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Learning with sublexical information from emerging reading vocabularies in exceptionally early and normal reading development

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ABSTRACT

Predictions from theories of the processes of word reading acquisition have rarely been tested against evidence from exceptionally early readers. The theories of Ehri, Share, and Byrne, and an alternative, Knowledge Sources theory, were so tested. The former three theories postulate that full development of context-free letter sounds and awareness of phonemes are required for normal acquisition, while the claim of the alternative is that with or without such, children can use sublexical information from their emerging reading vocabularies to acquire word reading. Results from two independent samples of children aged 3–5, and 5 years, with mean word reading levels of 7 and 9 years respectively, showed underdevelopment of their context-free letter sounds and phoneme awareness, relative to their word reading levels and normal comparison samples. Despite such underdevelopment, these exceptional readers engaged in a form of phonological recoding that enabled pseudoword reading, at the level of older-age normal controls matched on word reading level. Moreover, in the 5-year-old sample further experiments showed that, relative to normal controls, they had a bias toward use of sublexical information from their reading vocabularies for phonological recoding of heterophonic pseudowords with irregular consistent spelling, and were superior in accessing word meanings independently of phonology, although only if the readers were without exposure to explicit phonics. The three theories were less satisfactory than the alternative theory in accounting for the learning of the exceptionally early readers.

1. Introduction

Cognitive theories of learning to read alphabetic orthography have rarely been tested against evidence from the processes of preschool children with exceptionally early acquisition of reading, that is, those aged 2–5 years who have reached at least the level of word reading normally attained by a child with more than a year of school instruction. If the explanation of exceptionally early reading has any basis in cognitive mechanisms of learning, then application of cognitive theories of normal acquisition ought to be attempted. The fully useful theory would explain the cognitive mechanisms of exceptional learners as well as those with normal (and impaired) progress. There are

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several studies of exceptionally early readers (reviewed by Fletcher-Flinn & Thompson, 2000; Jackson & Coltheart, 2001) but only the case study, of a 2-year-old followed through to 7 years, (Fletcher-Flinn & Thompson, 2000, 2004), and 14 years of age (Fletcher-Flinn, 2014), offers evidence on a range of cognitive learning mechanisms that were compared with normal-progress control samples. The authors of that case study claimed the theories of reading acquisition of Ehri (1999, 2005a, 2012) and Share (1995) did not account for their results showing underdevelopment of letter-sound skills and phoneme awareness.

1.1. Unconditional developmental requirements

In Ehri's developmental phase theory the requirements in the normal development of word reading are: "Readers must know letter shapes and their sounds, and they must be able to detect phonemes within pronunciations [of words]..." (Ehri, 2012, p. 175). In Share's theory, although it does not include a sequence of several developmental phases, the requirements are similar. Sounds of letters and phonemic awareness are considered "critical co-requisites" for acquisition (Share, 1995, p. 161). This acquisition, as in Ehri's theory (Ehri, 2012, pp. 175–176), entails "decoding" via phonology of new or unfamiliar print words, which is only achieved with "near-complete" knowledge of the letter-sound correspondences involved (Share, 1995, p. 162). For the beginner these will initially be "context-free letter or digraph correspondences" (p. 164). Also critical in the beginner's acquisition is "the child's *explicit* awareness of phoneme structure" as demonstrated in "identification and manipulation of phonemic segments" (p. 191). There is similarity with Byrne's (1998) account of the beginner's acquisition of the "alphabetic principle," signified by successful "decoding". One of Byrne's conclusions was that "achieving phonemic awareness and relevant letter knowledge were necessary but not sufficient for decoding" (Byrne, 1998, p. 144). "Decoding," a form of phonological recoding, was critical to reading acquisition and was exemplified by pronunciation of print pseudowords (p. 2). Relevant letter knowledge was measured by the child responding with the sounds of isolated letters (p. 89). This account is narrower in scope than a theory of acquisition that encompasses development to skilled reading, and hence is not applied to our results on digraphs, or phoneme awareness beyond the earliest levels. The claimed developmental requirements are phoneme awareness and context-free letter and digraph sounds. (The word is the "context" in the term "context-free," which implies that the knowledge is not acquired within the context of word reading.) There is a body of evidence from normal progress children cited in support of these accounts (Byrne, 1998; Ehri, 1999, 2005a; Share, 1995).

The three accounts do not describe any acquisition condition that cancels these two requirements. Acquisition may involve: either (i) explicit instruction or implicit learning (Ehri, 2005b, p. 172), (ii) instruction, or learning by induction (Share, 1995, p. 192), (iii) aided learning or (rarely) unaided induction (Byrne, 1998, p. 62). None of these acquisition conditions was described as cancelling either of the developmental requirements. They are unconditional.

None of the three theorists have excluded application of their theory to exceptionally early acquisition of reading. Such application of the theories (with the qualifications for Byrne's) would predict for early readers a developmental level of word reading accuracy that matches their level of development of: (a) context-free sounds corresponding to letters and digraphs, and (b) awareness of phonemic segments of spoken words. Development of phonological recoding accuracy for unfamiliar print words (including pseudowords) would be available only to their developmental levels of (a) and (b).

1.2. Alternative source for development

The exceptional reader (Fletcher-Flinn & Thompson, 2004) when aged 5 years had a word reading level of 14 years, and accuracy of pseudoword reading that exceeded a skilled adult level, but context-free sounds of just two-thirds of the alphabet letters and awareness of phoneme segments of spoken words that remained underdeveloped. For an explanation of those results, Fletcher-Flinn and Thompson (2000, 2004) drew on the Knowledge Sources theory of learning word reading, which had previously only been tested with normal acquisition of reading. In common with several other contemporary theories of reading acquisition, the Knowledge Sources account postulates that "the child learns systematic relations between orthographic and phonological components of words that have become familiar" (Thompson, Cottrell, & Fletcher-Flinn, 1996, p. 191). Although based on this foundation from research advances of the 1970s and 1980s (cited in Thompson et al., 1996), the theory is distinctive in the claims of the developmental timing and the way in which this can occur. Research precursors to these distinctive aspects included frequency analyses of normal beginner readers' lexical and sublexical print input (Thompson, 1985); a cross-national study of the effects of instruction with and without explicit phonics on the acquisition processes of children with normal reading progress (Johnston & Thompson, 1989); and studies of children's learning by induction (Pick, Unze, Brownell, Drozdal, & Hopmann, 1978).

A range of evidence (summarized in Thompson, 2014; Thompson & Fletcher-Flinn, 2006, p. 144) indicated that a theory of acquisition should accommodate learning letter-based storage of words "as the child becomes familiar enough with component letters of a few print words to distinguish between them..." (Thompson & Fletcher-Flinn, 2012, p. 254). The child's environment would provide opportunity for (i) acquisition of letter identification (usually with verbal labels), and (ii) seeing and simultaneously hearing reading of print material of interest, with the child's consequential "attention to the relationship in which letters of words often match sound units of the spoken word..." (p. 254). From this beginning the child can store knowledge of letters of print words (lexical orthographic representations) along with existing knowledge of associated phonological and lexical-semantic representations. Moreover, such reading