in one specimen revealed the slight but perceptible

changes known as variation between similar writings from the same individual. Examination of all the specimens revealed differences between the writings of each study participant. In addition, it was obvious that none of the students could write above their skill level at the time the specimens were taken. The evidence from this study supports the premises of document examination that: no one can write above their skill level; no writer can write the same text exactly the same way twice; and no two writers write exactly alike.

Finally, as a student progresses through elementary grades, writing changes are not necessarily "numerous" and "pronounced." The art of handwriting is no longer a priority in schools. The emphasis is on readability and content; therefore, practice is limited and mistakes are

often not corrected. This leads to the individuality now found in the writing of the very young.

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