It's all in the name : early writing: from imitating print to phonetic writing

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2 EARLY WRITING: SIMILARITIES BETWEEN WRITING AND DRAWING[1],[2]

Abstract

Do young children understand that written forms differ from drawing and that writing does not include iconic devices? Does the development of symbolic and phonetic writing stagnate as children use iconic devices? In addition to a dictation as a test of early writing we included writing with a purpose (making labels to memorize the content of boxes) as the latter task more so than a dictation may entice young children into adding iconic devices. Three age groups (3½-4, 4-4½, 4½-5) participated. Children below 4½ often included iconic devices in writing especially when writing was used as a mnemonic device. With age the number of iconic devices to denote meaning diminished but not completely. Even beyond 4½, when they had started to write symbolic, children continued to represent iconic devices for number and color suggesting that children apply different, contradictory strategies simultaneously.

[1] If quoting the research in this chapter, please refer to: Both-de Vries, A. C., & Bus, A. G. (2006). *Early writing: Similarities between writing and drawing.* Manuscript submitted for publication.

[2] Our thanks to Inge de Groot for her assistance in the data-collection.

Introduction

The literature is not unambiguous about young children's ability to differentiate between writing and drawing. Brenneman and colleagues (Brenneman, Massey, Machado, & Gelman, 1996) argued that implicit knowledge about the structure of language and about three-dimensional objects is either innately specified or emerges very early, therefore facilitating a distinction between writing and drawing from the very start of making scribbles that go beyond scratching. When children write they use a set of discrete, linearly ordered, and unidirectional markings, because these features reflect the temporal code of language. In contrast, children use bounded and filled-in areas for drawings because they reflect efficiently objects' edges and surfaces.

Others have taken the position that emergent writers do not make a strict distinction between drawing and writing features (Levin & Bus, 2003). Beyond the stage of mere scribbling, children indeed include qualities in their writing that are more typical of writing than of drawing such as: linearity, unidirectionality, a minimum number of different signs that appear in various orders, the presence of distinct units, regular blanks, and the small size of graphic symbols (Clay, 1973; Ferreiro & Teberosky, 1982; Ferreiro, Pontecorvo, & Zucchermaglio, 1996; Tolchinsky-Landsmann, 1988; Tolchinsky-Landsmann & Karmiloff–Smith, 1992). However, the production of written forms is merely the drawing of the two-dimensional object known as "print" resulting in procedural knowledge of writing. The more children are advanced in drawing objects, the more they are advanced in drawing "print," that is in producing writing-like forms (Levin & Bus, 2003).

Having some knowledge of the written form at their disposal but missing the notion that writing is a notational system dictation of words may place children in a dilemma particularly when writing is used as a mnemonic device (Levin & Bus, 2003). They may resort to representing print, producing forms that have features of writing but ignore meaning and that are similar to forms they mostly produce when words are dictated for writing. Alternatively, when it is emphasized that writing should denote meaning children may focus less on representing the two-dimensional object "print" and more on representing the referent's meaning. As a consequence they may resort to drawing thus neglecting features of writing of which they are aware (Sorsby & Martlew, 1994; Tolchinsky-Landsmann & Karmiloff-Smith, 1992). It is also suggested that children may solve the dilemma – to represent the meaning of the word or to represent "print" - creatively by confounding the two notational systems: conserving the features of writing and introducing drawing-like representations such as number of signs or color (Luria, 1929/1983). Attempts to replicate Luria's results suggest that addition of iconic hints is limited to a small selection of features such as number and color (Levin & Korat, 1993; Levin, Korat, & Amsterdammer, 1996; Levin & Tolchinsky, 1989; Tolchinsky Landsmann, 1988; Tolchinsky & Levin, 1985). When word pairs contrasting in color, number, size, and form were dictated, children between 5 and 6 years always represented number (with a repetitive pattern), to an increasing extent the typical color (e.g. sun in yellow), to a decreasing extent form (circles for 'ball'), and rarely represented size (e.g., baby bigger than mother). We wonder

whether children continue to create such hybrid forms including iconic and written devices well into the stage that they have started to explore phonetic writing and begin to represent letters phonetically. Such outcomes would suggest that children use different, contradictory hypotheses simultaneously and that regression to iconic devices does not stop the development of new, more advanced strategies (Byrne, 1996).

In this study we tested whether, in the early stages, communication through writing is typically driven by object-related iconic devices just as drawing. As long as children know how to draw the two-dimensional object "print" but have not yet perceived writing as a communicative device, the request to write a particular word elicits a dilemma: representing the meaning of the word or representing "print." This dilemma may be solved by drawing; resorting to object-related iconic devices neglecting features of writing of which they are aware or by creating hybrid forms. Designing this study we suspected that children would often ignore the request to represent a referent and would stick to producing writing-like forms even though they do not yet perceive writing as a communicative device resulting in outcomes that are hard to interpret. To reduce the chance that children simply ignore the request to represent the referent's meaning and stick to drawing "print," we created a task that emphasizes the function of writing. The task, making labels for boxes to memorize their content, implied writing as a mnemonic device.

Method

Participants

Participants were 96 Dutch 3½ - to 5-year-olds. Each of three age groups was composed of 32 children, 16 boys and 16 girls. The youngest group was aged between 41 and 47 months ($M = 43.9$, $SD = 1.8$), the middle between 48 and 54 months ($M = 51.6$, $SD = 1.7$), and the oldest between 55 and 61 months ($M = 57.2$, $SD = 1.6$). The youngest children were recruited from three playgroups and children 48 months and older from 4 schools (in the Netherlands kindergarten starts on the day the child becomes 4 years old). When the teacher suspected that a child was developmentally delayed, the child was excluded. All children were from middle to high socio-economic status families. Two of the children originally selected were not willing to cooperate. In those cases sessions were discontinued and another child of similar age and gender was selected to replace the child. For each child a complete set of data was collected because the experimenter returned to the playgroup or school in those cases where children had been absent. As in most Dutch kindergartens, formal teaching of reading or writing including instruction of letters was not part of the curriculum of the play groups and schools.

Design

Children wrote and drew 16 words and we tested if similar iconic devices appeared in both forms. To enable us to observe the representation of object-related iconic devices in writing we selected word pairs varying in form, size, number, and color. We divided the 16 words in two sets each composed of 8 comparable words.

Both sets included two words contrasting in color, size, number, and form. Set 1 included: liquorices – snow (*color*), rabbit – man (*size*), ball – book (*form*), and flower - three flowers (*number*). Set 2: tomato – sun (*color*), baby – mother (*size*), wheel – box (*form*), and tree - three trees (*number*).

To strengthen the dilemma - representing the meaning of the word or representing "print" – we created a task that emphasized the function of writing (to memorize the content of the boxes). We called this task the *labeling* task. The other set of words was dictated without any explanation of the function of making notes. This task was called the *dictation*.

Half of each age group (16 children) used set 1 for the dictation and set 2 for the labeling task and the other half (16 children) used set 2 for the dictation and set 1 for the labeling task. The order of tasks, starting with dictation or labeling, was counterbalanced. Within each age group half of the children wrote and drew words in succession (e.g., "write tomato," "draw tomato") while the other half used one mode within each session: they drew or wrote all words of a set (e.g., "write tomato," "write sun").

Procedure

Assessments were spread over 4 sessions of 20 minutes. During the sessions the examiner met each child individually in a separate room. In the 4 sessions each child drew and/or wrote 8 words per session, in all they produced 16 products of writing and 16 products of drawing. For each product we supplied a separate sheet of blank paper. There was a choice of marker pens in seven colors: red, blue, yellow, green, brown, black, and pink.

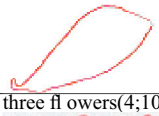
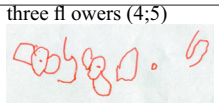
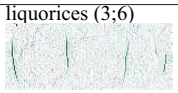
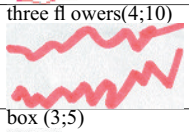
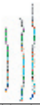
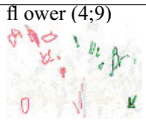
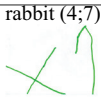
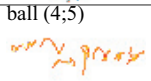
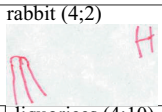
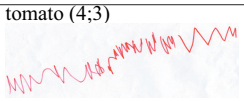
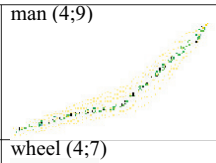
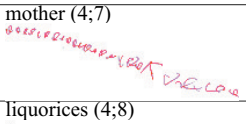
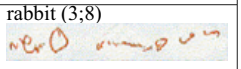
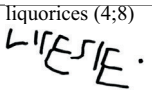
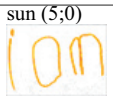
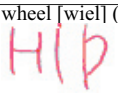
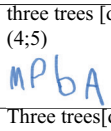
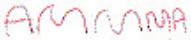
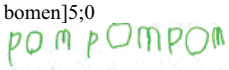
In the *dictation* the examiner asked the child to write or draw a word avoiding indefinite articles: "write/draw baby."

As an introduction to the *labeling task* the examiner wrapped up three objects, each in a separate box; for instance, a plastic tomato, a baby doll or pieces of liquorices. Next, the examiner explained that after the box was closed writing or drawing attached to the box would help to remember the contents of each box. The examiner placed objects representing each of the stimulus words in separate boxes, and asked the children to make writings and drawings on blank paper. After that the papers were glued to each box to remember its content. In advance children were told that presents were to be wrapped up in boxes but as the boxes were all the same, once the presents were inside, it would be difficult to know which box contained which present. Therefore children made written or drawn notes to memorize what they had put in the box.

Coding

To decide to what extent children's products of writing demonstrated writing-like characteristics, we coded all products of writing on a scale developed by Levin and Bus (2003). For each of the following features of writing we awarded one point: *1*. small good form, *2*. linearity, *3*. segmentation, *4*. complex form, *5*. at least three units, *6*. no variety or unintended variety, *7*. intended variation, *8*. at least one conventional symbol, *9*. at least one phonetic symbol, *10*. more than one

Figure 1. Products of writing including the feature mentioned in the left column. Numbers in parentheses are ages in years and months.

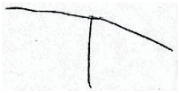
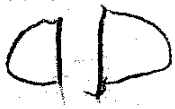
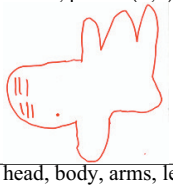
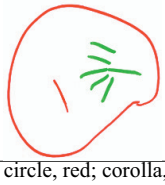
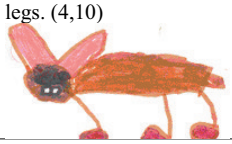
Writing feature	Stimulus (age in years and months)		
1 Small form	sun (3;8) 	fl ower (3;10 	three fl owers (4;5) 
2 Segmentation	liquorices (3;6) 	three fl owers(4;10) 	rabbit (4;9) 
3 Linearity	rabbit (3;10) 	box (3;5) 	three fl owers (4;7) 
4 At least three units	ball (4;3) 	three trees (3;3) 	fl ower (4;9) 
5 Complex form	rabbit (4;7) 	ball (4;5) 	rabbit (4;2) 
6 No variety or unintended variety	tomato (4;3) 	man (4;9) 	liquorices (4;10) 
7 Intended variety	mother (4;7) 	wheel (4;7) 	rabbit (3;8) 
8 At least one conventional symbol	liquorices (4;8) 	man (4;11) 	sun (5;0) 
9/10 One or more phonetic symbols	wheel [wiel] (5;0) 	tree [boom] (4;7) 	three trees [drie bomen] (4;5) 
11 Invented spelling (word is readable)	Box [doos] (4;10) 	mother [moeder] (3;11) 	Three trees[drie bomen]5;0 
12 Conventional spelling	Rabbit [konijn] (4;9) 	Box [doos] (4;9) 	Flower [bloem] (4;9) 

Note. Dutch translations are provided where one or more letters are phonetic.

different phonetic symbol, *11*. invented spelling, and *12*. conventional spelling; see Figure 1 for illustrations of each feature. The last 5 features are typical of symbolic writing, whereas the first seven features typify written form. A mean score beyond 7 indicates that children minimally use some conventional letters in their writing. Coding was carried out per stimulus; e.g., for all children *book* was completed before *tomato*. The stimuli were coded in random order. For a sample of children ($N = 21$) each producing 16 words in response to the request to write, the mean agreement between two coders (both authors) per word ranged from $r = .82$ (for 'three trees' and 'liquorices') to $r = 1.00$ (for 'book') (mean $r = .95$, $SD = .06$). The alpha reliabilities for set 1 and 2 were .96 and .97 respectively. For each child we calculated the sum score of 16 words (ranging from 0 to 16) on each feature of the writing scale. For a sample of children ($N = 21$) the agreement for the 12 writing features between the two coders ranged from $r = .87$ (for 'small form') to $r = .99$ (for 'conventional symbol') (mean $r = .94$, $SD = .04$).

A second scale, the drawing scale, was developed to code overlap between products of writing and drawing. We used children's drawings of objects to develop this scale. Like Levin and Bus (2003) we composed lists of features typical for each object. For tomato, for instance, the list included: circle, red, calyx, stalk, green stalk or calyx, and filling; see Figure 2. The number of features varied from 4 for simple figures (e.g., ball) to 17 for complex ones (e.g., man). Independent coding of products of writing with the drawing scale by the two authors resulted in a mean correlation of $r = .88$ for 96 writings produced by 6 children.

Figure 2. Drawings of three flowers, book, rabbit and tomato, illustrating the drawing scale. In the upper row relevant features are listed. Above each drawing is mentioned which object features were scored. Numbers in parentheses are ages in years and months.

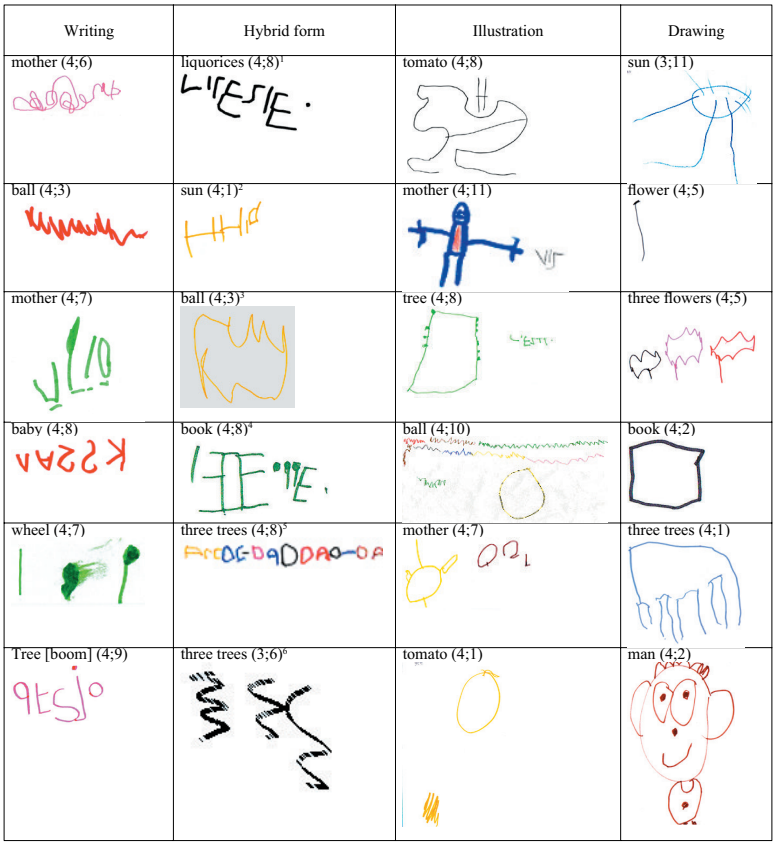
Three flowers *object features: three, petal, stalk, green stalk, corolla; different colored petals and corolla, put on the bottom of the paper.*	Book *object features: square, letters, illustration, thickness.*	Rabbit *object features: head, body, arms, legs, ears, fur, whisker, eyes, nose, mouth, tail, nails, profile, two-dimensional arms, two-dimensional legs.*	Tomato *object features: circle, red, calyx, stalk, green stalk or calyx, filling.*
petal (3;6) 	illustration (4;4) 	body, arms (3;10) 	circle, stalk (3;10) 
three, petal, stalk (3;10) 	square, illustration (4;4) 	eyes, nose, mouth (3;10) 	circle, red, stalk (3;7) 
three, petal, stalk, corolla (4;10) 	square, thickness (3;10) 	head, legs, ears, eyes, nose, mouth, tail, nails (4;10) 	circle, red, stalk (4;3) 
three, petal, stalk, green stalk, corolla (4;7) 	square, thickness (4;8) 	head, ears, whisker, nose, mouth, profile (4;7) 	circle, red; corolla; green corolla (5;0) 
three, petal, stalk, green stalk, corolla, put on the bottom of the paper (4;8) 	square, letters, illustration, thickness (4;10) 	head, body, arms, legs, ears, fur, whisker, eyes, nose, mouth, tail, nails, profile, two-dimensional arms, two-dimensional legs. (4,10) 	circle, red; corolla, green corolla, filling (4;9) 

With the help of the scores on the drawing and writing scales, each product of writing was assigned to one of the following types of products: *drawing, hybrid form (confounding writing and drawing), illustration, or writing* ; see Figure 3 for illustrations of each type.

Writings: products exclusively scoring on the writing scale,
Drawings: products exclusively scoring on the drawing scale,
Hybrid forms: products including drawing and writing features in one product, and
Illustrations: products including drawing and writing features but a separate drawing added to writing.

To make a distinction between hybrid forms and illustrations a new round of coding was necessary. Mean agreement between the two authors was .92 ($N = 80$).

Figure 3. Children's writing products categorized as *drawing, hybrid form (confounding writing and drawing), illustration, or writing*. Numbers in parentheses are ages in years and months.



[1][2] hybrid form including color [3][4] hybrid form including form [5][6] hybrid form including number

Results

Writing across age

All children produced written forms but their ability to do so improved with age as is indicated by an increasing number of writing features used to represent 'print'; see Figure 4. In the youngest group many children represented linearity (in 40% of 16 words), three or more signs (40%), small form (62%), and segmentation (54%) but hardly any other features; their writing often looked like pseudo-cursive scribbles. In addition to these features the middle age group also scored on complex form (41%), variation (47%) and intentional variation (38%). This often resulted in strings of pseudo-letters. The oldest children scored on a symbolic level: they included conventional letters and numbers in their writing (50%). Their writing was mostly not yet phonetic. A small proportion of the letters matched with sounds in spoken words (9%). Since scores beyond 9 (more than one phonetic symbol) were rare they are not represented separately from representing one phonetic symbol in Figure 4. A MANOVA with age as between-subject factor and repeated measures for the two tasks (dictated words and labels) revealed a statistically significant main effect for age (3 levels), $F(2, 93) = 23.1$, $p < .001$, $\eta^2 = .33$. Mean number of writing features represented in products of writing increased from 2.8 (SD = 2.3) in the youngest group to 4.9 ($SD = 2.3$) in the middle group and 6.5 ($SD = 2.0$) in the oldest group.

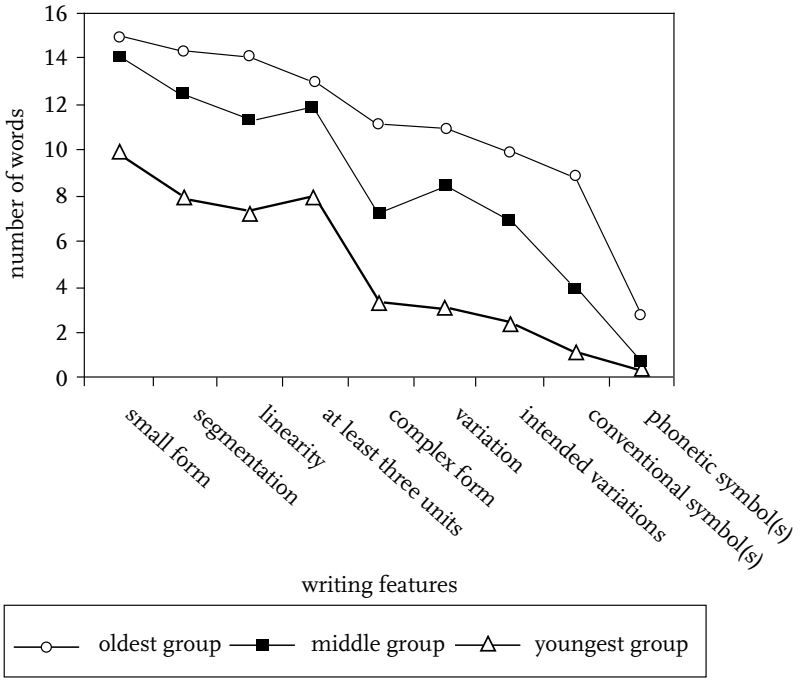


Figure 4. Writing features represented in children's products of writing for three age groups (maximum score = 16).

Overlap between writing and drawing

As writing improved the number of iconic devices decreased. Overall 5.4 (34%) out of 16 words (M = 34%, SD = 25) included one or more object-related iconic devices, see Table 1. With age the percentage of words including object-related iconic devices reduced from 43% (SD = 23) in the youngest group to 33% (SD = 29) in the middle group and 25% (SD = 19) in the oldest group. The Kruskal Wallis test (here preferred because of violations against normality) revealed a statistically significant age effect, χ^2 (2, N = 96) = 10.71, $p < .01$ (one-tailed).

Table 1. *Mean (SD) number of products coded as drawing, hybrid form, illustration or writing in three age groups (3½-4, 4- 4½, 4½-5) and two tasks (writing labels versus writing a dictation)*

Task	Type of writing product	Total group *N*=96	Youngest *N*=32	Middle *N*=32	Oldest *N*=32
Total (16 words)	Writing	9.4(5.2)	6.0(5.1)	10.3(5.2)	12.0(3.0)
	Hybrid form	2.7(1.9)	2.6(1.9)	2.6(1.9)	2.8(1.8)
	Drawing	1.9(3.3)	3.2(3.8)	2.1(3.7)	.4(.7)
	Illustration	.8(1.6)	.9(2.0)	.6(1.0)	.8(1.7)
Dictation (8 words)	Writing	5.0(2.7)	3.3(2.8)	5.5(2.7)	6.3(1.4)
	Hybrid form	1.3(1.3)	1.2(1.5)	1.2(1.2)	1.4(1.2)
	Drawing	.8(1.6)	1.5(1.9)	.7(1.8)	.1(.3)
	Illustration	.3(.9)	.5(1.2)	.4(.9)	.1(.3)
Labels (8 words)	Writing	4.4(2.9)	2.7(2.8)	4.8(2.8)	5.7(2.1)
	Hybrid form	1.4(1.1)	1.4(1.1)	1.4(1.2)	1.4(1.0)
	Drawing	1.2(2.0)	1.8(2.3)	1.4(2.2)	.3(.6)
	Illustration	.4(1.1)	.4(1.0)	.2(.4)	.7(1.5)

Note. Maximum score for total is 16, for dictation and labels 8.

However, we also found support for our suspicion that children often ignore the request to represent meaning. As the task characteristics entice young children into adding iconic devices they were more inclined to do so as is indicated by the finding that the task affected the number of object-related iconic devices especially in the two older groups. When writing had to denote meaning children focused more on representing iconic devices. All age groups produced more products including object-related iconic devices in the labeling task than

in the dictation, but in the youngest group (M = 46%, SD = 29 versus M = 39%, SD = 25) the difference was not statistically significant. In the middle group (M = 37%, SD = 38 versus M=29%, SD = 31) and oldest group (M = 27%, SD = 23 versus M = 19%, SD = 16) differences were statistically significant; Z = -1.79, p < .04 (one-tailed), N = 32 and Z = -1.96, p < .03 (one-tailed), N = 32, respectively. Taking a more careful look at the kind of products we concluded that drawings gradually disappeared but that the number of hybrid forms and illustrations remained about the same which suggests that though iconic devices as a means to represent meaning became less dominant, they did not entirely disappear in the here studied age range. They continued as hybrid forms or illustrations. Only drawings disappeared with age. They occurred significantly more frequently in the youngest and middle group than in the oldest group who hardly produced any drawings. Overall making labels yielded more drawings (M = 15%, SD = 25) than a dictation (M = 10%, SD = 20), Z = - 2.54, p < .01 (one-tailed), N = 96, but only the middle group produced significantly more drawings in the labeling task (M = 18%, SD = 28) than in the dictation (M = 9%. SD = 23), Z = -2.23, p < .01 (one-tailed), N = 32.

Features triggering hybrid forms

When referents included number (three trees and three flowers) children often created hybrid forms by repeating the same pattern to represent number; three in the form of three scribbles or three signs was present in 39% (SD = 39) of the writings that were meant to represent three trees or three flowers. For the four referents with a characteristic color (i.e., snow, liquorices, tomato and sun) 21% (SD = 22) was written in a suitable color (i.e., white or yellow, black, red and yellow). On the other hand, children rarely represented a square or round form for book and/or box and ball and/or wheel; in 7% (SD = 7) of the written representations for these referents. According to a Friedman Test the difference between number (proportion of representing three in three flowers and three trees), color (proportion of representing black for liquorices, white or yellow for snow, red for tomato and yellow for sun) and form (proportion of representing 'round' in ball and wheel and 'square' in book and box) was significant, χ^2 (2, N = 96) = 35.76, p < .01. Number and color were represented in all age groups to the same extent according to a non-significant Kruskal Wallis tests, see Figure 5. In so far children represented form (e.g. a round form for ball) they were more typical for the youngest children. Representing form disappeared in the older groups according a significant Kruskal Wallis test, χ^2 (2, N = 96) = 16.13, p < .001. In short, hybrid forms including number and colour features continued over age and but the ones that included form features disappeared.

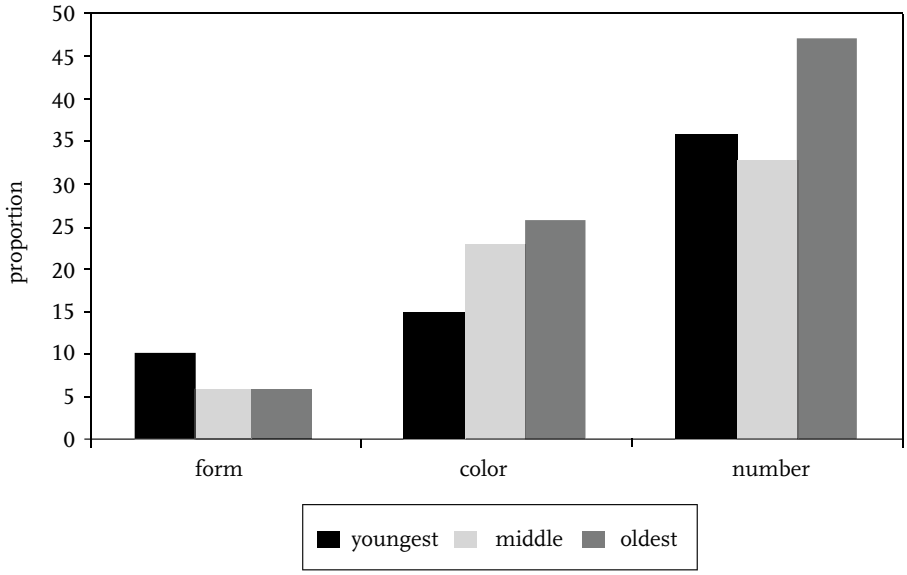


Figure 5. Mean proportion of hybrid forms with words including form, color, and number features by age group.

Discussion

The results confi rm Brenneman et al.'s (1996) hypothesis that children successfully produce forms that represent aspects typical for writing. The youngest children produce characteristics such as small form, segmentation, linearity, and more than three units resulting in writing-like forms like pseudo-cursive scribbles or strings of pseudo-letters. Children's ability to represent the form of writing gradually improves and beyond 4½ children's writing includes conventional letters, often randomly selected and sometimes matching phonetic features. We did not fi nd support for the hypothesis that children make a strict distinction between writing and drawing from an early age (Gombert & Fayol, 1992). The youngest group added iconic features to about half of the words (43%). Somewhat older children, 4 to 4½-year-old, were more successful at creating the impression of writing, but 34 percent of their writings included iconic features. Children beyond 4½ were less inclined to revert to iconic devices even when the task created a dilemma by strongly emphasizing the referential-communicative function of writing. In this group the number of products including iconic devices had diminished to less than 25%.

Drawing instead of writing disappeared within the present age range which shows that children make a clear distinction between writing and drawing as communicative devices. Children younger than 4 often replaced writing by drawing (21% of all writing products) but beyond 4½ drawings were very rare (2% of all writing products). In the stage in between (4-4½) children were quite advanced in producing the written form but they continued to mix up writing and drawing as notational devices. They regress into drawing as the mnemonic

function of writing is emphasized. To represent meaning this age group resorts to drawing (18%) when the referential function of writing was strongly emphasized. They stopped doing so in the dictation when they could ignore the request of readable writing and "draw" the written form (c.f. Levin & Bus, 2003). Whilst different from drawing, *hybrid forms* and especially those including number and color features, seemed to continue well into more advanced stages of writing when children begin to use conventional letters and numbers. All age groups produced a number of hybrid products scoring on the writing and drawing scale but in the oldest group these forms made up the majority of products that included iconic devices (70%). Some iconic devices namely those representing the referent's form (circle or square) occurred in the younger groups but disappeared with age. Older children who started to use conventional symbols seem to mix up iconic symbolizations as number and color with more advanced writing features such as phonetic writing, probably because their everyday experiences do not eliminate this misunderstanding. Number is often represented in an iterative analogical format (see for examples Tolchinsky, 2003, p.123); color is a frequently occurring feature of texts in advertisement. Children may therefore expect those facets to be aspects of conventional writing. Moreover, advanced writing features like conventional letters and phonetic writing are easily combined with representations of number and color, see in figure 1 the invented spelling of three trees: an iterative format, written in green. The same holds for illustrations. They also continue well into the stage of symbolic writing probably because illustrations often coincide with written text, for instance in picture storybooks.

In sum, from an early age children are familiar with features of writing but this does not imply that they use writing as a notational device. We find that it is only when children are quite advanced in producing written symbols that they stop replace writing by drawing indicating that children only gradually realize that letters and not iconic devices represent the referent in writing. Children beyond 4½ no longer revert to drawing when the request is to write although even children of this age group continue to use iconic devices such as number and characteristic colors. In other words, children on the verge of integrating new cognitive knowledge use multiple strategies (Kamberelis, 1994), mixing up iconic symbolizations as number and color with linguistic symbolization, i.e. phonetic writing. We reported age limits but we can imagine that those vary per sample. The present sample selected from higher educated families may be far ahead of the main stream.