

Introduction

Do orthographic and phonological peculiarities of alphabetically written languages influence the course of literacy acquisition?

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The most important cognitive models of alphabetic literacy acquisition, like those proposed by Uta Frith and Philip Seymour (cf. Frith 1985, and Seymour & Elder 1986), are presented as models of the way alphabetic orthographies in general are learned even though they are inspired by the study of the acquisition of a single orthography, needless to specify it, the English one. Indeed, it is not the fault of scholars working in English-speaking countries if the cognitive psycholinguistics of the written language has been much less pushed on in the other countries. However, everybody admits that it is important to check how and to what extent the orthographic peculiarities of alphabetic languages influence the course of literacy acquisition.

Why could – or should – orthography-related differences in literacy acquisition arise? English presents a relatively opaque system: there are many alternatives to spell phonemes and many ways of sounding out graphemes, and, in addition, many of the correspondences cannot be predicted from context-dependent graphophonological rules. Other languages present a much higher degree of orthographic transparency, either in one conversion direction (from spelling to sound or from sound to spelling) or in both directions. Literacy onset in languages having a highly transparent orthography might exhibit a much more precocious and systematic use of phonological decoding than is the case in English. Besides, some characteristics of the spoken language, like complexity of the syllabic structure (for example, clusters of two and three consonants at the onset and offset of the syllable) and number of vowels, might also influence the acquisition of the corresponding written language. English presents both a high number of vowels and of complex syllabic structures. These two characteristics of the language might not encourage or facilitate the resort to phonological transcoding in reading and writing. Compared to English, access to phonological transcoding might thus be easier for languages having either a small number of vowels or relatively simple phonological structures or both.

Recently, Wimmer & Goswami (1994) compared reading acquisition in English and German. In German, the mapping between graphemes and phonemes is largely consistent. The results of this study suggest a much more

precocious and efficient resort to phonological decoding in German than in English.

The present issue of *Reading and Writing: An Interdisciplinary Journal* gathers together seven papers that examine some aspect of the acquisition of either reading or written spelling or both in Romance languages. All the languages involved in this set of studies (French, Italian, Portuguese, and Spanish) are written with a much higher transparent orthography than English.

Moreover, all these languages present some degree of asymmetry in the consistency of grapheme-phoneme mapping. In Romance languages, where only one phoneme can usually be attributed to each grapheme (letter or letter cluster), the reverse is not true. Grapheme-phoneme conversion would thus be facilitated but not phoneme-grapheme conversion. In other words, access to the phonological transcoding process at the level of the most elementary unit might be easier in reading than in writing.

Interestingly, the degree of asymmetry in the consistency of mapping is much greater in French and Portuguese than in Italian and Spanish. If the degree of this asymmetry matters, then the more precocious or prevalent use of phonological transcoding in reading compared to writing might be expected to appear in a more dramatic way in both French and Portuguese than in both Italian and Spanish.

If either or both of the language phonological characteristics mentioned above, namely complexity of the syllabic structures and number of vowels, are relevant for access to phonological transcoding, then Spanish might exhibit an easier access to this procedure than the other Romance languages examined here.

The present studies were not aimed at directly comparing the effects of different orthographies or phonological properties to literacy onset. Thus, I must recognize that, as a collection (and, to do justice to them, regardless of the value of their contributions in seeking other objectives), they constitute only a first step in the cross-language approach. However, I am confident that their joint publication will make us think about both convergences and divergences in the available data, and thus will help us to go forward in the determination of the relevance of orthographic and language peculiarities for alphabetic literacy acquisition. In this perspective, here are a few remarks on each of the papers.

Giuseppe Cossu, Maria Gugliotta & John C. Marshall found a developmental asynchrony between reading and written spelling in Italian. Reading led to better scores than spelling for both words and pseudowords in first- and second-graders. The authors conclude that input orthographic representations are acquired more readily than output orthographic representations. They minimize the degree of asymmetry in mapping consistency between grapheme-phoneme and phoneme-grapheme conversion in Italian. Hence, they suggest that the developmental asynchrony between reading and writing is not related

to the degree of transparency of the orthography. However, the Italian orthography could present more opportunities for errors in spelling than in reading. For instance, if the child does not yet possess an accurate representation of geminate consonants, 'gatto' may be read accurately but will be misspelled as 'gato'. In the same vein, if the child confounds different spellings of the same phoneme, 'cavaliere' may be written 'cavagliere' (cf. Morchio, Ott & Pesenti 1989). Moreover, dialectal variability in pronunciation might increase the difficulty to associate the correct graphemes to the presented sounds and thus make a perfect response harder to reach in written spelling than in reading.

Nuria Sebastian-Gallés & Ana P. Vacchiano found that, in Spanish, analogical effects in reading pseudowords are present from age six on. Thus, beginning Spanish readers use analogical reading mechanisms. The authors also found some evidence that analogical reading errors and lexicalizations correspond to different mechanisms. As a matter of fact, the evolution of both types of errors with age was not the same. Whereas lexicalizations might result from inaccurate orthographic addressing, analogical reading errors may reflect the use of a phonological decoding procedure that would be to some extent under the control of the reader's lexical knowledge. Although these results cast doubt on the assumption of the classic double-route model according to which the phonological route is non-lexical, they remain consistent with the prediction of an easy and early access to this route in Spanish. This paper did not attempt to compare reading and writing. It is however interesting to signal that, according to Spanish authors (cf., for instance, Valle-Arroyo 1989), it is frequent to find Spanish children, as well as adults, who are good readers but poor spellers.

Liliane Sprenger-Charolles & Séverine Casalis found evidence of an important contribution of phonological decoding to both reading and spelling in French first-graders. As a matter of fact, a strong effect of regularity was obtained which increased from the sixth to the tenth month of formal instruction. A frequency effect, suggesting the simultaneous development of an orthographic lexicon, was also observed both in reading and in spelling.

Jacqueline Leybaert & Alain Content tested French-speaking children in upper grades (2, 4 and 6). As regards the comparison between reading and spelling, it is interesting to note that both the effect of frequency and the effect of lexicality, this one evaluated through better scores for words than for pseudowords, were present in reading at grade 2 but not in spelling at the same grade. These results are consistent with Cossu et al.'s suggestion that input orthographic representations are acquired more readily than output orthographic representations. Moreover, there was evidence of strong reliance on phonological transcoding at grade 2, even in children attending whole-word oriented classes.

Jacqueline Leybaert & Jésus Alegria tested both deaf and hearing French-speaking subjects on a spelling task. The orthographic transparency of the items was manipulated. Interestingly, hearing children were unable to use morphological information to derive spelling at grade 2, but this ability was clearly present at grade 4. Deaf subjects, even the youngest ones, showed a regularity effect thus indicating that they could have access to phoneme-grapheme knowledge. In contrast to the hearing, they were largely unable to exploit morphological information.

Ângela M. V. Pinheiro compared Brazilian Portuguese reading and spelling in the first four grades. Interesting differences appeared in the evolution of reading and spelling. Namely, while words were read much better than pseudowords, there was no such lexicality effect in written spelling. In particular, in grades 1 and 2, more errors were made in spelling low frequency words than pseudowords with this difference vanishing in upper grades. It thus seems that initial spelling in Portuguese is mainly non-lexical. Consistent with the suggestion that an output orthographic lexicon takes time to install, a regularity effect was found in spelling for all grades. By contrast, in reading, the effect of regularity was slight. It appeared only for low frequency words in grades 1 and 2. Thus, for Portuguese as for Italian and for French, the constitution of the input orthographic lexicon seems to forestall the constitution of the output lexicon, presumably because the outcome of the grapheme-phoneme conversion fits more precisely the item's phonological representation than the outcome of the phoneme-grapheme conversion fits the orthographic target.

The last paper, by *Helena A. da Fontoura & Linda S. Siegel*, differs from the previous ones in that English reading and spelling were tested. Its inclusion in the present issue is however justified by the fact that subjects were bilingual Portuguese-Canadian English from grades 4 to 6. Portuguese was their native language and was still used at home. Besides, the children attended Portuguese classes in addition to the regular English-speaking instruction. When tested in English, normal achievers in this group were as good as monolingual subjects; by contrast, bilingual disabled subjects were better than monolingual disabled subjects on both pseudoword reading and spelling. It thus seems that knowledge of the more regular conversion rules of Portuguese may transfer positively to the reading and spelling of English pseudowords. This fact suggests that deficits in the phonological processing of an opaque orthography may be circumvented to some extent by learning phonological transcoding in a more transparent orthography.

Three papers, those by *Cossu et al.*, by *Sprenger-Charolles & Casalis*, and by *Leybaert & Content*, incorporated graphophonological complexity, i.e., the number of letters corresponding to a grapheme in the respective analyses. One reason to examine the effects of this factor both in reading and in spelling is

that, if they exist, they may constitute evidence of phonological transcoding. Seeking this kind of evidence, *Leybaert & Content* found an effect of phonological complexity in spelling, which was greater in grade 2 than in more advanced grades, therefore suggesting that the youngest children relied more than the others on phoneme-grapheme knowledge. In reading, the effect of complexity was greater for pseudowords than for words.

In addition, differences between reading and spelling in the effects of graphophonological complexity may be found if graphemes rather than letters are units of different relevance in accessing the input and the output orthographic lexicons. In the present papers there were some results consistent with this idea. Thus, in *Cossu, Gugliotta & Marshall's* study, both geminate letters and consonant clusters elicited different error rates in reading and in spelling. Likewise, *Sprenger-Charolles & Casalis* comparing multi-letter graphemes to single-letter graphemes in lists matched for number of letters, found a complexity effect for spelling but not for reading. However, the lack of effect in reading presumably hides a change of processing with time. In fact, simple items were read more accurately than complex ones early in the school year but less accurately later on. Once a complex grapheme is learned, resorting to this multiletter unit reduces processing load.

Graphophonological complexity is only one of the variables that should be explored in order to disclose the intervention of a multidimensional structure between letters and written word representations.

Classic models of written word recognition, like IA (McClelland & Rumelhart 1981), did not contemplate any intermediate level of structure between letter detectors and word detectors. However, both neural imagery and experimental data obtained from the skilled reader (cf., e.g., Petersen, Fox, Snyder & Raichle 1990; Carreiras, Alvarez & de Vega 1993; Mewhort & Beale 1977; Prinzmetal, Hoffman & Vest 1991; Prinzmetal & Keysar 1989; Prinzmetal, Treiman & Rho 1986; Treiman & Chafetz 1987) suggest that infralexical units such as syllables and onsets/rimes are computed during the processing of written words. Pring (1981) and Radeau, Morais, Mousty, Saerens & Bertelson (1991, see more detailed description in Morais 1994, p. 296) also found evidence of the perceptual relevance of letters clusters corresponding to a grapheme. Data from spelling in brain-damaged patients also suggest the intervention of multidimensional structure. Namely, for the spelling of Italian, graphosyllables, the consonant/vowel status of the graphemes and gemination would be represented (Caramazza & Miceli 1990); for the spelling of English, consonant/vowel status and letter doubling would be important features (McCloskey, Badecker, Goodman-Schulman & Aliminosa 1994).

If skilled readers have to resort to a relatively complex structure of infralexical units beyond the single letter level, then to describe the ways by which this structure is built during the learning process should constitute a major objective of researchers dealing with literacy acquisition. This multidimensional orthographic structure might depend on the phonological structure of

the language. It might also depend on the consistency of mapping on each direction of conversion, thus allowing qualitative differences to arise between the representational structures that are involved in reading and spelling.

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