Lexical orthographic acquisition and whole-word visual processing

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Theory

The question of how we acquire lexical orthographic knowledge is crucial to better understand the cognitive impairments which should be related to developmental dyslexia/dysorthographia. The self-teaching hypothesis (Share 1999, 2008) suggested that most lexical orthographic knowledge is acquired incidentally during reading through phonological decoding. However, some data clearly showed that orthographic learning is not entirely parasitic on phonological processing (e.g., Cunningham, 2006, Dubois, Lafaye de Micheaux, Noël, & Valdois, 2007; Nation, Angell & Castles, 2007).

What cognitive factors, other than decoding skills, are involved in lexical orthographic acquisition?

Both theoretical (Ans, Carbonnel, & Valdois, 1998) and empirical data (Bosse, Tainturier, & Valdois, 2007, Bosse, & Valdois, 2009) suggested that visual attention processing is highly related to lexical orthographic acquisition. The simultaneous visual processing of all the letters of a word may be an important factor for lexical orthographic acquisition.

Hypothesis

When the simultaneous visual processing of all the letters of a new word is impossible during reading, then the lexical orthographic acquisition will be worse than when this processing is possible.

Participants

23 French adults (mean age = 38 years, SD = 8), all with a higher education curriculum (mean = 3.5 years after A-levels).

Items: 2 sets of 14 bisyllabic complex PW

2 inconsistent phonemes per PW, 2 unfamiliar graphemes per PW. e.g., Set A: kaltart; quavaune; baltare; cironne; deiphon...
Set B: qualitare; kvononne; bialtart; scaronne; daiffon...

Each participant was randomly assigned to Set A or to Set B.

A self-teaching paradigm

1) Learning phase

1 day after, assessment of items’ orthographic knowledge:
- Items were recognised quicker in the forced choice task
- Items were more correctly spelled in the spelling to dictation task

2) Orthographic test phase

- Spelling to dictation of the 14 items in a random order

Results

- No decoding difference between the S and NS conditions during the reading phase
- Forced choice task, % of correct responses:
  - Forced choice between 2 spellings (e.g., kaltart - qualitare)

Discussion

Results showed that participants have better learned items’ specific orthography when they read items in the S condition than in the NS condition:
- Items were more correctly spelled in the spelling to dictation task
- Items were recognised quicker in the forced choice task

During the learning-reading phase, items were read as well in the S condition than in the NS condition. Moreover, in both conditions, each grapheme was presented during the same time.

The Simultaneous condition permitted a better whole-word orthographic acquisition.

Conclusion

Whole-word orthographic acquisition during reading seems to depend not only on decoding skills, but also on simultaneous visual processing of all the letters of the word.

Some cases of developmental dysorthographia may be due to an impairment on simultaneously processing all the letters of words during reading (see also Bosse & Valdois, 2007).