ESSAY 2: In what ways, and to what extent, has recent literacy research advanced our understanding of the learning of reading and writing ?

This essay aims to identify contemporary evidence from psychological research in reading and writing. General observations are made about the character of the language native English speakers use when they learn to read (as children). The theoretical perspective is cognitive and developmental psychology. Evidence is provided for different models of processing (both from normal and abnormal output, such as dyslexia). We continue by considering the role of context in printed work recognition and its impact on word recognition skills. After this we examine phonological awareness in children, and its relevance in developing good reading skills. Finally we inspect the connection of word representation and memory in the light of recall experiments. We conclude by considering what must be taught in the classroom, and what processes children must develop in order to read.

Background

Reading can be defined as the ability to "recognize, understand and pronounce printed words" (Stuart 1999) and "decoding and comprehension" (Stainthorp 2004). By decoding we refer to the mapping the letter-sound correspondence, while spelling requires the ability to map sounds to letters.

In this essay, it is assumed that language is species-specific (that is, that language is biologically determined) but that literacy is culturally determined and that reading is an applied cognitive act. As far as English is concerned, spelling is irregular and inconsistent[i]. All theories presented will assume some basic characteristics for English: there are many to one and one to many mappings of letters to sounds. One sound can be spelled in more than one way and one letter, or group of letters, can stand for more than one sound:

a. Many to one mappings:
/ou/ n*o*t*e*, b*ow*, th*ough*, m*au*v*e*
/f/ *f*un, *ph*oto, o*ff*, enou*gh*

b. One to many mappings:
<g> - /g/ /dj/ get, gender (cf. gill – respiratory organ – vs gill – measure)
<ea> - great; plead; react; lead

A further distinction can be made between heterographic homophones: sound the same - spelt differently (cf. weigh vs way; there vs their vs they're) and homographic heterophones: spelt the same - sound differently (lead vs lead (verb: cause to follow; noun: metal); sow vs sow (plant vs. female pig).

In order to understand spelling, we need to know about graphemes - groups of letters that are needed to form a single phoneme. Morphophonemic spelling involves sound-letter encoding which is transparent for some words (lift or program) but less so for other words (colonel or Wednesday). Graphemic parsing is used for discerning letters form digraphs, for example, how /ph/ is parsed to make the sound /f/ (cf: shepherd vs aphid).

The disadvantage of this method for the neophyte is a heavy reliance on the sound-letter correspondence.

Some researchers maintain that young learners pass through a series of stages before they are able to read and write. The first stage is the *logographic* (Frith, 1985) or the *partial alphabetic* (Ehri, 1998, 2002)[ii] in which young pupils rely on visual features for the identification of words. The *logographic* stage suggests that children can decipher words provided they have a visual memory representation for the target language. Research shows that children enter the *logographic* stage first for reading and only later for spelling (Frith, 1985). The second stage is known as the *alphabetic* (Frith, 1985, Ehri, 1998, 2002). Children at this stage develop letter to sound correspondence awareness. The third and final stage is the *orthographic* (Frith 1985) or the *consolidated-alphabetic reading* stage (Ehri 1998, 2002) characterized by automaticity and flexibility, when reading and spelling become independent of sound. The pedagogical implications of the stage model might lead to placing learners into groups based on their developmental needs (including differential literacy instruction).

Further recent research evidence

Stainthorp (2004) presents contemporary evidence from psychological research and its implications for the teaching and learning of reading and writing, using a theoretical perspective arising from cognitive and developmental psychology. Phonological awareness and letter knowledge, and needless to say exposure to print, are requisites for learning to read. There is also a need to recognize the phoneme's "psychological reality" (Sapir, 1949, presented pioneering work in this field, proposing the phoneme not as a linguistic abstraction but as a cognitive unit). In an opaque language such as English (where the pronunciation of words cannot be decoded by their written form, as they are in less opaque languages such as in written Spanish) phonics teaching is crucial for the mapping of letter-sound correspondences and also for the inverse mapping of sound letter-correspondences. Decoding enables the child to access the sound and therefore the meaning of new words. Adams (1990) argues that educators need not remain trapped in the "phonics versus teaching-for-meaning" dilemma, and supports the use of phonics in conjunction with semantics.

However, Byrne (2002) places emphasis on the fact that the psychologically real unit, the phoneme, is "buried" in the speech signal as a result of co-articulation (overlapping of articulation for the different phonemes within a word, since phonemes are not concrete units in continuous speech). Byrne proposes then that syllables are more weighty units than individual phonemes. Children are more aware of syllables than of phonemes: they can count the syllables in words, like the three syllables in banana, before they can count the phonemes in dog.

Other authors such as Stuart (2002) propose a dual-route cascade model as a framework for considering reading development. This model claims that skilled readers employ two processes in recognizing printed words, a lexical process, (a fully interactive parallel processing system), and a nonlexical process, which is a serial processing system.

Lexical routes deal with all words, regardless of spelling, because these words are stored in a lexicon. The nonlexical route deals with reading unfamiliar words (not previously encountered and stored) and will 'regularize' exception words whose spelling patterns do not obey the grapheme-phoneme correspondence (for example, reading gauge as gorge).

PDP (Parallel Distributed Processing) models, on the other hand, claim that *all* processing is parallel, and that a single network system can compute the pronunciation of regular and exception words as well as nonwords. PDP models link orthography to phonology and do not offer any access to semantics, to the meanings of words. A second computational network is assumed to link orthography to semantics and semantics to phonology - hence it's a dual processing (dual-route) model (Colheart et al, 1993).

While reading speed varies according to the task, fast reading is taken as evidence of accessing the word directly via the lexical route. A regular word is one that can be read accurately by the application of Grapheme Phoneme Correspondences (in English: pet, trunk). An exception or irregular word is one that will not be read accurately by the application of GPCs: as in rough, or listen. Lexical processing assumes that each word is stored and recognized as a whole. When skilled readers come across a new word in print, they implement phonic rules - each word is broken down into small segments of matching print and sound before it can be recognized and understood as a whole.

Two kinds of evidence exist for the lexical and sublexical processes. The first hinges on a distinction between regular words and exception words. Regular words are those whose spellings obey the rules for translating from print to sound in English. A reader can read lemon correctly both because it is stored as sight vocabulary (lexical process), and because it has been translated from print to sound (sublexical process). Exception words like 'gauge' can only be read correctly if they are stored as sight vocabulary (lexical process). If translated from print to sound, they will be mispronounced, so that 'gauge' will rhyme with 'forge', and 'blood' with 'brood', whilst 'bouquet' will come out as 'bowkwet'. The second kind of evidence rests upon a distinction between exception words and nonwords. Nonwords are legal letter sequences like 'bleaner', 'grent' and 'spatch', which are phonologically legitimate English clusters but have not yet become real words in English.

Hence these approaches throw light on "regularity effects" and the reader's reaction times (fast reading is evidence of accessing the word directly via the lexical route). It must be stressed, however, that these models, in the same fashion as psycholinguistic models of language acquisition, have not been conceived as pedagogical tools, but to explain sophisticated language processing and developmental shifts (in theories that support the latter) and they focus on word recognition by skilled readers.

Evidence from dyslexic readers

Disorders of reading and spelling can throw light on theories regarding normal development of literacy skills, such as dyslexia[iii] does. Based on reading performance, Castles and Coltheart (1996) identify two main categories of dyslexia: phonological and surface dyslexia. Phonological dyslexia is characterized by the difficulty in the pronunciation of nonsense words like *'throld'* or *'mape'*. Surface dyslexia is mainly related with a great difficulty in the reading of exception words such as *'island'* and *''yacht'*. According to Stainthorp (2004) the output of adults with acquired surface dyslexia lends support to the evidence of lexical and sublexical routes, as in surface dyslexia the lexical route is argued to have been damaged (and the sublexical route is spared), as irregular words are regularised (listen is read as /liston/ ; broad – /brode/, island as /izland/), while

regular words are read correctly. In acquired phonological dyslexia (the mirror image of surface dyslexia) there is no problem in reading either regular or exception words but the sufferers are unable to read pseudowords: this is taken to be evidence that the lexical route is spared, but the sublexical route is damaged[iv]. Dyslexia occurs in about 4-8% of the population (more common in boys than girls), hence recent literacy research in this learning disability can inform and support teaching personnel and parents, with the proviso that it is diagnosed by a psychologist or health professional.

The role of context in printed word recognition

Recent research has cast doubt on the earlier suggestion that good readers make more use of context than poor readers. There is now much evidence suggesting that in fact, use of context decreases as word recognition skill increases. Readers with poorly developed word recognition processes tend to be poor readers. Stuart (1999) gives an illustration of an experiment by West and Stanovich (1978) in which they asked 10-year-olds, 12-year-olds and adults to read a word preceded by congruous or incongruous or neutral context, for example, the word cat:

congruous The dog ran after the (cat).
incongruous The girl sat on the (cat).
neutral The (cat).

Their hypothesis declared that if context is used to speed word recognition, congruous context should lead to faster recognition than neutral context. Incongruous context should lead to slower recognition than neutral context: there should be an inhibition effect. It turned out that the younger, *less* skilled readers made more use of context, not the older, more skilled ones.

West and Stanovich also used semantic priming to discover that if the word 'butter' or the word 'summer' was flashed on a computer screen for a thousandths of a second, and this was followed by presenting the word 'bread' for long enough to be seen and read, 'bread' will be read faster if it was preceded by the related word 'butter' than if it was preceded by the unrelated word 'summer'. When we recognize printed words, we activate not just their meanings, but the meanings of related words. Less skilled readers use context to *compensate* for the fact that they cannot read the words on the page. Hence teachers are advised to encourage children to use context both to *predict* and to *check* the meanings of unfamiliar words.

Phonological awareness in children

Good readers are better than poor readers at judging sound similarities. Sensitivity to sounds helps children learn to read and there is always an association between being good at playing with sounds in spoken words, and being a good reader. The relationship goes both ways: there is evidence for both positions: whether being phonologically aware made a child into a good reader, or whether being a good reader made a child phonologically aware. In Denmark, for example, syllable clapping games, and other multisyllabic words representing objects in the kindergarten environment have helped children to benefit from phonological awareness. This used to be taught overtly in traditional phonics teaching, by teaching children graphs, consonant digraphs (e.g. ch, th, ph, sh), vowel digraphs (e.g. ai, ee, ea, oo, oa, ou, etc.) and trigraphs (e.g. ear, igh).

Stuart (1999) concludes that phonological awareness is a good foundation for successful reading, as it gives children the insights necessary to the ability to store and use phonic rules in reading, and also by enabling children to build up a well-specified sight vocabulary more quickly. From good beginnings like these, a self-teaching system can emerge: sight vocabulary becomes a database from which the child gradually infers new and more complex phonic rules.

Word Representation and Memory

The connection between sound and meaning is arbitrary, apart from some onomatopoeic words, such as splash, bow-wow, quack-quack – which differ in any case from language to language. In a famous psycho-semantics experiment quoted in Aitchison (1987), W. Köhler (1929) presented German subjects with two line drawings, one curvy, the other made of spikes and angles. The subjects were told that the names applied to them were *takete* and *maluma* and they were asked which name was appropriate for which drawing. Overwhelmingly the rounded drawing was labelled *maluma* and the spiky one *takete.* But in spite of this result, no natural language links up [t], [k] with spikes, or [m], [1] with curves. Burgess (1986, p. 194), taking a more literary approach, looked at the word for moon in twenty-six languages, assuming that "a good descriptive word for moon is an attempt on the part of the mouth to imitate its roundness". In his view, the Latin languages and the Germanic languages (luna vs moon) seem to follow this tendency ! As far as I am aware, this kind of experiment has not been replicated in recent psychological research, but the semantic and creative aspects of language should perhaps not be overlooked, and merits closer inspection by psychologists.

The 'bathtub effect' is perhaps the most commonly reported finding in the literature on memory for words. The beginnings and ends of words are better remembered than the middles (think of a word as a person lying in a bathtub, with their head out of the water one end and their feet out the other). The 'bathtub effect' was first pointed out by Brown and McNeill (1966), who tried to induce a 'tip of the tongue' (TOT) state by reading out definitions of relatively uncommon words to around 50 students. This procedure resulted in over 200 'positive TOTs', situations, which supported the observation that people tend to recall the beginnings and ends of words better. The effect seems to be stronger in malapropisms – similar words wrongly selected (eg, cylinders for syllables, anecdote for antidote, facilities for faculties)

Conclusion

In conclusion, we are able to establish from recent literary research that the fundamentals of reading and writing must be taught. Evidence shows that children who are slow in grasping the basics are slow to make further progress, so it's important to know what children can and can't do so that teachers know what they must teach (Byrne, 2002).
There is no innate capacity for learning to read and write, hence these activities have to be taught overtly as they rely on cognitive mechanism other than linguistic competence.

The National Literacy Strategy Framework for Teaching recognises the need for both the development of sight vocabulary and phonetic knowledge: when children learn to read, they need to develop both lexical processes (sight vocabulary) and sublexical processes (a phonic rule

system). Nevertheless, the purpose of reading is to understand the meanings of the texts read and be enriched by this process, and not just to master orthography. Effective reading and writing instruction at an early stage has shown to have "positive Matthew Effects"[v], (Stanovich, 1986) that is, positive consequences in all curriculum areas. Exposure to print not only entails an increase in the vocabulary repertoire but also increases cognitive growth, positive attitudes and a development of skills. On the other hand, literacy research has shown that poor reading accuracy (and reduced exposure to print) causes "negative Matthew effects" the progressive decline of slow starters, such as low self esteem, disruptive behaviour, and difficulties in other areas of the curriculum.

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Endnotes

[i] There are different kinds of "writing": pictographic (hieroglyphics for example): segment at the level of the concept; logographic (Chinese, Japanese Kanji): segment at the level of the concept; phonographic (or sound based): segment below the level of the word; for example: syllabic (eg Japanese kana) in which we find the segment at the level of the syllable and alphabetic (segment at the level of the phoneme). A further distinction is made between shallow - phonemic systems (in which are found transparent, regular letter-sound and sound letter correspondences as in Italian, Serbo-Croat, Welsh, Greek) versus deep - morphophonemic systems (in which the sound-letter relationships is diverse, higher order lexical aspects and morphemic aspects encoded, eg English, French).

[ii] Ehri (2002) distinguishes between the following stages:

- Pre-alphabetic stage
- Partial alphabetic stage
- Full alphabetic stage
- Consolidated alphabetic stage

[iii] 'dys' meaning 'difficulty' and 'lexia' 'words'.

[iv] Some authors such as Boder (1973) differentiate three subtypes of dyslexia: ***dysphonetic, dyseidetic*** and a combination of the previous two. The ***dysphonetic*** **dyslexic** is defined as the one who has difficulty with non-lexical spelling, that is semantic substitutions (eg funny for laugh). **D*yseidetic* dyslexics** lack word-specific spelling memory - they have phonological skills but they have difficulty learning the orthography (they spell what they perceive: eg *'tok'* for *'talk', 'hows'* for *'house', 'lisen'* for *'listen'*). Boder's classification stems from a diagnostic screening tool for developmental dyslexia. However, this is a descriptive model, rather than explanatory (a common problem with descriptive linguistics).

[v] Stanovich (1986, quoted also by Stainthorp, 2004) uses the phrase "Matthew Effects" (after the Gospel according to St. Matthew: the rich get richer and the poor get poorer) to describe the progressive attrition of those with slow reading development.