Emergent literacy consists of the skills, knowledge, and attitudes that are developmental precursors to reading and writing. This article offers a preliminary typology of children’s emergent literacy skills, a review of the evidence that relates emergent literacy to reading, and a review of the evidence for linkage between children’s emergent literacy environments and the development of emergent literacy skills. We propose that emergent literacy consists of at least two distinct domains: inside-out skills (e.g., phonological awareness, letter knowledge) and outside-in skills (e.g., language, conceptual knowledge). These different domains are not the product of the same experiences and appear to be influential at different points in time during reading acquisition. Whereas outside-in skills are associated with those aspects of children’s literacy environments typically measured, little is known about the origins of inside-out skills. Evidence from interventions to enhance emergent literacy suggests that relatively intensive and multifaceted interventions are needed to improve reading achievement maximally. A number of successful preschool interventions for outside-in skills exist, and computer-based tasks designed to teach children inside-out skills seem promising. Future research directions include more sophisticated multidimensional examination of emergent literacy skills and environments, better integration with reading research, and longer-term evaluation of preschool interventions. Policy implications for emergent literacy intervention and reading education are discussed.

INTRODUCTION

There are few more attractive cultural icons in late twentieth-century America than the image of a parent sharing a picture book with a child. Of the competition, apple pie can make you fat; the flag can lead to war; and even motherhood, with which shared reading is associated, often draws forth complex, ruffled images. Shared book reading, however, speaks of love, the importance of the family unit, and parental commitment to a child’s future. Shared reading embraces goals of educational advancement, cultural uplift, and literate discourse. It is, to use a phrase of Kagan’s (1996), “a pleasing idea.”

This pleasing idea is part of a topic of inquiry known as emergent literacy. Our aim here is to survey emergent literacy with a particular emphasis on applied issues, at a level that may be useful to psychologists and educators whose focal interests lie elsewhere. We first catalog the component skills, knowledge, and attitudes that constitute the domain of emergent literacy and then review evidence on links between those components and conventional literacy. Next we review research on how variation in natural environments supports or impedes the development of emergent literacy, followed by a survey of interventions to enhance emergent literacy, emphasizing programs that aim to promote emergent literacy in children from low-income backgrounds. Finally, we summarize the state of this field, its social policy implications, and needed directions for future research. The “pleasing idea” will not emerge unscathed. Few if any conceptions look the same in the light of empirical scrutiny as they do in a romantic prism. We conclude, however, that there is substantial educational and social value in work that has already been done on emergent literacy, and there is promise of more to come.

WHAT IS EMERGENT LITERACY?

The term “emergent literacy” is used to denote the idea that the acquisition of literacy is best conceptualized as a developmental continuum, with its origins early in the life of a child, rather than an all-or-none phenomenon that begins when children start school. This conceptualization departs from other perspectives on reading acquisition in suggesting that there is no clear demarcation between reading and prereading. For instance, the “reading readiness” approach, which preceded an emergent literacy perspective and is still dominant in many educational arenas, has as its focus the question of what skills children need to have mastered before they can profit from formal reading instruction. Such perspectives create a boundary between the “prereading” behaviors of children, and the “real” reading that children are taught in educational settings. In contrast, an emergent literacy perspective views literacy-related
behaviors occurring in the preschool period as legitimate and important aspects of literacy. A second distinction between an emergent literacy perspective and other perspectives on literacy is the assumption that reading, writing, and oral language develop concurrently and interdependently from an early age from children’s exposure to interactions in the social contexts in which literacy is a component, and in the absence of formal instruction. More traditional approaches often treat writing as secondary to reading and focus on the formal instruction required for children to be able to read and write.

Although investigators have examined the literacy-related behaviors of preschool-aged children for some time (e.g., Durkin, 1966), the term “emergent literacy” is typically attributed to Clay (1966). A more formal introduction of the term and field of inquiry was heralded by Teale and Sulzby’s (1986) book, *Emergent Literacy: Writing and Reading*. Current inquiry into emergent literacy represents a broad field with multiple perspectives and a wide range of research methodologies. This avenue of inquiry is complicated by changing conceptualizations of what constitutes literacy. For instance, recent years have seen an almost unbounded definition of literacy that is often extended to any situation in which an individual negotiates or interacts with the environment through the use of a symbolic system (i.e., maps, bus schedules, store coupons). We restrict our focus to more conventional forms of literacy (i.e., the reading or writing of alphabetic texts). The majority of research on emergent literacy has been conducted with English-speaking children learning an alphabetic writing system. Consequently, the extent to which these concepts of emergent literacy extend to children learning other writing systems or languages other than English is not clear.

**A Definition**

Emergent literacy consists of the skills, knowledge, and attitudes that are presumed to be developmental precursors to conventional forms of reading and writing (Sulzby, 1989; Sulzby & Teale, 1991; Teale & Sulzby, 1986) and the environments that support these developments (e.g., shared book reading; Lonigan, 1994; Whitehurst et al., 1988). In addition, the term has been used to refer to a point of view about the importance of social interactions in literacy-rich environments for prereaders (Fitzgerald, Schuele, & Roberts, 1992) and to advocacy for related social and educational policies (Bush, 1990; Copperman, 1986). We distinguish these three uses with the terms *emergent literacy* (characteristics of prereaders that may relate to later reading and writing), *emergent literacy environments* (experiences that may affect the development of emergent literacy), and the *emergent literacy movement* (advocacy of practices that increase social interactions in a literate environment for prereaders).

**Components of Emergent Literacy**

Two strands of research provide information about the components of emergent literacy. One research perspective, which consists of mainly quantitative studies, has examined the relation between emergent literacy and the acquisition of conventional literacy. The other research perspective, which tends to consist of qualitative studies, has examined the development of behaviors of preschool-aged children in response to literacy materials and tasks. Emergent literacy comes in many forms, and the typology we offer has some empirical support, but is preliminary (see Table 1 for a brief summary and list of common measures).

**Language.** Several aspects of children’s language skills are important at different points in the process of literacy acquisition. Initially, vocabulary is important. Reading is a process of translating visual codes into meaningful language. In the earliest stages, reading in an alphabetic system involves decoding letters into corresponding sounds and linking those sounds to single words. For instance, a child just learning to read conventionally might approach the word “bats” by sounding out /b/ /æ/ /t/ /s/. Not infrequently, one can hear a beginning reader get that far and be stumped, even though all the letters have been sounded out correctly. A teacher or parent might encourage the child to blend the sounds together by reducing the delays between the sounds for each letter by saying the letter sounds more rapidly. Whereas adults would understand this phonological rendering, beginning readers can get this far and still not recognize that they are saying “bats.” To them these are still four isolated sounds. Sometimes there is a pause while the child takes the next step and links the phonological representation to a meaningful word, or the link is provided by an adult, who sensing that the child doesn’t know what he has said, will help by saying something like, “Yes, /b/ /æ/ /t/ /s/, ‘bats.’ You read it.” In either case, one frequently sees the look of pleasure or relief on the child’s face at this resolution, which makes sense of the letters and corresponding sounds.

Reading, even in its earliest stages, is a process that...
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<td>Phonological awareness</td>
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^a Effects of individual differences in emergent literacy components: N = no effect demonstrated; EL = effect on other emergent literacy components (e.g., effect of language on narrative); R = effect of emergent literacy component on reading in elementary school.

^b PPVT-R = Peabody Picture Vocabulary Test—Revised; EOWPVT-R = Expressive One-Word Picture Vocabulary Test—Revised; DSC = Developing Skills Checklist.

^c See, e.g., Teale & Sulzby (1986).

^d Standardized measures of environmental print do not exist; the assessment procedure commonly employed involves showing children product labels or pictures of familiar signs (e.g., McDonalds).


^f No standardized test of invented spelling is available (see Teale & Sulzby, 1986).

^g A variety of observational and questionnaire methods of assessing print motivation have been used by researchers (e.g., Crain-Thoresen & Dale, 1992; Scarborough & Dobrich, 1994).

is motivated by the extraction of meaning. Imagine the scenario above with a child who has never seen a bat and does not know what the word means. In this case the adult’s attempt to help is useless because the child has no semantic representation to which the phonological code can be mapped. Consistent with this logical connection between reading and language, several studies have demonstrated a longitudinal relation between the extent of oral language and later reading proficiency within typically developing, reading-delayed, and language-delayed children (e.g., Bishop & Adams, 1990; Butler, Marsh, Sheppard, & Sheppard, 1985; Pikulski & Tobin, 1989; Scarborough, 1989; Share, Jorm, MacLean, & Mathews, 1984). Other research (see below) indicates that a child’s semantic and syntactic abilities assume greater importance later in the sequence of learning to read, when the child is reading for meaning, than early in the sequence, when the child is learning to sound out single words (see Mason, 1992; Snow, Barnes, Chandler, Hemphill, & Goodman, 1991; Whitehurst, 1996a).

In addition to the influence of vocabulary knowledge and the ability to understand and produce increasingly complex syntactic constructions on children’s literacy skills, Snow and colleagues (e.g.,
Dickinson & Snow, 1987; Dickinson & Tabors, 1991; Snow, 1983) have proposed that children's understanding of text and story narratives is facilitated by the acquisition of decontextualized language. Decontextualized language refers to language, such as that used in story narratives and other written forms of communication, that is used to convey novel information to audiences who may share only limited background knowledge with the speaker or who may be physically removed from the things or events described. In contrast, contextualized uses of language rely on shared physical context, knowledge, and immediate feedback. Children's decontextualized language skills are related to conventional literacy skills such as decoding, understanding story narratives, and print production (e.g., Dickinson & Snow, 1987).

Conventions of print. Books are constructed according to a set of conventions that can be understood without being able to read (Clay, 1979a). In English, these include the left-to-right and top-to-bottom direction of print on each page, the sequence and direction in which the print progresses from front to back across pages, the difference between the covers and the pages of the book, the difference between pictures and print on a page, and the meaning of elements of punctuation, including spaces between words and periods at the ends of sentences. Knowing these conventions aids in the process of learning to read (e.g., Clay, 1979b; Tunmer, Herri- man, & Nesdale, 1988). For example, Tunmer et al. found that scores on Clay's (1979b) Concepts about Print Test at the beginning of first grade predicted children's reading comprehension and decoding abilities at the end of second grade even after controlling for differences in vocabulary and metalinguistic awareness.

Knowledge of letters. In alphabetic writing systems, decoding printed words involves the translation of units of print to units of sound, and writing involves translating units of sound into units of print. At the most basic level, this task requires knowing the names of letters. A beginning reader who does not know the letters of the alphabet cannot learn to which sounds those letters relate (Bond & Dykstra, 1967; Chall, 1967; Mason, 1980). In some cases, this task is facilitated by the fact that some letter names provide clues to their sounds. Knowledge of the alphabet at entry into school is one of the strongest single predictors of short- and long-term literacy success (Stevenson & Newman, 1986); however, interventions that teach children letter names do not seem to produce large effects on reading acquisition (Adams, 1990). Because of this finding, Adams (1990) suggested that higher levels of letter knowledge may reflect a greater underlying knowledge of and familiarity with print or other literacy-related processes. Consequently, whereas teaching letter names may increase surface letter knowledge, it may not affect other underlying literacy-related processes, such as print familiarity. A number of recent studies, however, have indicated that letter knowledge significantly influences the acquisition of some phonological sensitivity skills (e.g., Bowey, 1994; Johnston, Anderson, & Holligan, 1996; Stahl & Murray, 1994) as defined below.

Linguistic awareness. Just as children must be able to discriminate units of print (e.g., letters, words, sentences), so too must they be able to discriminate units of language (e.g., phonemes, words, propositions) to read successfully. Normally developing children in the late preschool period can discriminate among and within these units of language. Linguistic discrimination, however, is not the same as linguistic awareness. Linguistic awareness is metalinguistic. It involves the ability to take language as a cognitive object and to possess information about the manner in which language is constructed and used. A child might well be able to discriminate the difference between two words as evidenced by auditory evoked responses (Molfese, 1990; Molfese, Morris, & Romski, 1990) or by simply being able to respond appropriately to linguistic units incorporating these distinctions (e.g., "Show me the hat. Now touch the bat"). However, the same child might have no awareness that "bat" and "bat" are units of language called words that are constructed from units of sound that share two phonemes and differ on a third.

Linguistic awareness is not an all-or-none phenomenon. A child may be aware of some portion of the way language is organized (e.g., that propositions are formed from words) without being aware of other aspects of linguistic organization (e.g., that words are formed from phonemes). Evidence suggests a developmental hierarchy of children's sensitivity to linguistic units (e.g., measured by the ability to segment a spoken sentence or word). For example, children seem to achieve syllabic sensitivity earlier than they achieve sensitivity to phonemes (e.g., Fox & Routh, 1975; Liberman, Shankweiler, Fischer, & Carter, 1974), and children's sensitivity to intrasyllabic units and rhyme normally precedes their sensitivity to phonemes (e.g., MacLean, Bryant, & Bradley, 1987; Treiman, 1992). The operationalization of the construct of linguistic awareness is further complicated by the fact that tasks used in assessment vary considerably in the cognitive and linguistic demands they place on children within particular levels of language. For example, phoneme isolation (e.g., "What
is the first sound in fish?”) is substantially easier for kindergartners than phoneme deletion (e.g., “What would fish sound like if you took away the /f/ sound?”; Stahl & Murray, 1994; Stanovich, Cunningham, & Cramer, 1984), even though both are measures of phonological sensitivity that appear to call on the same phonological insights.

A growing body of research indicates that individual differences in phonological sensitivity are causally related to the rate of acquisition of reading skills (Bradley & Bryant, 1983, 1985; Mann & Liberman, 1984; Share et al., 1984; Stanovich, Cunningham, & Freeman, 1984; Wagner & Torgesen, 1987). Children who are better at detecting syllables, rhymes, or phonemes are quicker to learn to read (i.e., decode words), and this relation is present even after variability in reading skill due to intelligence, receptive vocabulary, memory skills, and social class is partialled out (e.g., Bryant, MacLean, Bradley, & Crossland, 1990; MacLean et al., 1987; Wagner, Torgesen, & Rashotte, 1994). Moreover, the relation appears to be reciprocal. That is, phonological sensitivity is critical to learning to read, and learning to read increases phonological sensitivity (e.g., Perfetti, Beck, Bell, & Hughes, 1987; Wagner et al., 1994). Phonological sensitivity is also related to children’s spelling abilities (e.g., Bryant et al., 1990).

Nearly all research on linguistic awareness in emergent literacy has focused on phonological sensitivity (i.e., that words are constructed from sounds) rather than higher levels of linguistic awareness (e.g., that propositions are formed from words). It is possible that awareness of other levels of linguistic structure (e.g., words as constituents of propositions, events as components of narratives or stories; Bruner, 1986; Mandler & Johnson, 1977; Nelson, 1996) assumes greater importance when the child is reading for understanding rather than reading to decode. For instance, syntactic awareness and pragmatic awareness (i.e., comprehension monitoring) appear to play a role in reading comprehension and a lesser role in word identification (Chaney, 1992; Tunmer & Hoover, 1992; Tunmer et al., 1988; Tunmer, Nesdale, & Wright, 1987).

**Phoneme-grapheme correspondence.** Understanding the links between phonemes and alphabet letters is either the most advanced of the emergent literacy skills or the least advanced of the conventional literacy skills a child must acquire, depending on where one draws the boundary between conventional literacy and emergent literacy. Knowledge of phoneme-grapheme correspondence requires knowledge of both the sounds of individual letters and combinations of letters (e.g., the /f/ sound in the graphemes f and ph). It is assessed, for example, by showing the child letters and asking, “What sounds do these letters make?” At later stages, it is assessed by phonological recoding tasks (i.e., reading pseudowords), which also involve the ability to blend the individual phonemes. Children who have better phonological recoding ability have higher levels of reading achievement (Gough & Walsh, 1991; Hoover & Gough, 1990; Jorm, Share, MacLean, & Matthews, 1984; Juel, 1988; Tunmer et al., 1988).

**Emergent reading.** Pretending to read and reading environmental print are examples of emergent reading (Teale & Sulzby, 1986). Before children can read words, they are often able to recognize labels, signs, and other forms of environmental print. Advocates within the emergent literacy movement (e.g., Goodman, 1986) have suggested that this skill demonstrates children’s ability to derive the meaning of text within context. However, studies have not generally supported a direct causal link between the ability to read environmental print and later word identification skills (Gough, 1993; Masonheimer, Drum, & Ehri, 1984; Stahl & Murray, 1993). Purcell-Gates (1996; Purcell-Gates & Dahl, 1991) has assessed a factor that she terms “intentionality” by asking children what printed words on a page might signify. Children who indicate that they understand the functions of print (e.g., that the print tells a story or gives directions) have high levels of print intentionality. In contrast, children who have low levels of print intentionality do not indicate that they understand that print is a symbol system with linguistic meaning (e.g., they may simply name letters when asked what words might signify). Purcell-Gates (1996) found that children’s understanding of the functions of print (i.e., intentionality) was related to children’s print concepts, understanding of the alphabetic principle, and concepts of writing (i.e., use of letter-like symbols).

A number of qualitative studies have examined how preschool-aged children behave in situations in which reading is typically required in order to uncover the knowledge and beliefs that children may have concerning reading. For example, Ferreiro and Teberosky (1982) conducted an extensive study of 4- to 6-year-old children in Argentina and described what appeared to be an orderly developmental progression of children’s understanding of print. For instance, 4-year-old children recognized the distinction between “just letters” and “something to read” (typically three or more letters). Ferreiro and Teberosky (1982) also reported that children pass through stages where they believe that print is a nonlinguistic representation of an object, for example, a picture or icon, to believing that print codes only parts of the lingu-
tic stream (e.g., the nouns), to understanding that there is a one-to-one correspondence between the print and the language that results from reading.

Sulzby and others (e.g., Pappas & Brown, 1988; Purcell-Gates, 1988; Sulzby, 1985, 1988) have used children’s emergent readings of books to develop an understanding of children’s acquisition of the written language register (i.e., the language common to text) and sense of story. For example, in a longitudinal study Sulzby (1985) asked 24 4- to 6-year-old children to “read” one of their favorite storybooks at the beginning and end of kindergarten. At the beginning of kindergarten, she found that most children produced story-like readings that were governed primarily by the pictures, and approximately half of these story-like readings had oral language form (e.g., labeling of pictures) rather than written language form. At the end of kindergarten, although children had retained their relative rank of story reading complexity, most had advanced to a more complex level of emergent reading (e.g., readings governed by pictures but using written language form). Sulzby (1985) provided additional data from a cross-sectional study showing a developmental pattern of increasingly sophisticated emergent reading in 2- to 5-year-old children.

**Emergent writing.** Behaviors such as pretending to write and learning to write letters are examples of emergent writing. Many adults have had the experience of seeing a young child scribble some indecipherable marks on paper and then ask an adult to read what it says. The child is indicating that he or she knows print has meaning without yet knowing how to write. There have been a number of descriptive studies of children’s emergent writing (e.g., Ferreiro & Teberosky, 1982; Harste, Woodward, & Burke, 1984; Sulzby, 1986). Most of these studies converge on a common developmental pattern of children’s emergent writing. It appears that very young children treat writing in a pictographic sense that includes using drawing as writing or using scribble-like markings with meaning only to the child. Later, children begin to use different letters, numbers, and letter-like forms to represent the different things being written about. In this phase, children may reorder relatively few symbols to stand for the different words. Often in this phase, characteristics of the thing written are encoded into the word (e.g., a bear is bigger than a duck, therefore, the word “bear” has to be bigger than the word “duck”). For many children in the late preschool period, letters come to stand for the different syllables in words, and from this stage children finally begin to use letters to represent the individual sounds (e.g., phonemes) in words. Even when children use letters to represent individual sounds, they often do so in an idiosyncratic way (e.g., representing only the first and last sounds of a word as in the spelling “BK” for the word “bike”). This type of writing has been termed “invented spelling,” which consists of writing words following a more or less phonological, rather than orthographic, strategy. Some evidence suggests that invented spelling is a good vehicle for bringing about phonological sensitivity and knowledge of grapheme-phoneme correspondence (e.g., Clarke, 1988; Ehri, 1988). Whereas there is evidence of age-graded emergence of these writing patterns, children often move between levels of writing depending on the writing task (e.g., invented spelling for short familiar words, idiosyncratic use of letters for sentences) but tend to show stability within task (Ferreiro & Teberosky, 1982; Sulzby, Barnhardt, & Hieshima, 1989). Interestingly, children do not always employ phonetic decoding to reread their text even when it was apparently encoded phonetically (i.e., using invented spelling). For instance, when asked to reread their writing children may not track the print or may locate words in different places across rereadings (e.g., Ferreiro & Teberosky, 1982).

**Other cognitive factors.** A number of more general cognitive factors have also been implicated in the acquisition of emergent and conventional literacy skills. Phonological memory (i.e., the ability to immediately recall nonwords or digit series of increasing length presented orally) appears to be related to children’s rate of vocabulary acquisition (Gathercole, Willis, Emslie, & Baddeley, 1992) and reading acquisition (Gathercole, Willis, & Baddeley, 1991; Rohl & Pratt, 1995; Wagner et al., 1994). Rapid naming (i.e., naming arrays of digits, letters, colors, or objects as quickly as possible) taps phonological access to long-term memory (e.g., Wagner & Torgeson, 1987), and recent data suggest that poor performance on rapid naming tasks may discriminate poor readers from good readers independently of phonological sensitivity (McBride-Chang & Manis, 1996). Whereas both phonological memory and rapid naming are related to phonological sensitivity, evidence indicates that they are distinct processes, particularly in older children (e.g., Wagner et al., 1994).

**Print motivation.** Print motivation refers to children’s relative interest in reading and writing activities. Many advocates of emergent literacy argue that children are interested in literacy and, therefore, make active attempts to develop an understanding of print. Several studies have attempted to assess children’s interest in literacy using a variety of methods such as parent-report of child interest, parent-report of the frequency of requests for shared read-
ing, examining the proportion of time children spend in literacy-related activities relative to nonliteracy activities (e.g., Lomax, 1977; Thomas, 1984), or by examining degree of engagement during shared reading (Crain-Thoresen & Dale, 1992). Some evidence suggests that these early manifestations of print motivation are associated with emergent literacy skills and later reading achievement (e.g., Crain-Thoresen & Dale, 1992; Payne, Whitehurst, & Angell, 1994; Scarborough & Dobrich, 1994; Thomas, 1984). A child who is interested in literacy is more likely to facilitate shared reading interactions, notice print in the environment, ask questions about the meaning of print, and spend more time reading once he or she is able. During the early school years, print motivation may lead children to do more reading on their own, and print exposure is also a predictor of growth in reading achievement for school-aged children (e.g., Cunningham & Stanovich, 1991; Stanovich & West, 1989; West, Stanovich, & Mitchell, 1993).

Summary. From an emergent literacy perspective, children learn much about reading and writing prior to formal schooling. In the narrow sense, children acquire knowledge of vocabulary, syntax, narrative structure, metalinguistic aspects of language, letters, and text that directly relate to the acquisition of conventional reading (i.e., decoding and/or comprehension) and writing. These components of emergent literacy are the beginnings of the skills that a child needs to acquire in order to become literate in the conventional sense. In a broader sense, children acquire knowledge on the functions, uses, conventions, and significance of text. This knowledge may be reflected in activities such as emergent reading and emergent writing, reading environmental print, and general print motivation. These activities may not reflect component skills in the sense that they are connected to decoding, encoding, or comprehension skills directly. Rather, this knowledge may reflect a child’s developing conceptualization of reading and writing and may interact with both formal and informal learning opportunities to advance a child’s acquisition of conventional literacy.

These different areas of literacy knowledge have usually been examined by two different research traditions. The component skills area has focused on relating emergent literacy to conventional reading and writing outcomes but has generally not attended to the development of these skills. This approach has often been eschewed by advocates of emergent literacy because it focuses on the narrow aspects of literacy from an adult perspective. In contrast, the focus on children’s development of broader literacy knowledge has provided rich descriptions of the ways children interact with literacy materials but generally has neither examined the convergent and independent properties of this knowledge nor demonstrated a causal relation between the development of this knowledge and the development of conventional literacy. Information from both approaches has much to add to an understanding of emergent literacy, and an empirical and theoretical synthesis is both required and possible.

Two Domains of Emergent Literacy

Specification of a complete model of how these different components of emergent literacy develop, influence each other, and influence the development of conventional forms of reading and writing in the context of other skills is not possible given current research. However, a broad division is possible. The model we propose is that emergent and conventional literacy consists of two interdependent sets of skills and processes: outside-in and inside-out, as represented in Figure 1 (see Gough, 1991, for a related distinction between decoding and comprehension).

The outside-in units in Figure 1 represent children’s understanding of the context in which the writing they are trying to read (or write) occurs. The inside-out units represent children’s knowledge of the rules for translating the particular writing they are trying to read into sounds (or sounds into print for writing; see Table 1 for a classification of emergent literacy skills following this framework). Imagine a child trying to read the sentence, “She sent off to the very best seed house for five bushels of lupine seed” (Cooney, 1982, p. 21). The ability to decode the letters in this sentence into correct phonological representations (i.e., being able to say the sentence) depends on knowing letters, sounds, links between letters and sounds, punctuation, sentence grammar, and cognitive processes, such as being able to remember and organize these elements into a production sequence. These are inside-out processes, which is to say that they are based on and keyed to the elements of the sentence itself. However, a child could have the requisite inside-out skills to read the sentence aloud and still not read it successfully. What does the sentence mean? Comprehension of all but the simplest of writing depends on knowledge that cannot be found in the word or sentence itself. Who is the “she” referred to in the sentence above? Why is she sending away for seed? Why does she need five bushels? What is lupine? In short what is the narrative, conceptual, and semantic context in which this sentence is found, and how does the sentence make sense within that context? Answering these questions
Fluent reading involves a number of component skills and processes. A reader must decode units of print into units of sound and units of sound into units of language. This is an inside-out process. However, being able to say a written word or series of written words is only a part of reading. The fluent reader must understand those auditory derivations, which involves placing them in the correct conceptual and contextual framework. This is an outside-in process. The bidirectional arrows in the figure illustrate that there is cross talk between different components of reading. For example, the sentence context affects the phonological rendering of the italicized letters in these two phases: “a lead balloon,” “lead me there.”

depends on outside-in processes, which is to say that the child must bring to bear knowledge of the world, semantic knowledge, and knowledge of the written context in which this particular sentence occurred. A child who cannot translate a sequence of graphemes into sounds cannot understand a written sentence, but neither can a child who does not understand anything about the concepts and context in which the sentence occurs. Outside-in and inside-out processes are both essential to reading and work simultaneously in readers who are reading well.

EMERGENT LITERACY ENVIRONMENTS

Robust relations exist between several components of emergent literacy and conventional literacy. What aspects of emergent literacy environments support the development of these and other components of emergent literacy?

Home Literacy Environment

Significant correlations exist between the home literacy environment and preschool children’s language abilities (e.g., Beals, DeTemple, & Dickinson, 1994; Crain-Thoreson & Dale, 1992; Mason, 1980; Mason & Dunning, 1986; Rowe, 1991; Snow et al., 1991; Wells, 1985; Wells, Barnes, & Wells, 1984; and see recent review by Bus, van IJzendoorn, & Pellegrini, 1995). It has also been suggested that the home literacy environment is associated with the development of other components of emergent literacy (e.g., Anderson & Stokes, 1984; Purcell-Gates, 1996; Purcell-Gates & Dahl, 1991; Teale, 1986); however, there has been less quantitative work that has focused on these components.

Language outcomes. The prototypical and iconic aspect of home literacy, shared book reading, provides an extremely rich source of information and opportunity for children to learn language in a developmentally sensitive context (e.g., DeLoache & DeMendoza, 1987; Ninio, 1980; Pellegrini, Brody, & Sigel, 1985; Sénéchal, Cornell, & Broda, 1995; Wheeler, 1983). For instance, Wells (1985) found that approximately 5% of the daily speech of 24-month-old children occurred in the context of storytime. Ninio and Bruner (1978) reported that the most frequent context for maternal labeling of objects was during shared reading. Shared reading and print exposure foster vocabulary development in preschool children (e.g., Cornell, Sénéchal, & Broda, 1988; Elley, 1989; Jenkins, Stein, & Wysocki, 1984; Sénéchal, & Corneliussen, 1993; Sénéchal, LeFevre, Hudson, & Lawson, 1996; Sénéchal, Thomas, & Monker, 1995). Print exposure also has substantial effects on the development of reading skills at older ages when children are already reading (e.g., Allen, Cipielewski, & Stanovich, 1992; Anderson & Freebody, 1981; Cunningham & Stanovich, 1991; Echols, West, Stanovich, & Zehr, 1996; Nagy, Anderson, & Herman, 1987).

Sénéchal et al. (1996) reported that other aspects of the home literacy environment (e.g., number of books in the home, library visits, parents’ own print exposure) were related to children’s vocabulary skills; however, only the frequency of library visits was related to children’s vocabulary after controlling for the effects of children’s print exposure. Payne et al. (1994) found that adult literacy activities (e.g., the amount of time a parent spends reading for pleasure) were not significantly related to children’s language,
which was best predicted by activities that directly involved the child (i.e., frequency of shared reading, number of children's books in the home, frequency of library visits with child). Other aspects of adult-child verbal interactions have also been implicated in the acquisition of some emergent literacy skills. For example, Dickinson and Tabor (1991; see also Beals et al., 1994) reported that features of conversations among parents and children during meals and other conversational interactions (e.g., the proportion of narrative and explanatory talk) contributed to the development of children's decontextualized language skills.

Nonlanguage outcomes. Compared to research examining the relation between home literacy environments and children's oral language skills, there has been relatively little quantitative research concerning home literacy environments and other emergent literacy skills. Both Wells (1985) and Crain-Thoreson and Dale (1992) found that the frequency of shared reading was related to concepts of print measures. Purcell-Gates (1996), in a study of 24 4- to 6-year-old children from low-income families, reported that families in which there were more higher-level literacy events occurring in the home (i.e., reading and writing texts at the level of connected discourse) had children with a higher level of knowledge about the uses and functions of written language, more knowledge of the written language register, and more conventional concepts about print. Mason (1992) reported that shared reading and children's reading and writing at home were associated with children's abilities to label environmental print. Print motivation may also be the product of early experiences with shared reading (e.g., Lomax, 1977; Lonigan, 1994).

Existing studies do not support a direct link between shared reading and growth in phonological skills (e.g., Lonigan, Dyer, & Anthony, 1996; Raz & Bryant, 1990; Whitehurst, 1996a). For example, Lonigan et al. found that growth in preschool phonological sensitivity was related to parental involvement in literacy activities in the home but growth in phonological sensitivity was not associated with shared reading frequency. Recently, Sénechal, LeFevre, Thomas, and Daley (in press) reported that kindergarten and first-grade children's written language knowledge (i.e., print concepts, letter knowledge, invented spelling, word identification) was associated with parental attempts to teach their children about print but not exposure to storybooks. In contrast, children's oral language skills were associated with storybook exposure but not parents' attempts to teach print.

Rhyming skills. Children's early knowledge of and/or experience with rhyme may play a role in the development of phonological sensitivity (e.g., MacLean et al., 1987). Preschool-aged children are able to detect rhyme even when other phonological sensitivity measures are too difficult (e.g., Bradley & Bryant, 1983; Kirtley, Bryant, MacLean, & Bradley, 1989; Lenel & Cantor, 1981; Stanovich, Cunningham, & Freeman, 1984), and this ability predicts subsequent word identification (MacLean et al., 1987; Bryant et al., 1990). The exact nature of the relation between the ability to detect rhyme, phonological awareness, and reading is still the subject of debate (e.g., Cardoso-Martins, 1994). Rhyming may be an early form of phonological sensitivity (Bryant et al., 1990), and/or rhyming may enable children to begin to learn orthographic patterns via analogy (i.e., recognizing common spelling patterns between words that rhyme; Goswami & Bryant, 1992; Walton, 1995). Experiences that teach children about rhyme sensitize them to the sound structure of words (e.g., Bradley & Bryant, 1983); however, a specific connection between such experiences in the home and rhyming ability has yet to be demonstrated.

Preschool and Teacher Effects

Children's day-care and preschool environments can have positive effects on children's emergent literacy (Bryant, Burchinal, Lau, & Sparling, 1994; Scarr & McCartney, 1988; Schiecker, White, & Jacobs, 1991). The most commonly used measure of day-care quality is the Early Childhood Environmental Rating Scale (ECERS; Harms & Clifford, 1980), a rating scale that provides an assessment of aspects of the curriculum, the environment, teacher-child interactions, and teaching practices within the classroom. Bryant et al. (1994) measured the quality of 32 Head Start classrooms in North Carolina using the ECERS, and the cognitive ability and achievement of children from these classes. Quality of home environment was measured using the Home Screening Questionnaire (Frankenberg & Coons, 1986), which includes questions about the language stimulation in the environment, schedule and organization at home, use of punishment by parents, and family activities, and was completed during an interview with the parent. When home environment was controlled statistically, ECERS scores still predicted children's cognitive and achievement scores.

Whereas the ECERS focuses on very broad classroom and center variables, Crone (1996) found that dimensions of teacher behavior during shared reading (e.g., dramatic quality, warmth, attempts to en-
gage individual children) related to children’s active involvement in shared reading and individual differences in children’s phonological processing ability on the Developing Skills Checklist (CTB, 1990). Dickinson and Smith (1994) also examined the effects of preschool teachers’ interactional styles during shared reading on the vocabulary and story comprehension abilities of 25 4-year-old children in 25 different preschool classrooms. They found that the proportion of teacher and child talk during reading that included analysis of characters or events, predictions of coming events, and discussion of vocabulary (e.g., definitions, comments about sounds or functions of words) was significantly associated with a higher level of children’s vocabulary and story comprehension even when controlling for the total amount of teacher and child speech. Other research has also found that characteristics of preschool settings such as opportunities to engage in shared reading, writing activities, and teachers’ child-direct speech is associated with higher levels of vocabulary, print concepts, and story comprehension (e.g., Dickinson & Tabors, 1991).

Causal Modeling

There have been relatively few studies examining relations between the multidimensional aspects of emergent literacy, emergent literacy environments, and reading and writing development over time (but see Mason, 1992). Such work is important because of the tangled web of correlations among emergent literacy environments, emergent literacy skills, and conventional literacy skills. Bivariate or cross-sectional studies are likely to generate an incomplete and distorted picture of the causal pathways to conventional literacy. Whitehurst (1996a) developed a structural equation model to explain how children’s emergent literacy skills evolve over time and how children’s literacy environments relate to these skills and reading acquisition for a group of 200 4-year-old Head Start children followed until they were 7 years old. A simplified version of this model is shown in Figure 2.

A number of important conclusions can be derived from the model. First, inside-out emergent literacy skills, including phonological sensitivity, are as critical to reading acquisition for a low-income population as they are for the socioeconomically heterogeneous samples that have been studied previously (e.g., Share et al., 1984). The variable reflecting inside-out skills (i.e., letter knowledge, phonological sensitivity, emergent writing) is the strongest predictor of reading at the end of first grade. Second, there is strong continuity between outside-in emergent literacy skills (i.e., receptive and expressive language) from preschool into the early school years and similarly strong continuity between inside-out emergent literacy skills and measures of conventional literacy (i.e., word decoding, spelling, comprehension) during the same period. Third, outside-in and inside-out emergent literacy skills become increasingly independent from preschool to first grade when reading involves mainly learning to decode words. Language skills (outside-in skills), however, again play a significant role in reading in the second grade as the focus shifts from decoding to reading comprehension. Fourth, the main effects of the literacy environment on children’s emergent literacy skills are indirect through their effects on children’s language skills. Finally, the model identifies only number of siblings in the home as a developmental precursor of inside-out emergent literacy skills. Perhaps children need to engage in a lot of conversation with adults to develop phonological sensitivity, and perhaps these experiences are compromised in families in which adult time has to be shared among many children.

Clearly this is an incomplete model of the development of emergent literacy skills and conventional literacy skills in children from low-income families, limited as it is to home variables, and providing much more information with regard to origins of outside-in emergent literacy than origins of inside-out emergent literacy. However, these results indicate that the experiences that lead to the development of inside-out skills are not the same as those that lead to the development of outside-in skills (i.e., language), and that early differences in these areas are relatively stable across time, a conclusion supported in other populations (Byrne, Freebody, & Gates, 1992; Wagner et al., 1994).

SOCIAL CLASS DIFFERENCES IN EMERGENT LITERACY

According to the 1991 Carnegie Foundation report, Ready to Learn: A Mandate for the Nation, 35% of children in the United States enter public schools with such low levels of the skills and motivation that are needed as starting points in our current educational system that they are at substantial risk of early academic difficulties. Although one might quarrel with definitions and causes, there seems to be little doubt that there is a significant mismatch between what many children bring to their first school experience and what schools expect of them if they are to succeed. This problem, often called school readiness, is strongly linked to family income. When schools are
ranked by the median socioeconomic status of their students’ families, SES correlates .68 with academic achievement (White, 1982). The National Assessment of Educational Progress (1991) has documented substantial differences in the reading and writing ability of children as a function of the economic level of their parents. Socioeconomic status is also one of the strongest predictors of performance differences in children at the beginning of first grade (Entwisle & Alexander, cited in Alexander & Entwisle, 1988, p. 99). These performance differences have been reported in reading achievement and a number of the emergent literacy skills outlined previously.

The relation between the skills with which children enter school and their later academic performance is strikingly stable (Baydar, Brooks-Gunn, & Furstenberg, 1993; Stevenson & Newman, 1986; Tramontana, Hooper, & Selzer, 1988). For instance, Juel (1988) reported that the probability that a child would remain a poor reader at the end of the fourth grade if he or she was a poor reader at the end of the first grade was .88. Moreover, as noted by Stanovich (e.g., 1986), deficits in reading skills initially may be relatively specific, but this specificity breaks down as the reciprocal relation between reading and achievement in other areas increases.

Emergent Literacy Skills

Children from low-income families are at risk for reading difficulties (e.g., Dubow & Ippolito, 1994; Juel, Griffith, & Gough, 1986; Smith & Dixon, 1995) and are also more likely to be slow in the development of language skills (e.g., Juel et al., 1986; Lonigan & Whitehurst, in press; Whitehurst, 1996b). In addition, there are SES differences in children’s letter
knowledge and phonological sensitivity prior to school entry (Bowey, 1995; Lonigan, Burgess, Anthony, & Barker, in press; MacLean et al., 1987; Raz & Bryant, 1990), and these differences in phonological sensitivity relate to later differences in word decoding skills (Raz & Bryant, 1990).

Emergent Literacy Experiences

There are large social class differences in children’s exposure to experiences that might support the development of emergent literacy skills. Ninio (1980) found that mothers from lower-SES groups engaged in fewer teaching behaviors during shared reading than mothers from middle-class groups. Numerous studies have documented differences in the pattern of book ownership and frequency of shared reading between lower- versus higher-SES families (e.g., Anderson & Stokes, 1984; Feitelson & Goldstein, 1986; Heath, 1982; Raz & Bryant, 1990; Teale, 1986). For instance, McCormick and Mason (1986) reported that 47% of their sample of public-aid parents reported no alphabet books in the home, whereas only 3% of their sample of professional parents reported the absence of such books. Adams (1990, p. 85) estimated that the typical middle-class child enters first grade with 1,000–1,700 hours of one-on-one picture book reading, whereas a child from a low-income family averages just 25 hours.

INTERVENTIONS TO ENHANCE EMERGENT LITERACY

On the assumption that enhancing emergent literacy skills will increase subsequent reading achievement, interventions have been developed to improve one or more components of emergent literacy. These studies have potential implications for the theory of emergent literacy and the development of conventional literacy as well as for creating cost-effective programs for low-income and other children that produce substantial and lasting benefits for children’s literacy.

Dialogic Reading

Whitehurst and colleagues have demonstrated that a program of shared-reading, called dialogic reading, can produce substantial changes in preschool children’s language skills. Dialogic reading involves several changes in the way adults typically read books to children. Central to these changes is a shift in roles. During typical shared-reading, the adult reads and the child listens, but in dialogic reading the child learns to become the storyteller. The adult assumes the role of an active listener, asking questions, adding information, and prompting the child to increase the sophistication of descriptions of the material in the picture book. A child’s responses to the book are encouraged through praise and repetition, and more sophisticated responses are encouraged by expansions of the child’s utterances and by more challenging questions from the adult reading partner. For 2- and 3-year-olds, questions from adults focus on individual pages in a book, asking the child to describe objects, actions, and events on the page (e.g., “What is this? What color is the duck? What is the duck doing?”). For 4- and 5-year-olds questions increasingly focus on the narrative as a whole or on relations between the book and the child’s life (e.g., “Have you ever seen a duck swimming? What did it look like?”).

Dialogic reading has been shown to produce larger effects on the language skills of children from middle- to upper-income families than a similar amount of typical picture book reading (Arnold, Lonigan, Whitehurst, & Epstein, 1994; Whitehurst et al., 1988). Studies conducted with children from low-income families attending child care demonstrate that both child-care teachers and parents using a 6-week small-group center-based or home dialogic reading intervention can produce substantial positive changes in the development of children’s language as measured by standardized and naturalistic measures (Lonigan & Whitehurst, in press; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, Arnold, et al., 1994) that are maintained 6 months following the intervention (Whitehurst, Arnold, et al., 1994).

Whitehurst evaluated the combination of dialogic reading and a center-based phonological sensitivity training program adapted from Byrne and Fielding-Barnsley’s (1991a) Sound Foundations with a group of 357 4-year-olds attending eight different Head Start centers (Whitehurst, 1997a). Children in control classrooms received the regular Head Start curriculum, and children in the intervention condition were involved in small-group dialogic reading several times each week in intervention classrooms over the course of the school year. These same children brought home the book that was being used in the classroom each week for use with their primary caregivers. Results at the end of the Head Start year showed large and educationally significant effects of the intervention on a writing factor and a concepts of print factor but no significant effects on a linguistic awareness factor; effects on language were mediated by the degree to which parents were involved in the at-home component of the shared reading program. Effects on
language, writing, and print knowledge favoring children in the intervention condition were still significant a year later at the end of kindergarten, with effect sizes in these three domains ranging from $\frac{1}{2}$ to $\frac{1}{2}$ a standard deviation (Whitehurst, 1997a). Consistent with other research reported above, shared reading interventions do not appear to result in significant growth in phonological sensitivity (Lonigan, Anthony, Dyer, & Collins, 1995; Whitehurst, Epstein, et al., 1994), demonstrating the relative independence between language and shared reading, on the one hand, and phonological sensitivity, on the other.

It is difficult to implement and maintain an intensive program of shared reading in childcare settings. Substantial variability in center compliance with the dialogic reading program schedule, which significantly moderates the program’s effects, is typical (Lonigan & Whitehurst, in press; Whitehurst, Arnold, et al., 1994), and centers tend not to continue the necessary small-group reading outside of the experimental context (Whitehurst, Arnold, et al., 1994). Successful alternatives to child care intervention include outreach from pediatric outpatient settings (e.g., Needlman, Fried, Morley, Taylor, & Zuckerman, 1991), library outreach programs (e.g., Morisset, 1993), and the use of community volunteers (e.g., Lonigan et al., 1995).

Little Books

Even simple emergent literacy interventions can be effective if they are sufficiently intensive. McCormick and Mason (1986) conducted two quasi-experimental studies evaluating the efficacy of providing their “Little Books” to prereaders from low- and middle-income families. Little Books are small, easy-to-read books that contain simple words, simple illustrations, and repetitive text. Intervention group children in the first study were given a Little Book to keep, their parents were provided additional Little Books and a printed guideline for their use, and more Little Books were mailed to the child’s home during the summer and fall. The intervention group of the second study received only the first packet of Little Books. Emergent literacy skills were assessed at the beginning and end of the following school year. In the first study, the intervention group scored higher than the control group on several composite measures, including word knowledge, spelling knowledge, and number of words read from the Little Books. In the second study, the intervention group read more words from the Little Books but did not differ on any other measure.

Changes in Preschool Emergent Literacy Environments

Changes in children’s preschool environments can have an impact on children’s emergent literacy skills. For example, Neuman and Roskos (1993) examined the effects of creating literacy-rich play settings in Head Start centers. They randomly assigned eight different Head Start classrooms to either a no-treatment control group, an office play setting with adult monitor group, or an office play setting with adult interaction group. The office play settings were structured to provide children with opportunities to interact with print and writing in the form of signs and labels, functional print items (e.g., calendar, telephone book), and writing materials. In the adult interaction group, a volunteer parent was instructed to assist children in their literacy play (e.g., by modeling literacy behavior like “taking an order” or writing a list). In the adult monitor group, a volunteer adult was instructed to simply observe children in their play and take notes on the quality of the children’s play behavior. Prior to the intervention, all of the classrooms had little literacy materials available to the children. For instance, each classroom had approximately 10 books in a library corner but no writing materials freely available to the children. Across the intervention, children had access to these literacy-play settings 3 days each week for 5 months. Observations across the intervention period indicated that the proportion of literacy behaviors increased in the classrooms with the office-play settings. At the end of the 5 months, 138 children were administered three measures of emergent literacy. Children in both intervention conditions scored higher on an environmental print task than children in the control classrooms, and children in the adult interaction classrooms scored higher than children in the adult monitor classrooms on this measure. Children in both intervention classrooms also scored higher than children in the control classrooms on a measure of labeling functional print items (e.g., a calendar, a typed business letter) but not on a measure of describing the functions of the print items.

Intergenerational Family Literacy

Intergenerational literacy programs focus intervention efforts on the family, rather than on the child or caregiver separately, based on the hypothesis that maximal effects will be achieved by combining the positive effects of early childhood intervention with a facilitative effect of better early parenting, improvement in family income, increased adult literacy, and
enhanced parental support for children’s school-related functioning (St. Pierre, Layzer, & Barnes, 1995). Most programs integrate early childhood intervention, parenting skills education, and other parent education (e.g., literacy, job skills, vocational training), but they differ substantially in the intensity and mode of delivery of services.

Minimal effects have been observed on children’s short-term cognitive, behavioral, or health-related outcomes in evaluation studies. For instance, in a randomized experimental design, children participating in the U.S. Department of Education’s national family literacy initiative, Even Start, gained no more than children in the control condition on language or school readiness skills. In a study of a larger Even Start sample, a medium effect was reported on school readiness skills; however, this difference was not maintained once children entered school, and it was found in a nonexperimental design in which gains were estimated against projected normative growth rates rather than against a control or comparison group (St. Pierre et al., 1995).

In contrast to the weak effects found on child outcomes, intergenerational literacy programs typically produce positive effects on parent attitudes or behaviors related to literacy or learning (e.g., parent-child interaction, literacy materials in the home) and generate increases in obtaining GED certificates by adults. However, little or no effects are found on formal measures of adult literacy or on family income (St. Pierre et al., 1995).

Phonological Sensitivity Training

As noted above, children’s phonological sensitivity is one of the strongest predictors of later reading achievement. Experimental studies of programs designed to teach children phonological sensitivity show positive effects on children’s reading and spelling skills (e.g., Ball & Blachman, 1988; Bradley & Bryant, 1985; Lundberg, Frost, & Petersen, 1988; Torgesen, Morgan, & Davis, 1992; Uhry & Shepherd, 1993), and programs that include letter-sound training (e.g., Ball & Blachman, 1988; Bradley & Bryant, 1985) produce larger results (Wagner, 1996). The majority of these programs teach children how to categorize objects on the basis of certain sounds (e.g., initial phonemes). Other programs explicitly teach children phonemic analysis and synthesis skills. Torgesen et al. (1992) compared the effects of training synthesis skills only to training both analysis and synthesis skills. During a 7 week program, groups of three to five children in the combined training group worked with an adult to learn how to identify and pronounce the initial, final, or middle sounds in two- and three-phoneme words (analysis). These children were then taught how to pronounce words after hearing their phonemes in isolation. Children in the synthesis condition received only the blending training. A control group listened to stories, engaged in discussions about the stories, and answered comprehension questions. Results indicated that both training groups experienced increases in synthesis skills, whereas only the combined group increased in their analysis skills and scored higher than the other two groups on a reading analogue task.

Whereas most phonological sensitivity training studies have been conducted with children at the beginning stages of learning to read (i.e., kindergarten or first grade), Byrne and Fielding-Barnsley (1991b) found that preschool children (M age = 55 months) exposed to 12 weeks of their Sound Foundations program demonstrated greater increases in phonological sensitivity than a group of control children exposed to storybook reading and a semantic categorization program. This intervention program consisted of teaching children six phonemes in the initial and final positions of words by drawing attention to the sound in words, discussing how the sound is made by the mouth, reciting rhymes with the phoneme in the appropriate position, and encouraging children to find objects in a poster that had the sound in the initial (or final) position. Worksheets in which children identified and colored items with the phoneme in the correct position were used, and the letter for the phoneme was displayed. A final stage of training introduced children to two card games that required matching objects on the basis of initial or final phonemes. Some of the gains children in Byrne and Fielding-Barnsley (1991b) made were maintained through the first and second grades (Byrne & Fielding-Barnsley, 1993, 1995). However, an uncontrolled trial using regular preschool teachers and classrooms found substantially smaller effects and a large degree of variability in the fidelity of program implementation (Byrne & Fielding-Barnsley, 1995), findings which call into question the potential success of a staff-implemented phonological training program under nonexperimental conditions in children’s preschool environments.

Whole Language Instruction

The whole language approach to beginning reading can be considered an extension of an emergent literacy philosophy to reading instruction. Whole language instruction involves an increased emphasis on the outside-in components of reading compared
with the inside-out components (e.g., see Adams, 1991; Adams & Bruck, 1995). Whole language adherents believe that there are strong parallels between the acquisition of reading and the acquisition of oral language, and they therefore argue that reading acquisition would occur as easily and naturally as language acquisition if the meaning and purpose of text were emphasized. However, Liberman and Liberman (1992; see also Perfetti, 1991) note many differences between oral language and text that suggest that the parallel between language and reading acquisition does not stand up to careful scrutiny. Additionally, studies concerning skilled reading clearly disconfirm a core assumption of whole language, that skilled reading involves a “psycholinguistic guessing game” (Goodman, 1967) in which the reader deduces unfamiliar words from their context. Skilled readers process each individual word when reading text (Carpenter & Just, 1981; Just & Carpenter, 1987; Patterson & Coltheart, 1987) and are unable to guess a word correctly from context more than 25% of the time (e.g., Gough, Alford, & Holley-Wilcox, 1981; Perfetti, Goldman, & Hogaboam, 1979). Contrary to the whole language position, it is only for individuals whose word identification skills are poor that contextual cues contribute to the accuracy and speed of word identification (e.g., Bruck, 1990; Perfetti et al., 1979; Simons & Leu, 1987; Stanovich, 1981).

As contentious as the debate between advocates of whole language and code-based instruction (e.g., emphasis on phonics and other inside-out units) has often been, it is important to recognize that there are significant points of overlap. Indeed, our conceptual model in Figure 1 indicates that skilled reading and writing inseparably involve both inside-out and outside-in processes and skills. Components of phonological sensitivity or phonics instruction can be successfully incorporated into an instructional program in which the functions, meanings, and value of text are emphasized (Castle, Riach, & Nicholson, 1994; Foorman, Francis, Noy, & Liberman, 1991; Hatcher, Hulme, & Ellis, 1994; McGuinness, McGuinness, & Donohue, 1995; Stanovich & Stanovich, 1995; Vellutino, 1991). Results of a meta-analysis by Stahl, McKenna, and Pagnucco (1994) indicate that instructional programs that include both whole language (outside-in) and skills-based (inside-out) components produce positive effects on both achievement and attitudes toward reading.

That does not mean, however, that an empirically guided instructional strategy for beginning reading allows free choice of instructional components. A large research literature consistently demonstrates that skills-based instruction (e.g., phonics) produces superior results in reading skills in comparison to reading instruction that does not include a skills emphasis (Adams & Bruck, 1993, 1995; Stanovich & Stanovich, 1995; Vellutino, 1991). This result is obtained with children from middle- and upper-income families as well as with children from lower-income families (Stanovich & Stanovich, 1995). In the context of this research, whole language is the useful handmaiden to code-based instruction; it is not a successful stand-alone approach for many children. Although most children will learn to read regardless of the instructional strategy to which they are exposed, a substantial number of children will have difficulty. Recent data indicate that those children who benefit least from typical “extra-help” remediation are those with phonological sensitivity deficits (Vellutino et al., 1996), a finding that highlights the importance of skills-based instruction for the at-risk reader.

A LOOK TO THE FUTURE

Similar to its subject matter, the study of emergent literacy is in the early stages of development. Although the current state of the area provides evidence of a number of paths through which children’s acquisition of reading and writing can be understood, there are many questions without answers. It seems clear that well-developed language skills, letter knowledge, and some form of phonological sensitivity are necessary for reading and writing, and that the origins of these components of emergent literacy are found during the preschool years. Preschool measures of these components predict subsequent reading achievement (see Table 1 and Figure 2). However, the interactions between, or relative independence of, various emergent literacy skills are not clear. Consequently, a well-elaborated developmental model of emergent literacy is not yet possible. It is clear that aspects of the home literacy environment, such as shared reading, benefit children’s language development, and that there are a number of interventions that can be used to enhance both language and phonological sensitivity during the preschool period. This brief review suggests a number of research and social policy initiatives that will expand knowledge of emergent literacy and incorporate what is already known into current practices. Several of these points are expanded below.

Directions for Future Research

Different domains of emergent literacy. Most research has not distinguished between different forms of emergent literacy experience and different forms of
emergent literacy skills. Typically one finds studies involving a single measure of emergent literacy experience (e.g., frequency of shared reading) and a single measure of emergent literacy outcome (e.g., preschool language use). The predominance of such univariate approaches, coupled with methodological weaknesses in terms of sample size and statistical treatment, may be the reason one recent review of the literature found relatively weak empirical support for the connection between shared reading and the development of emergent literacy skills (Scarborough & Dobrich, 1994; see critiques by Bus et al., 1995; Lonigan, 1994). A number of studies indicate clearly the need to separate different types of emergent literacy skill and to question whether each of those types of skill arises from the same matrix of experience (e.g., Sénéchal et al., in press; Whitehurst, 1996a).

The two domains of emergent literacy (i.e., inside-out and outside-in skills) appear to be most strongly related to reading development at different points in the reading acquisition process. Inside-out emergent literacy skills are critically important in the earliest stage of learning to read when the focus is on decoding text. This is as true in children who are at risk of reading difficulties because of variables that correlate with low-income family background as it is in children who are at risk because of a specific deficit in phonological sensitivity. Outside-in emergent literacy skills are also critical to learning to read, but may play a greater role at the stage at which children begin to read more complex text for meaning and pleasure than in the initial stage of learning to decode (e.g., Snow et al., 1991; Whitehurst, 1996a).

Inside-out and outside-in components of emergent literacy are not the product of the same experiences. Most aspects of children’s emergent literacy environments that are typically measured, including print exposure, are associated with the outside-in skills. Extant data shed little light on the environmental correlates of the inside-out skills. The literature does suggest a number of possible candidates, however. One of these is the opportunity to engage in conversation with adults (Whitehurst, 1996a). For instance, Caravolas and Bruck (1993) reported that development of phonological sensitivity is shaped by frequency and form of phonological input (see also Caravolas, 1993). Similarly, Murray, Stahl, and Ivey (1996) demonstrated that exposure to alphabet books that included letter-sound information resulted in more gains in phonological sensitivity than exposure to alphabet books without letter-sound information, or exposure to storybooks. Regardless of the specific mechanism for these effects, children in low-income groups receive little exposure to these situations (e.g., Heath, 1989; McCormick & Mason, 1986).

**Better integration of research.** For some aspects of emergent literacy (e.g., emergent writing, emergent reading), we know how the skills develop and where they come from but little about their function or utility. For other components (e.g., linguistic awareness), we know what the skills are good for but little about how they develop and their origins. Progress will require an understanding of what aspects of emergent literacy are related to what aspects of reading and writing, and what features of emergent literacy environments are related to what aspects of emergent literacy. Localization of these effects is likely to change as the demands of literacy acquisition change (i.e., from primarily decoding to comprehension). Progress in this domain will be advanced by a synthesis of the two research traditions that have examined emergent literacy. Whereas the qualitative approach has provided rich descriptions of children’s emergent literacy, demonstrations of the significance and independence of the observed behaviors is required. The more quantitative-oriented approach has provided important information concerning the emergent literacy skills critical for the transition to conventional literacy; however, questions concerning the origins of these skills need to be addressed. A causal modeling approach may be an effective means of answering some of these questions, and answers to these questions will allow refinement of interventions for emergent literacy and conventional literacy (i.e., reading and writing).

**Longer-term outcomes of interventions.** Short-term results of emergent literacy interventions are promising enough to both warrant and require long-term outcome studies. Given the evidence that the outside-in skills of emergent literacy significantly relate to learning to read, it is not unreasonable to expect that effects of interventions shown to improve these skills (e.g., Lonigan & Whitehurst, in press; Whitehurst, Arnold et al., 1994) will affect children’s reading and writing outcomes. However, because most of the evidence linking outside-in skills and reading comes from correlational studies, there is little unambiguous evidence that improving outside-in skills through shared reading or other activities will improve later literacy acquisition (e.g., Lonigan, 1994; Scarborough & Dobrich, 1994). Moreover, given that language skills may not have their most significant role in reading achievement until second or third grade (Whitehurst, 1996a), researchers interested in demonstrating long-term effects of early shared reading experiences must be persistent and patient. The interventions themselves must also represent a suffi-
cient dosage in the sense that a few months or a year of increased print exposure in the preschool period may not be enough to sustain language gains through the early elementary school years. Similarly, results of programs to teach the inside-out skills of emergent literacy provide a promising avenue by which children’s early reading and writing can be improved. However, questions remain concerning whether these effects generalize to fluent reading in context for meaning, and how to effectively deliver training in real preschool and kindergarten classrooms.

Implications for Public Policy

Despite these limitations in current knowledge concerning emergent literacy, we believe that existing data support a number of public policy directions concerning both interventions for promoting emergent literacy skills and educational practices concerning the teaching of conventional literacy.

Multifaceted interventions. Because both outside-in and inside-out components are required for eventual reading success, interventions need to target both areas. Interventions that focus on increasing children’s experience with picture books and other literacy materials and the frequency of their verbal interactions with adults around emergent-literacy materials, such as dialogic reading, have their primary effect on the outside-in skills of emergent literacy. Interventions focused on improving phonological processing skills in children have effects on the inside-out skills of emergent literacy. Acquisition of the inside-out skills of emergent literacy requires more explicit teaching than many children receive before they enter school, particularly children from backgrounds of poverty, who are much less likely than their middle-class counterparts to have been exposed to activities such as alphabet boards, learning to print their names, or playing rhyming games.

Developmentally appropriate interventions. Although the evidence indicates that the inside-out skills of emergent literacy can be taught to prereaders and that this training transfers to reading-related tasks, a practical intervention will have to be much more developmentally appropriate in technique and much broader in content than the laboratory-like methods that have been employed to date. A primary criterion for developmentally appropriate practice at the preschool level is that children be allowed to learn through active exploration and interaction (Bredekamp, 1986). Even if one could overcome the practical barriers of training teachers to implement a curriculum for inside-out emergent skills and design teaching materials that would sustain children’s interest over an extended period, it would be impossible to have teacher-to-child ratios that would allow children to proceed individually at their own pace. Moreover, teacher-led instruction to groups of children would simply require too much sitting still, too much attending to the teacher, and too much feedback of right and wrong to be considered developmentally appropriate for preschoolers.

Computer-based interventions. We believe that computer-based technology is the most promising method for dealing with these limitations and effectively teaching inside-out emergent literacy skills in preschool and kindergarten settings. There is now a large literature demonstrating that preschoolers can interact successfully with computers both in terms of sustained interest and substantive gains in knowledge (e.g., Lepper & Gurtner, 1989). Well-designed software allows children to learn through active exploration and interaction. Preliminary evidence points to the potential effectiveness of software designed to teach phonological sensitivity skills to children (Barker & Torgesen, 1995; Foster, Erickson, Foster, Brinkman, & Torgesen, 1994).

Foster et al. (1994) conducted two experiments in which preschool and kindergarten children were randomly assigned to receive either their standard school curriculum or between 5 and 8 hours of exposure to DaisyQuest (Erickson, Foster, Foster, Torgesen, & Packer, 1992), a computer program designed to teach phonological sensitivity in the context of an interactive adventure game. Children in the experimental group in both studies demonstrated significant and large gains in phonological skills compared to the children in the no-treatment control group. The obtained effect sizes of 1.05 standard deviation units on tests of phonological sensitivity compared favorably to longer teacher-led programs with older children (e.g., Torgesen et al., 1992). In a second study, Barker and Torgesen (1995) examined the effectiveness of the DaisyQuest program with a group of 54 at-risk first-grade children who were randomly assigned to either an experimental or control group. Children in the experimental group received approximately 8 hours of exposure to the program, and children in the control group received an equal amount of exposure to computer programs designed to teach early math skills or other reading skills. Exposure to the DaisyQuest program produced significant and large improvements in children’s phonological sensitivity and word identification skills compared to the control groups (i.e., an effect size of 1.1 standard deviation units was obtained on the measure of phoneme segmentation).
Dangers of a critical period model. One of the dangers of the assumption in the whole language movement that learning to read is similar to learning to talk is the implication that there is a "critical period" for learning to read and write as there may be for learning to talk. Under this scenario, children who are at risk for problems in learning to read must receive intervention early if they are to become literate. In this context, deficiencies in children's emergent literacy experience of the types evidenced by many children from low-income backgrounds are thought to doom them to reading failure in elementary school. Although we have documented strong correlations between emergent literacy skills and later reading achievement, these findings are descriptive, not prescriptive.

This point is illustrated by data from Whitehurst (1997b) on the differential course of development of two groups of children who started and ended Head Start within programs run in the same suburban county by the same Head Start agency, but in two different locations approximately 15 miles apart. The children entered and exited Head Start at very similar and relatively low levels of development on language and other emergent literacy skills and then, depending on the location of their Head Start center, transitioned into either school district P or school district C. District P was a demographically mixed and relatively low levels of development on language and other emergent literacy skills and then, depending on the location of their Head Start center, transitioned into either school district P or school district C. District P was a demographically mixed and stable district serving free lunch (an index of poverty) to 34% of its students, while district C was a district in demographic flux as it served increasing numbers of children of recent non-English-speaking immigrants from central America; district C served free lunch to 58% of its children.

Figure 3 plots Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 1981) scores on four occasions, starting with entry into Head Start, again on exit from Head Start, again on exit from kindergarten, and again on exit from first grade. The final data points are scores on the Wide Range Achievement Test Word Reading subscale (WRAT) (Jastak & Wilkinson, 1984) on exit from first grade. Note that for children in district C, growth is a smoothly decelerating function and that WRAT scores at the end of first grade are exactly at the same level as PPVT scores. In contrast, children in district P show a bigger jump in PPVT scores from Head Start to kindergarten than do their peers in district C. Further, and here is the important point, their word-reading skills at the end of first grade are nearly a whole standard deviation higher than their PPVT scores and nearly a whole standard deviation higher than the reading scores of their peers in district C. Children in district P, who started Head Start nearly two standard deviations below the mean in language abilities and thus could be considered at very high risk of reading failure, are close to the mean of the population on reading ability at the end of first grade. In contrast, their peers in district C, who were indistinguishable from the district P children on skill measures taken during Head Start and on measures of family demographics, are failing at reading at the end of first grade. Presumably, the differences between the reading outcomes of these two groups of children are due to differences in the effectiveness of instruction across the two school districts. The striking contrast between the academic fates of these two groups of children should serve as a warning against the view that deficiencies in emergent literacy skills necessarily prevent effective reading instruction.

Literacy is a relatively late development in the history of the human species. It is not a spontaneous achievement as evidenced by the fact that even in industrialized societies such as the United States the number of adults who are not functionally literate hovers around 20% (e.g., National Center for Educational Statistics, 1996). Conventional literacy consists of a set of skills that must be taught and learned. Learning to play the piano would be a more appropriate model for learning to read and write than would learning to talk. Clearly, the more piano lessons a person has and the more that person practices, the better that person will play the piano, but the person who starts taking piano lessons at age 10 and continues until age 16 is not necessarily at a disadvantage compared to the person who starts at age 6 and continues until age 12 (e.g., Ericsson, Krampe, & Tesch-Romer, 1993). Switching from playing the piano to reading, the worldwide success of adult literacy programs provides clear evidence that one can be taught to read at any age from late preschool through adulthood. In addition, there is little if any evidence that the underlying inside-out components of literacy are age-graded. For example, Morais, Content, Bertelson, and Cary (1988) found that Portuguese illiterate adults could quickly learn to perform a pseudoword phoneme deletion task when provided with corrective feedback and instructions.

The reason that emergent literacy skills are important for children entering elementary school is not that children with low levels of those skills cannot succeed in the task of learning to read. Rather, the reason is that schools provide an age-graded rather than skills-graded curriculum in which early delays are magnified at each additional step as the gap increases between what children bring to the curriculum and what the curriculum demands. To return to the model of piano playing, it would be as if the per-
Figure 3 These longitudinal data represent receptive language scores (PPVT) and reading scores (WRAT) for two groups of children from low-income families who entered and exited Head Start with similar levels of language and other emergent literacy skills. Children then transitioned into either school district C (N = 48 children) or P (N = 24 children), with district C serving a much more economically depressed community than district P. Children in district P are close to the national mean on word reading at the end of first grade and are performing a standard deviation higher on reading than their peers in district C. Both groups of children had low levels of emergent literacy skills at entry into public school and would have been viewed as at high risk for developing reading problems. Deficiencies in emergent literacy skills influence but do not foredoom later reading success.

son who started lessons at age 10 were given as the first lesson the fingering exercises for the Beethoven sonata being worked on by the 10-year-old who started lessons at age 6. The developmental function for learning to read is cultural and exogenous, not biological and endogenous.

Although we have presented compelling evidence that learning to read is easier for children with higher levels of emergent literacy skills and that interventions can enhance emergent literacy skills, literacy is too important to a child’s life-long prospects for our schools to give up on children who are not prepared for the typical reading curriculum. We can help children at risk for developing reading problems by enhancing their emergent literacy skills through the use of preschool emergent literacy interventions and/or skills-based reading instruction, but we can also hurt their chances irrevocably if we allow deficiencies in emergent literacy to serve as an excuse not to teach reading effectively to children who arrive at school unprepared.

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