Children Learning Literate Practices in Spriting

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Abstract: The exploratory empirical work presented here suggests that children engage in conceptual processes through a new activity called *spriting* (Shankar 2005, 2006) previously thought of as late-emerging and dependent on writing. Spriting is a new technologically-supported composition process that does not require intermediate mediation with a written form. The output of spriting is a *talkument*. In this paper, results are presented from a design research study of the impact of spriting on the literacy development of children, ages 5-10, at two different schools. In particular, composite composing and editing actions in spriting presage a reversal of some trends seen in written composition, such as older children producing longer compositions. Furthermore, this paper describes early observations of children appearing to make certain literate habits, such as pausing to plan, explicit in spriting in ways they had not learned to do yet in writing. Results suggest that spriting could offer an alternative way to explore extended forms of literacy and habits of mind before a child is able to write.

Introduction

Learning how to write has long been seen as a precursor to developing critical cognitive skills, typically lumped under the term "literacy". For example, children who cannot read or write are not expected to understand the difference between 'meaning' and 'saying' (e.g. Olson & Torrance, 1985), understand that compositions encode purpose and make things happen in the world (e.g. Bereiter & Scardamalia, 1987), or learn to recontextualize their oral language skills for a distant and critical audience (e.g. Purcell-Gates, 1991). This article explores the idea that children are much more capable of shaping their actions and communication in a literate manner than we have been able to observe given the literate tools available. There is some evidence that composition tools impact editing practices. Word processors can positively impact more experienced writers' revision practices (Haas, 1989) and even have a weak effect on children's writing as young as kindergarten (Jones, 1998). This work introduces a new technological support for composing in order to study the impact on children with emerging literacy skills.

In order to put this work in the broad frame intended, some new terms are required. First, I introduce a new practice called *spriting* (rhymes with writing), which refers to using one's own oral productions in a writerly process of composition, supported by new technology. Pragmatically, the spriting process goes something like this: children hold or wear a microphone that plugs directly in to the computer. Using custom built software called the SpriterWriter (see the interface presented in Figure 1), the child presses a record button and speaks for as long as s/he wants, and then presses a stop button to end the recording. While the child is recording, her/his speech productions appear as graphic representations in the software. The software automatically segments the speech productions into "sausages", based on spoken phrase automatic end-point detection. These smaller sausage units are independently editable and are intended to expedite review and editing. Through simple point and click interaction with the graphic representations, the child can *aud* the work (a correlate to reading in the aural mode), and apply editing functions (e.g. rearrange by drag and drop; cut, copy, and paste; delete; insert). Theoretically, the output of a spriting process could be an oral *talkument* (e.g. an audio file) or a written *document*, if the child would transcribe his or her own spriting or was supported by a technological process such as speech recognition. In practice, children rarely transcribed their spriting to writing, more often working very hard to realize their compositions goals as talkuments.

In short, spriting does not require children to make the additional leap to using a deeply different form of composition representation such as writing itself. Yet, spriting shares important properties with writing, such as permanence and shareability, and permits extended processes of planning and editing.

The introduction of spriting helps make a new distinction in literacy between alphabetic and higher-level skills. I refer to the knowledge and skills that bridge reading and writing, and auding and spriting as *literacy*. I borrow a term from Seymour Papert, *letteracy* (Papert, 1993), to refer to the mechanical and presentational skills specific to reading and writing, including the ability to write letters, spell, punctuate, and design a page. In spriting, I observed many parallels to written mechanics in this new compositional mode. Children were as concerned with *how* they said something—and frequently edited for these new "oral mechanics"—as they were concerned with *what* they said. I have dubbed these new material concerns, *prosodacy,* referring to acoustic-phonetic features of the voice, paralinguistic features of speech, and the age-old art of poetics, composing words pleasing to the ear. This new distinction between literacy and letteracy, pushed to a radical position, means that it is possible for someone to be highly literate but not know how to read or write.

This paper presents quantitative and qualitative empirical data and observations from a study done when I was a doctoral student at the MIT Media Laboratory that show how spriting enabled children, ages 5 to 10, to compose, edit and reflect on their compositions in ways that differ in marked ways from their emergent writing practices. While the full scope of the investigation was very broad, including results on editing, collaboration, vocabulary, and singing, and technology development (Shankar 2005), my purpose here is to focus only on some very specific results in the children's editing practices.

My approach in this paper is as follows. First I describe the exploratory research method used, the three populations of children who assisted this work, and the dataset generated. Secondly, I provide a quantitative overview of composite composition and editing moves to sketch some overall trends between age groups and SES, typical predictive indicators of literacy development. Thirdly, I discuss how the introduction of a new compositional form can produce new insights into the composition process generally, as it permits comparisons where few have existed before. To do so, I present two learning stories of children spriting and how they handled the new challenge of integrating moments of pause for thinking. Finally, I conclude with a discussion

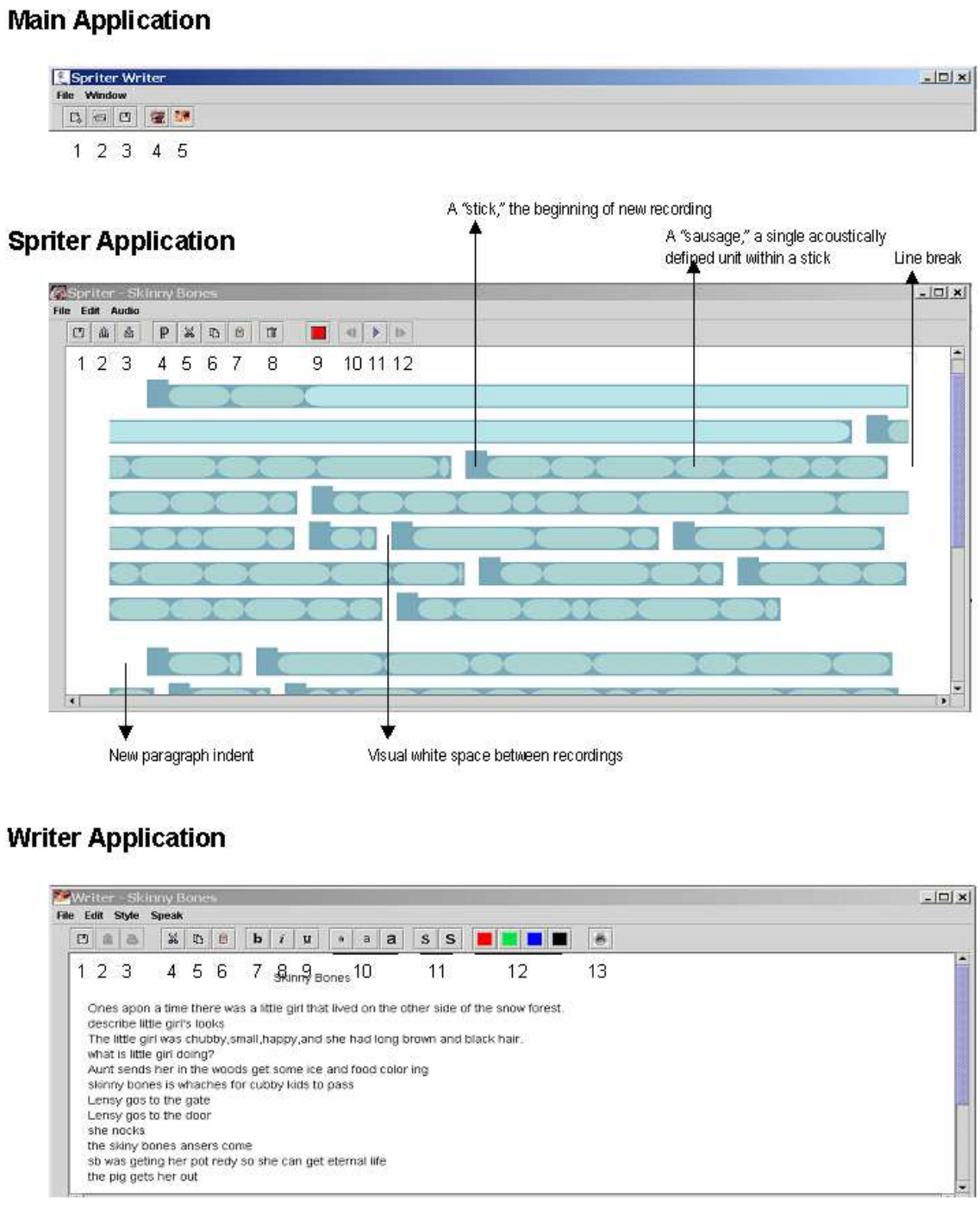

Figure 1 The SpriterWriter interface.

on implications for literacy learning.

Methodology

I used a *design research* approach, inheriting from *design experiments*, which are also intended to evolve new learning technologies (Brown, 1992; Collins, 1992) and develop and refine new theories (diSessa & Cobb, 2004; Edelson, 2002) within real learning environments. Designing certain kinds of tools that challenge many dear cultural values, like writing, and require complex and sophisticated research, like spriting, might be seen as a process of evolving the ends of design as much as the means of design. While design work like this should prepare the way for many small kinds of experiments to follow, we must also allow time for design and cultural change to evolve contemporaneously. A design experiment approach was one way to allow the ends to evolve through the influence and needs of the learners themselves.

I performed initial exploratory and prototyping work with low-income adult learners in East Harlem, NYC, who were at elementary levels of letteracy learning. This research suggested that spriting can be a useful tool for supporting certain kinds of learning central to composition and editing. With particular questions and a spriting prototype, I undertook a thirteen week long study with children ages 5 to 10 at two elementary schools, here referred to as Umoja and Molière elementary schools, to explore how an improved spriting technology might contribute to their literacy and letteracy learning. I revised the software in cycles that ranged from a week to several weeks, according to my observations of its usability and the enthusiasm with which the children embraced it to do their work.

The design research experiments were conducted at two private elementary schools, both located in different urban-residential areas of a major city in the USA. The names of the schools and children referred to are pseudonyms. I call the first school Umoja Elementary, a private school founded upon African principals of community and culture (Nguzo Saba). The school functions as a one-room school house concept, not assigning children into grades per se. The students are children of color (Caribbean, African, African-American), low to middle SES, ages 5 to 10, and represented all the students in the school – not a select subset. The group ranged from 6 students when I began (referred to as the "older" Umoja students), and expanded to 11 students when the five/six year olds 'graduated up' (referred to as the 'younger' group) a few weeks later. The Umoja younger children were learning character formation rules at the time. While STEM activities were creatively realized in the Umoja curriculum, reading and writing activities were conventionally practiced with vocabulary words lists, fill-in-the-blank worksheets, some personal reflection writing prompts, and occasional stories read by the teacher. The children were invited to sprite once per week or more, and were able to decline if they didn't want to. For these children, choosing to sprite - whether or not they had the time, inspiration, and persistence to actually compose anything - must be understood as highly motivated and enthusiastic behavior.

The second school was Molière Elementary, a private French-English bilingual school. I offered an after school spriting club once a week, to which ten 3rd and 4th grade students responded (e.g. Irish, Russian, French-Canadian, French, and African families), a club which served to unintentionally self-select students from families with higher learning and research connections. The children were high SES, ranking in the top half of their classes in both French and English language exams; their school ranked in the top half of all independent schools. They had already learned to read and write in both French and English a wide variety of genres, including daily journaling activities, book reports, written poems and much more. The class was held for one hour on Thursday afternoons after regular school classes were out in the school computer lab in the basement.

The Moliere children, on the basis of their older age, longer and more extensive training in genre and composition forms often taught in schools, would be expected to make more sophisticated spriting products than both groups of relatively younger Umoja children. Differences between them cannot be attributed to their interaction with spriting. However, when certain behaviors, processes or products emerge in common between the schools—even against the predicted differences, these commonalities should be subjected to further analysis and interpreted in light of what spriting offers. In sum, how might spriting allow each child to exercise their current literacy skills, develop new abilities, and challenge themselves in powerful ways?

By acting as researcher, teacher, and technologist, I was able to exercise great flexibility in focusing and refocusing literacy activities on the fly, the technology on a weekly basis, as well as the classroom activities and forms of student participation with each other and with the computer. I judged an activity successful when the children had energy and long-term focus, spent a lot of time on editing, or requested more time. The definition of acceptable spriting work was something that the students and I continuously negotiated throughout the thirteen weeks at both schools as what could both sustain their interest and mine. However, the most unexpected results emerge from observing children's great enthusiasm for activities I did not suggest and was initially confused by. For example, although I initially framed a talkument as an intermediate product on its way to becoming a text, the children embraced talkuments as final products. Their energy and interest in making talkuments in turn encouraged me to adapt the technology to produce a better talkument product and to involve writing in ways that supported their spriting process rather than the other way around.

Data collection included video records of all spriting activities, saved daily versions of spriting work, saved records of interactions with the technology, examples of the students' writing from their regular classroom teachers, and detailed field notes. In total, the children from both schools produced a total of 197 compositions. To narrow and balance the descriptive analysis, I chose three to four solo compositions to transcribe from each child, a total of 67 compositions. Selection was based on the work's resemblance to or distinctiveness from written genres; its virtuosity relative to the child's other compositions; and the importance the child ascribed to it. The latter two factors often led to the same selection, as the work that interested them most was also the one that they worked hardest at. These 67 talkuments and all the recordings made in the process - even if ultimately deleted - were transcribed. Transcription includes notation of (filled) pauses and breathes, false starts, incomplete and unusually pronounced words using embedded XML marks, used for automated processing purposes, as well as to remind the reader that this is an imperfect and partial translation of speech, impossible to capture fully in all of its *material repleteness*. When children are trying the hardest to transform thought, feeling and intention into words is when their speech is most fragmented (Chi, 2000). The transcription attempts to draw attention to these periods of intense linguistic construction.

Since the time when I performed this work, podcasts, moblogging and other voice publication methods have emerged as legitimate and authentic purposes for real-time voice composing, making this work all the more relevant as the means of distribution of such work are emerging. Understanding the importance that children attribute to spriting and talkuments becomes even more critical for how it might inform current literacy practice and pedagogy, and how it might presage future literacy trends.

Overview of the Composition and Editing Actions

Looking across the 67 transcribed talkuments including both individual and collaboratively composed talkuments, there is strong evidence that all children, ages 5-10, composed at length, reviewed and edited their work. Considering that at the time the youngest children were working hard to write their names, this result alone, when compared to standard letteracy development comparisons across the same ages, is a striking result. Within this general trend, there are indications of developmental differences. In order to see these developmental trends, the data is organized in to three different groups descending in average age: Molière

Table 1 Record and Play composing moves, Recording lengths, and Total Words.

		Record Actions (#)	Play Actions (#)	Record then Play Consecu.	Recording Len. Each (sec)	Talkument Len. Total (sec.)	Words Total
Moliere	N	31	31	30	31	32	32
	AVE	**18.29**	**31**	**8.7**	**37.2**	**349.3**	**359.2**
	SD	17.7	30.3	7.2	34.4	216.6	276.4
Umoja older	N	25	22	21	25	25	24
	AVE	**8.6**	**17.2**	**4.5**	**46**	**273**	**222.3**
	SD	6.1	14.3	4	47.8	214	168.2
Umoja younger	N	10	10	10	10	10	10
	AVE	**9.8**	**30.3**	**6.2**	**44.4**	**358.9**	**256.2**
	SD	6.3	25.6	4.6	30.5	268.1	207.2

children (ages 8-9), the older Umoja children (ages 6-8, 10), and the younger Umoja children (ages 5-6).

In Table 1, the average number of Record and Play actions per talkument are presented for each group. The Molière children, as predicted by their older average age, made an average of 18 recordings per talkument, and listened to their spriting on average 31 times per talkument. The Umoja children made more or less the same number of recordings per talkument.

While the Molière children tended to make more recordings, they also tended to make slightly shorter recordings (37 sec on average in Table 1 column "Recording Len. Each"), tending towards a more bricolage, piecemeal construction process than all the younger Umoja children. This "bits and pieces form a whole" style emerged after a few weeks in a couple of the Moliere children who desired extreme control over their talkument product. Most children at both schools tended towards long spoken expositions, with a few gross post hoc edits.

As presented in Table 1, total talkuments lengths ranged from 270 to 360 seconds for all children—with the youngest children producing the longest talkuments! This is exactly the opposite of what one would predict in writing, and an extremely important insight into what spriting can offer literacy development – composition length is no longer a bellwether indicator of literacy development. Length of talkument, however, does not predict the number of words used. Older children had more fluency with spoken language and greater grasp of compositional planning, thus averaging a little more than one word per second (359 words in 349 seconds) while the youngest averaged approximately 2/3 a word per second (256 words in 358 seconds).

Older children tend to have composition plans that exceed a single recording action. In Table 1, the 'Record then Play' column indicates the sequential relationship between recording and playing actions. The Molière children immediately listened to only 8.7 out of the average 18.29 recordings they made, while the younger Umoja children listened immediately to 6.2 out of an average 9.8 recordings—2/3 of all their recordings. I observed the older children make several recordings consecutively and then listen to a group of them, while the younger children composed in a record-listen-record-listen cycle, the next move inspired by what they have just heard. Interestingly, the youngest children also listen more often to their own recordings—in Table 1 their record-play ratio is 1:3 compared to the older children's 1:2. Thus, there are indications of a developmental trend towards making shorter, more numerous recordings that are listened together as composites (not individual recordings), in a review cycle that occurs less frequently.

Table 2 Average editing moves per talkument.

		Delete	*Move*	*Split*
Moliere	N	30	17	14
	AVE	**11.8**	**8.8**	**9.1**
	SD	11	12.6	20.6
Umoja older	N	20	4	10
	AVE	**8**	**4.8**	**3.2**
	SD	6.6	4.9	3.2
Umoja younger	N	9	5	7
	AVE	**9.9**	**3**	**5.1**
	SD	10.5	2	4.7

Children engage in editing moves through spriting even before they know how to write. As they get older, they engage in even more editing moves. Table 2 shows that the younger Umoja children delete and move content, and make splits. The Molière children make on average 12 deletions and move sausages nearly 9 times *per talkument*, and they make finer edits by splitting content when necessary. The standard deviation for split edits is very high because children used splits in only certain talkuments and certain situations. The older Umoja children fit somewhere in the middle of these two groups as they begin to compose lengthy and purposeful talkuments. Spriting might be treated now as a complementary process to writing in the elementary years, both spriting and writing processes eventually to equalize in length and complexity.

Manifestations of Planning Processes in Spriting

The spriting process affords new insights into composition generally, and might provide new insights into the general theory of composition process—heretofore examined only through the window of writing behavior. For example, planning processes in spriting are very different from what children seem to experience when writing. In spriting, several children learned that planning is a time for *pausing*.

I encouraged the children to take intentional moments for thinking. This kind of thinking activity is often called "planning" in the writing process literature, but has unfortunately been co-opted in most school settings with highly structured activities for purposes of global planning (e.g. outlines, templates, concept maps, et cetera) that should occur "first" in the composition process. Though these devices can be useful, they do not supplant the need for thinking throughout the composition process, sometimes called "local planning" in writing composition research. Ironically, the value of these kinds of global planning devices might be more recognizable, and even more necessary, in the spriting process than in the writing process, when children discover for themselves how useful broad composition plans are when writing mechanics are not the primary obstacles.

Many children become frustrated when spriting—and even frightened away from trying to sprite—by the immediacy of the task. They find that the words they expect to be there are *not* there. They fall into a silence they find uncomfortable, even unbearable. Because children talk easily when they respond to adult questions or when they converse with their friends, they seem to expect that words will always emerge to accomplish the task they have set for themselves. When they watch television, they see people who always know what to say. They see politicians answer questions no pause. We have few public models of people pausing to think before talking. Therefore, it is not surprising that children, even if they have very little experience writing or spriting literate compositions, do not expect that thinking could take time.

In writing, the time to get something down on paper or screen is much longer than speech (300% to 400% longer even for an expert typist). Therefore, the time spent thinking and planning comes for 'free' while a child struggles with mechanical production. I saw many children struggle initially with the fact that they could not say everything they wanted to in one long, synchronous recording, as they felt they did when writing. They would get frustrated at their self-perceived lack of fluency, erase everything and start over again. The idea that thinking is doing something had not seemed to occur to them before. Writing may be less conducive to

cultivating the habit of mind to pause to think during composition. Spriting seemed to help students learn aspects of composition that they may have performed implicitly while writing, due to the slower mechanics, but had not realized they did so in such a way as to use this cognitive skill flexibly.

In spontaneous speech, Frieda Goldman-Eisler (1958) claims that pauses provide an external window on internal cognitive processes, and that pause lengths increase with task abstraction and 'explicitness' – a feature correlated with how familiar/unfamiliar the conversants are with each other. When I began the design research, I believed that pauses, filled (e.g. um, uh) or empty, should be reduced and minimized respectively as a feature of editing a talkument from intermediate to final product. I learned from the children that pauses – both filled with a delightful variety of sounds and empty – could be indispensably important to a talkument. Next, I tell two learning stories of how pauses were important in spriting. Neither describes the general case of learning to pause but instead complicates the notion of what pausing to think should be. These stories demonstrate that a single, global approach to pauses in spriting (pedagogically, technological support, etc.) would not only be difficult to achieve in practice, but might also be undesirable.

Madeline Likes Her Pauses

In the fourth week of spriting class at the Molière Elementary, I devised an activity intended to focus the children on editing, and in particular to remove what I considered long and unnecessary pauses. They were to create a talkument with three short stories. If any story exceeded four spriting lines in length, they were to edit it down. They could consult with friends to figure out what might be eliminated. The best story was to be placed first in the composition (by dragging and dropping). Although complicated, the children understood these directions and produced some material that was amongst their best work for the entire spriting class.

Eight-year-old girls, Madeline and Emily, finished quickly and were the first to listen to each other's compositions. I instructed them also to point out long silences to their partner. Emily must have commented to Madeline that her composition had too many long silences. Madeline motioned me over to discuss this.

My composition has many long silences. Do I have to remove them? She said. Actually, I like the silences.

Why is that? I asked.

When I talk I often use long silences.

Well, just because your talk has long silences doesn't mean you want your composition to be exactly the same. The person listening to this will not be able to look at your face when hearing your talkument, they can only hear your voice. Sometimes when you aren't saying anything, your face says something instead. But in a talkument you can't use your face. So make sure that the silences are useful.

Clearly I didn't get her point, so she tries to restate it differently.

I also use a long pause before something scary. So, I prefer to keep them.

It hits me. She's referring to the use of pauses for dramatic effect, a performance issue an oral storyteller would be very concerned with. Using pauses for dramatic effect demonstrates a mature sense of verbal storytelling. Pauses are not always emblematic in spriting of an internal cognitive struggle to produce words. If these dramatic pauses were removed—or even shortened—automatically by the spriting technology, Madeline's mature compositional purposes would be destroyed.

Due to this and other experiences that demonstrated a usefulness and meaning to pauses that I had not considered before, I disabled the SpriterWriter's technological support for automatically shortening long pauses.

Niesha's Beats as Pause

Niesha, an eight-year-old child at Umoja Elementary, had a gift for beats. These beats consisted of lip smacks, purses, sucks, kisses, clicks, hummed bars from songs, and more, all merged together into a drum rhythm that accompanied her spriting. Many of the Umoja children were able to create inventive, spontaneous rhythms with their voices, whereas none of the Moliere children could. Certainly a familiarity with rhythmic talk as heard in rap and hip-hop contribute to their able improvisation. But Niesha was particularly gifted amongst her classmates. She enjoyed making her compositions a continuous, unbroken weave of rhythm, talk and song. For example, here is a transcribed excerpt from one of her compositions:

> I like (.) hmm {VOC mouth sounds} (7.4) I like spaghetti, {VOC mouth sounds} I like chicken {VOC mouth sounds} spicy chicken {VOC mouth sounds} I like Chinese food, the rice the Chinese rice and the (.) red - no the orange chicken (inaudible) they are so good if you eat them your mouth bam! if you eat the orange chickens. {VOC mouth sounds}

This example is the first in a series of talkuments in which she uses descriptive and journal-like talk coupled with these drum-like mouth sounds and excerpts from songs to describe foods she likes and its effect upon her. In between each mention of a food, she made what she called a 'beat.' Beats for Niesha include sounds she makes with her mouth, song excerpts, and small bits of Americana like "Peace", "Ho Ho Ho Merry

Christmas". Her beat is nearly impossible to transcribe to text. The (inaudible) mark in particular, and the {VOC mouth sounds}, often stands for sections of spriting that simply have no textual equivalent.

One of Neisha's primary goals was to make long talkuments; she bragged about the great length of her spriting multiple times to me and to her teacher. How ridiculous our goals for mature writing, such as length, appear when they are transplanted into another media like spriting in which they are so easily achieved! Her composition approach was typical of most children at both schools. She first recorded one or two continuous recordings and then edited these by adding or deleting a few major narrative chunks. I dubbed this editing approach "chunk insertions". This composition strategy required great fluency, and children had to devise ways to plan what to say next while they were recording. Niesha appears to use beats as pausing time. Her nearly automatic ability to perform beats allowed her to time to construct her next thoughts. The effect of this strategy is a kind of stream of consciousness flood of verbal and sound images from Niesha's life experience.

Discussion

The quantitative descriptive overview and qualitative examples are meant to suggest very different kinds of conclusions than those that have dominated literacy research, particularly with respect to the ascribed importance of writing and text in literacy development. When children are learning to speak, they explore issues both great and small simultaneously. But only a few years later when they begin school, they focus intensely on the letterate issues – the smallest units of writing composition, and neglect practice of literate concepts for several more years. The introduction of spriting at beginning levels of letterate and literate development appears to allow children practice with extended forms of literacy and habits of mind such as review and editing well before they can properly execute the full character set.

One specific issue discussed here is the importance of learning a literate habit of mind – that is, to recognize the need to make composition plans. In written discourse, planning comes for free with the longer written mechanic requirements. But spriting speeds up the composition process to a pace that resembles spontaneous speech, but lacks most if not all of the social supports. To characterize the importance of pauses in literacy development, it would be helpful to distinguish two different kinds of learning. The first is actually learning to do something; for example, learning how to sing. The second kind of learning is to be conscious of *how* one actually does that thing. This distinction might be related to Karmiloff-Smith's concepts of implicit and explicit knowledge (1992), sometimes also referred to as meta-discourse or meta-awareness. She writes that the ability to do something (implicit knowledge) can disappear for a time as the knowledge of how to do this thing shifts to making hypotheses about how one actually does this (explicit forms). Although both types of learning are not required for action (obviously, just learning how to do something is often enough), it is sometimes critical to know how one actually does it in order to deploy the ability when the usual supports are not available. Spriting allows students to discover habits of the literate mind that they may already do when writing, but do not understand or identify as actions involved in composing. Spriting forces them to think about—and potentially develop new hypothesis for— how they go about the process of composing. If children have the ability to make more aspects of the composition process explicit, they can control these skills in both their written and spoken compositions.

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Acknowledgments

My thanks to the three anonymous reviewers for their helpful critiques, and my gratitude to my former advisor, Seymour Papert, who legitimized my dream and made this work possible.