

Early literacy development in Catalan: characteristics and instructional influence¹

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Resumo: Este artigo analisa a relação entre o nível de consciência fonológica, conhecimento das letras e as estratégias utilizadas para ler e escrever, em crianças de cinco anos, ensinadas em catalão. Participaram 69 crianças de três classes diferentes. Cada um dos seus professores utilizava um método diferente de ensino: analítico, sintético ou analítico-sintético. As crianças foram avaliadas no início e no final do ano letivo em: Reconhecimento de letras, segmentação palavra oral, leitura de palavras, leitura de um texto curto e um ditado. Foram realizadas análises de granulação fina em nas respostas das crianças, para identificar estratégias e padrões específicos. A análise qualitativa indica que a capacidade de segmentar uma palavra em sílabas por via oral parece ser suficiente para as crianças começarem a ler de uma forma convencional. Além disso, a consciência fonológica e o conhecimento das letras são usados em formas relativamente diferentes, dependendo do tipo de texto a ser lido. As abordagens de ensino dos professores parecem ter uma influência nos resultados das crianças.

Palavras-chave: alfabetização inicial, métodos de ensino, consciência fonológica

Abstract: This article examines the relationship between the level of phonological segmentation, letter knowledge, and the strategies used to read and write, in 5-year-old children taught in Catalan. 69 children from 3 different classes participated. Each of their preschool teachers held a different conception about teaching early literacy: analytical, synthetic, or analytical-synthetic. Children were assessed at the beginning and at the end of text and a dictation. We performed fine-grained analysis on children's data to identify specific strategies and patterns. The qualitative analysis indicates that the ability to segment a word



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text and a dictation. We performed fine-grained analysis on children's data to identify specific strategies and patterns. The qualitative analysis indicates that the ability to segment a word into syllables orally seems to be sufficient for children to start reading in a conventional way. Furthermore, phonological segmentation and letter knowledge are used in relatively different ways depending on the type of text being read. Teachers' instructional approaches seem to have an influence on children's results.

Keywords: Early reading and writing, instructional methods, phonological segmentation

Résumé: Cet article analyse la relation entre le niveau de conscience phonologique, la connaissance des lettres, et les stratégies utilisées pour lire et écrire, chez des enfants de cinq scolarisés en catalan. 69 enfants de 3 classes différentes ont participé à cette étude. Chacun de leurs enseignants utilisait une méthode d'enseignement différente: analytique, synthétique, mixte. Les enfants ont été évalués au début et à la fin de l'année scolaire en: reconnaissance de lettres, segmentation orale de mots, lecture de mots, lecture d'un texte court et une dictée. Nous avons effectué une analyse fine des réponses des enfants pour identifier des stratégies et modèles spécifiques. L'analyse qualitative indique que la capacité de segmenter un mot en syllabes oralement semble être suffisante pour que les enfants commencent à lire. La conscience phonologique et la connaissance des lettres sont utilisées de forme relativement différente en fonction du type de texte à lire. Les approches pédagogiques des enseignants semblent avoir une influence sur les résultats des enfants.

Mots-Clés: alphabétisation initiale, approches pédagogiques, conscience phonologique

INTRODUCTION

Research on reading in the past two decades has been closely linked to the study of meta-linguistic awareness (Yaden, Rowe & MacGillivray, 2000). This concept relates to the capacity of paying attention to and reflecting on different aspects of language, for instance, its sounds (phonological awareness).

Phonological awareness is a meta-linguistic component that can be defined as the capacity of attending to, manipulating and segmenting different units of the acoustic string such as syllables and phonemes (Lieberman, Shankweiler, Fischer & Carter, 1974; Mattingly, 1992). Such awareness is needed to understand the *alphabetic principle*, namely that the graphic elements in an alphabetic system represent phonemes. No one questions the importance of phonological awareness in early literacy development, but doubts persist about which is the basic unit of segmentation (syllable, intra-syllable –onset or rhyme-, phoneme) that children need to be aware of in order to start reading. Research conducted in recent years seems to question the universal character of this unit and suggests that depending on the characteristics of the particular language, the unit of segmentation may vary (Anthony & Lonigan, 2004; Bowey, 2002; Schatschneider, Francis, Forman, Fletcher & Mehta, 1999). For instance, the results of studies conducted in English with units such as onset and rime have not been replicated in regard to Spanish (Defior, 1994; Vernon, 1998). In Spanish, as well as in Catalan, the easiest unit to segment in a word is the syllable (Teberosky, 1997), because it is acoustically indicated by the variations of language intensity. Indeed, while in English the speech rhythm is “stress-timed”, in Spanish and Catalan the speech rhythm is “syllable-timed” (Ramus, Dupoux & Mehler, 2003). In Spanish, research analysing the development of segmenting ability in relation to different units shows that the syllable also functions as a training platform for attempting segmentation into intra-syllabic components (Vernon, 1998). In contrast, decomposing words into phonemes in early literacy development is difficult, since there are no indications in the acoustic speech chain to help in delimiting them. This difficulty

relates to the fact that in oral language the sounds are co-articulated and perceived as overlapping (Alegría, 1997).

The linguistic abstraction required to identify phonemes is not directly accessible to children who are just beginning to learn to read, even if the language in which they are learning has a relatively transparent orthography. Nevertheless, being able to recognise phonemes orally might be necessary and important for building up correspondences between phonemes and graphemes (Duncan, Seymour & Hill, 1997; Hatcher & Hulme, 1999; Hulme, et al., 2002; Lundberg, 1998), although children may use letter names as a reference for letter sounds and use this knowledge to decipher new words (Treiman, Tincoff & Richmond-Welty, 1996). Attending to the research in this area, most of the studies have focused on the relationship between phonological awareness and reading. Studies that have looked at writing seem to show that learners require more detailed levels of segmental knowledge in order to write conventionally than in order to read (Casillas & Goicoetxea, 2007; Vernon & Ferreiro, 1999). In view of the close relationship that may be postulated between learning to read and learning to write, it would seem useful to identify the links between both these tasks and phonological awareness. In addition, since in our society, schools are responsible for teaching children to read and to write, attention should be given to how teaching influences early literacy development.

Curiously, much research on the initial acquisition of literacy (Geudens, Sandra & Van den Broeck, 2004; Morris, Bloodgood, Lomax & Perney, 2003; Share & Gur, 1999; Tafa & Manolitsis, 2008), has failed to provide an adequate description of the instructional practices in which the pupils from whom the data have been obtained are involved. From a socio-constructivist perspective (Solé & Teberosky, 2001), the knowledge children construct in regard to written language is not independent of the social practices in which reading and writing are learned and used. Within the school environment various different conceptions co-exist about the best way to instruct pupils to ensure their mastery of the written language. There is reason to expect that different experiences of contact with reading and writing tasks will be reflected in some way in the knowledge acquired by pupils. Data from recent research in Spain (Castells, 2007; Jiménez & Guzmán, 2003; Tolchinsky, Bigas & Barragan, 2012) show that the different ways of conceiving the teaching of reading and writing correspond quite neatly to the classical approaches: synthetic, analytical and analytical-synthetic². These approaches, with certain slight differences, have also been found in other countries (New Zealand: Connelly, Johnston & Thompson, 2001; USA: Xue & Meisels, 2004; France: Goigoux, 2000; Switzerland: Hoefflin, Cusinay, Pini, Rouèche & Gombert, 2006).

Among other concerns, these perspectives differ in the way the role of learning is conceived as well as the means by which learning to read and to write are promoted. From a *synthetic* approach to learning, pupils are seen as needing to develop a set of “skills” regarded as prerequisites that are taught sequentially: attending to the sounds of the language (phonological awareness), establishing correspondences between sounds and letters, and reading syllables until the pupils are eventually able to read whole words. The learner is conceived as a passive participant, while the teacher plays the main part in this process. Comprehension, in this approach, results from the ability to decode (Thomas & Barksdale-Ladd, 1997).

From the *analytical* and *analytical-synthetic* perspectives, pupils are assumed to have a more or less extensive amount of knowledge related to reading and writing without a sequence of prerequisites being established. This knowledge constitutes the basis for constructing new and

² Behind each of these approaches it is possible to find different theories about learning and its relationship to development. Although this is an issue of extremely great interest, it is not possible to go into it here for reasons of space.

more complete learning. In the *analytical* approach, pupils are seen as having the major responsibility for performing these constructions, as they bring meaning to the text on the basis of their experience within a literate society (Thomas & Barksdale-Ladd, 1997). The teacher becomes a facilitator of the pupils' learning, creating the conditions for them to interact with diverse printed material, in authentic experiences with text. Little value is attributed to the explicit teaching of grapheme-phoneme correspondences as pupils are expected to learn this aspect through direct use of reading and writing (Goodman, 1989; Goodman & Goodman, 1979).

Concerning the *analytical-synthetic* approach, the responsibility for concretising new learning is shared between teacher and pupils, the former providing help and means so that the latter can produce new representations of reading. The presence of reading and writing activities designed to enhance children's early literacy abilities will be evident in this case, though the teacher will tend to foster comprehension as well by making use of socially significant materials (Pressley, 1998).

These different conceptions influence the goals, the social organisation, the content prioritised, the materials employed, and the reading and writing activities the pupils are given to do. That is why pupils learning to read and write with a synthetic approach may be expected to learn different concepts and skills, at least in part, from those learning from an analytical approach.

Research comparing teaching methodologies (e.g. Connelly, Johnston & Thompson, 2001; Dahl & Freppon, 1995; Freppon & McIntyre, 1999; McIntyre, 1992; McIntyre & Freppon, 1994; Xue & Meisels, 2004), seems to point out that pupils taught with a synthetic approach learn to recognise phonemes, establish relations with the corresponding letters and are capable of blending the sounds resulting from decoding more quickly than those taught with an analytical-synthetic approach, whereas pupils in an analytically oriented classroom develop such knowledge to a lesser extent and, therefore, are less efficient in recognising letters and combining them to read words or sentences. Conversely, children in the latter classroom and those in the analytical-synthetic classroom use strategies based on global reading or global word recognition and usually find writing easier than those taught with a synthetic approach. Nonetheless, it is important to note that these results are not completely conclusive, because some studies have found that children taught in analytical classrooms develop quite strong phonemic awareness through the writing activities teachers propose to them (Leybaert & Content, 1995; Thompson, Fletcher-Flinn & Cottrell, 1999).

Therefore, greater knowledge is needed of the approaches that best prepare pupils to tackle the problems of reading and writing autonomously and efficiently. A possible means to this end consists in adopting a natural and contextualised research strategy that takes into account the characteristics of the instruction in which children are involved, without sacrificing the rigour and controls required to evaluate the participants' knowledge.

SOCIO-EDUCATIONAL CONTEXT AND SPECIFICITY OF CATALAN AS THE OBJECT OF LEARNING

The educational system in Catalonia –an Autonomous Community with full powers over education- is structurally the same as in the rest of Spain. This system provides for compulsory education from 6 to 16 and non-compulsory education for infants between the ages of 0 and 6. The majority of Catalan children start school in the second cycle of kindergarten (3-6). It is supposed that by the last year of kindergarten (around 5-6) most children will have the ability to read and write some words and short texts. Schools tend to

decide on teaching syllabuses for reading that are consistent throughout the whole cycle of kindergarten and are usually carried over into primary education.

Catalonia has two official languages: Catalan and Spanish. Spanish is studied as a second language, whereas the vehicular language in schools and the language used in teaching literacy is Catalan. This Romance language spoken by over nine million people in the world has similarities with Spanish. For instance, Catalan is composed by 28 phonemes and Spanish has 24 (Quilis, 1993). Although Catalan vowel and consonant system is somewhat different and its spelling is less regular than Spanish, the existing inconsistencies in Catalan orthography are governed by rules that can be applied in almost every case in which a particular spelling pattern occurs. With regard to reading, the Catalan writing system, similarly to the Spanish, may be characterized as having a “shallow” orthography (Seymour, Aro & Erskine, 2003).

Aims

This study aims to explore the relationship between segmental knowledge together with letter knowledge and learners’ strategies when faced with texts accompanied by an image, decontextualized words and dictated words. Information is also required on whether the methodological approaches employed by teachers in natural contexts influence the relationships established among all the different types of knowledge. Thus we addressed the following research questions:

- a) What relationships emerge between phonological segmentation and letter knowledge and the ability to read and write in Catalan, with 5 year olds?

We expected that all the variables would be related, but the relationships could differ depending on teachers’ instructional approach.

- b) At what level of phonological segmentation and letter knowledge can pupils start to read and write some words? Do they read the same way when the text is accompanied by an image as when it is not?

Early literacy research leads us to hypothesise that children would need to be able to segment phonologically to write and read conventionally, though no research in Catalonia has explored these questions yet. We also expected that children would show differences when reading different kind of materials.

- c) Do the instructional practices of teachers holding different conceptions about the teaching of reading and writing have an influence on their pupils after a year’s instruction?

We expected that pupils in a synthetic approach would establish phonographic correspondences and read more quickly than those in an analytical-synthetic approach, whereas pupils in an analytically oriented classroom would be less likely to develop such knowledge and be less efficient in decoding. In contrast, we were expecting that children in the analytical-synthetic and analytical classrooms would use strategies based on global word recognition and write in a greater extent than those from a synthetic approach.

METHOD

Design

In order to answer the previous questions, we selected natural groups (schools and classes in which the preschool teachers manifested and implemented different approaches to teaching reading) and a repeated measurements (pre-post) design. The independent variable was the instructional approach implemented by the preschool teachers. The dependent variables considered were phonological segmentation, letter knowledge, reading words and a short text, and writing dictated words. The data-gathering instruments were devised with the intention of trying to ensure a certain ecological validity, and to conduct a qualitative fine-grained analysis of children's responses. Thus, instead of classifying children's responses as correct or incorrect, we assumed that, drawing on Piaget's theory, "error" or "deviant" responses are informative of children's internal processes of organization (Brown, 1973), and should be taken into account in order to characterise particular patterns of literacy growth (Read, 1986; Sharp, Sinatra & Reynolds, 2008; Vernon & Ferreiro, 1999).

Participants

A total of sixty-nine children in the last year of kindergarten (38 boys and 32 girls; age at the first stage of the research, October: $M = 65$ months, $SD = 3.75$), from three schools in the province of Barcelona participated in the study. The final sample is presented in Table 1.

Table 1: Number of pupils in each class and assessment*

	Synthetic	Analytical	Analytical-synthetic
First assessment (October - November)	20	24	25
Last assessment (May)	20	22	22

*Note: The loss of a small part of the sample in the second assessment did not affect the general configuration of the groups.

Participants were solicited by letters sent to parents. The letter included information on the study's aims and was distributed to the families via the schools. The schools were selected as follows: before and during the first few days of the new school year, semi-structured interviews (whose questions were based on the dimensions proposed by DeFord, 1985; Lenski, Wham & Griffey, 1998; Westwood, Knight & Redden, 1997) were held with a number of preschool teachers and three were chosen who reflected a particular instructional perspective. The information from the interviews was then checked against data obtained from various direct observations and recordings of teaching sequences in which teachers were implementing reading and writing instruction. The observations were analysed attending to the content teachers emphasised, the social organisation of the class and the materials used in the activity.

One of the preschool teachers was identified with a *synthetic* approach to reading. She said her main aim was for the children to learn to read before starting their first year in primary school; and to achieve this, it was essential for them to learn the sounds and mechanics of reading. This teacher said she taught reading and writing together because the children had to recognise the sounds and letters. She did not set herself any specific goal in regard to reading comprehension. Writing was restricted to copying and drawing letters and words. Children were asked to work individually and they used an edited book with isolated words and phrases, worksheets and storybooks.

The preschool teacher who reflected an *analytical* view gave her pupils reading and writing tasks that were related to each other, such as writing a letter to a friend, or writing a story all the class together. She did not have any general targets for these two instruments, but started out from each child's level of knowledge and particular interests, making them think. She sought to get the children to use reading and writing meaningfully and communicatively and focused on getting them to pay attention to the meaning of the words rather than decoding them. Children were asked to work in pairs or small groups to help each other. The materials were varied and used for different purposes (i.e. storybooks, predictable books, journals, letters from home, a list with the children's names, words mentioned by children).

The preschool teacher who reflected an *analytical-synthetic* perspective was interested in getting her pupils to learn sounds, relate them to the letters and be able to read autonomously. The sequencing she established in reading was based on auditory discrimination of the sound by establishing phonographic correspondences and moving on from there to the linking of the different sounds until the meaning of the word. This teacher said that she paid attention to vocabulary comprehension, as well as to the children's ability to combine the individual sounds. She also stressed the use of writing in functional and communicative tasks together with others linked to copying and drawing letters and words. In this class children could be found either working alone, or helping a partner when they were asked to write something. This teacher used worksheets for promoting basic reading abilities, and varied materials to teach comprehension and writing (storybooks, letters from parents and news from journals).

In addition, the classes had other features in common, such as: being located in the same geographical area; the socioeconomic characteristics of the children's families (average in all three classes); the presence in all the schools of documents stressing the continuity of the method of teaching to read in kindergarten.

Procedure

The sessions to evaluate the children's knowledge were held at the start of the school year (October-November) after a period of adaptation, and at the end of the school year (May). The preschool teachers explained to their pupils what they would do and the researchers spoke to the children before the evaluation sessions with the aim of enhancing their predisposition and openness to taking part and making comments. The tasks were conducted individually by each child together with a researcher and the sessions recorded with audiovisual equipment. Each individual assessment session lasted about 35 minutes and took place in a classroom in the child's own school. All the participants were assessed by the same researcher while they were doing the tasks. Tasks were counterbalanced across children and testing phases to eliminate the effect of task order.

Task characteristics and evaluation criteria

Since one of our interests was to perform a fine-grained analysis, it was important that the tasks allowed us to identify qualitative differences -in terms of strategies- that could be graded. Thus we were able to distinguish the pupils displaying knowledge closest to the conventional in a similar way to other research (Vernon & Ferreiro, 1999; Share & Gur, 1999). In the tasks with different category codes, inter-judge procedures were used to ensure reliability. Two judges (the authors) coded the 10% of the answers (fourteen answers chosen randomly from the first and the last assessment sessions), of each task independently. As the kappa index was adequate in all the cases, the disagreements were solved through discussion and the judges proceeded to code the remaining data.

Letter knowledge. The letters presented, 29 in all, were those of the Catalan alphabet plus the diacritic <Ç>, digraphs -<NY>-, and -<LL>-, printed in non-alphabetical order. The letters were presented in both upper case (20-point Times New Roman) and lower case (26-point ScriptS). The correctly named letters were counted between 0 and 29.

Phonological segmentation. In view of the goals pursued by the research, the method used by Vernon (1998) and Vernon and Ferreiro (1999) was adopted, as it allowed the children's behaviour to be graded.

The task consisted in children being shown an image (e.g. a 'pear'; in Catalan *pera*) and being asked to orally segment the word presented – to say it 'in small bits.' Two test samples (*pera* and *foca* – 'pear' and 'seal') were prepared which the researcher used to exemplify the different types of segmentation. The task was presented as a game. The researcher took an image and gave several examples, "This is a /'pɛ rə / (pear); if I say it in small bits I can say /pɛ -rə / or, even harder, /pɛ -r-ə /. And I can also say it in smaller bits /p-ɛ -r-ə /. You have to try to say it in small bits, as many as you can." All kinds of segmentation were accepted, although the researcher encouraged the children to segment the words phonologically. When the child had segmented four words of different syllabic length in a similar way, the test was concluded.

The children's behaviour was recorded and their utterances transcribed. The segmentations they made were then divided into different categories ordered developmentally as suggested by Vernon (op. cit.) (see Table 2).

Scoring was from 1 to 5. It is important to note that whenever a child hesitated and produced more than one answer, only the most analytical response was taken into account in data quantification and statistical analysis. Inter-judge reliability for this task, based on 10% of the sample, was high ($K = 0.85$).

Table 2: Tasks and categories

Scoring	Phonological segmentation	Reading words	Reading a short text	Dictation
1	Segments into syllables; in the monosyllables, geminates the consonant or vowel –for the word <i>crema</i> (cream) /kre-mə /	Says can not read the word; does not recognise the letters; attributes a name or label without	Does not know what the text means; attributes a meaning related to the image	Writes a word with an unconventional representation (e.g. TRTORN, instead of <i>casa</i> –'house'-)
2	Segments intrasyllabically, isolating an element of the syllable -the vowel or the consonant- and repeating it /kre-e-mə /	Decodes, without being able to combine the letter sounds identified into a unit and fails to understand the meaning	Maintains the attributed meaning even though recognising the letters	Syllabic writing with a conventional sound value, whereby the child writes one of the letters contained in each syllable (e.g. AA, CA, AS, CS, instead of <i>casa</i>)

3	Completely isolates the final sounds of the word /kre-m-ə /	Reads it	Decodes the text without succeeding in understanding its meaning	Syllabic-alphabetic writing. Writes more consonant and vowel sounds contained in each of the syllables in the word (e.g. CAS or ASA for <i>casa</i>)
4	Isolates the sounds of the word, except consonant clusters /kr-e-m-ə /		Begins by attributing a specific meaning, then taking into consideration the letters, reads the word	Alphabetic writing in which the majority of the sounds are represented, even though the child may have missed out one or more of the consonants in a consonant cluster
5	Segments by isolating all the sounds present in the words /k-r-e-m-ə /		Reads the text without entering into a contradiction with the image	Alphabetic writing with full discrimination of the sounds in consonant clusters such as: cr (<i>crema</i> – ‘cream’)

Reading words. The pupils were confronted with decontextualised words; they had to take the set of signs, or spelling, as a reference in order to read them. The words presented had different numbers of syllables and consonant combinations, similar to those used in the segmentation and dictation tasks. The children were first presented with some familiar words -*mama, casa, sol* (mummy, house, sun)- they could recognise holistically or by one of their letters, before being shown others whose length or complexity required the use of other strategies. If the children found it hard to read or said they could not do it, they were credited with the strategy nearest to conventional reading they had used on four of the words presented.

The strategies most frequently employed in reading were identified and the children’s behaviour was categorised on this basis (Table 2). The points given ranged from 1 to 3. Inter-judge reliability was high and significant ($K = 0.87$).

Reading a short text in the context of an image. This task involves reading material containing contextual signs that might facilitate comprehension, although they might also lead to mistakes. In the first case (“la pilota” – the ball), although the words were the name of one of the objects in the image, this item could be interpreted as secondary, since the central image was that of a football player. In the second case, the image was of a male person and there was no other clue that might help in recognising the words “un músic” (a musician). We hoped that this task would enable us to observe the strategies employed by the children to ascertain the meaning. Similar tasks have been used in other studies (Elliott, 1992; Ferreiro & Teberosky, 1979).

The different answers given by the children were recorded in a similar way to that used on the *reading words* exercise. The categories were also similar to those of the *reading words* exercise (Table 2), although the characteristics of the material used meant that we also had to

create some new ones. The maximum score on this task was 5 and the lowest score was 1. Inter-judge reliability, based on 10% of the sample, was high and significant for this task ($K = 0.86$).

Dictation. The dictation task was introduced to compare the strategies the pupils tried for reading with those they used in writing. This task also served as a benchmark for the results obtained by the children on segmentation. Adopting the same criterion employed for the phonological segmentation task, a similar procedure to that of Ferreiro and Teberosky (1979) was chosen consisting of dictating certain words to the children and seeing how they wrote them. In particular, they were asked to write their name, as that is usually something they can do quite well, and some words presenting greater or lesser complexity in regard to the letters and letter combinations in them. The different writings produced by the children were categorised following Ferreiro and Teberosky (1979) (see Table 2). The minimum possible score on this test was 1 and the maximum 5. Inter-judge reliability, based on 10% of the sample, was $K = 0.90$.

RESULTS

The results are presented in relation to the questions and aims guiding this study. As the classes were natural groups that had been receiving instruction consistent with the instructional approach of the current preschool teacher during the two years prior to the research, they were not homogeneous with each other. Hence the statistical tests employed were non-parametric and the significance value adopted was $p < .01$.

Relationship between phonological segmentation, letter knowledge, reading different texts and writing. Between-class differences

Table 3 shows that the correlations between the types of knowledge evaluated vary from one class to another. In the synthetic class, the significant relations appeared at the end of the school year and had to do with segmental awareness and letter knowledge ($\rho = 0.62$, $p < .01$), segmental awareness and dictation ($\rho = 0.67$, $p < .01$), and letter knowledge and dictation ($\rho = 0.59$, $p < .01$). In the analytical class, there were strong correlations for all the measures of knowledge at both assessments. In the analytical-synthetic class, various relationships emerged between the different types of knowledge at the beginning of the academic year; at the end of the year, the only task that did not correlate with the others was reading words.

Table 3: Spearman correlations among tasks for each class and assessment

Group	Tasks	First assessment				Last assessment			
		2	3	4	5	2	3	4	5
Synthetic	1. Letter knowledge	.33	.46	.15	.47	.62*	.53	.39	.59*
	2. Segmenting	-	.17	.36	.24	-	.51	.42	.67*
	3. Reading words		-	.23	.48		-	.50	.55
	4. Reading a short text			-	.04			-	.55
	5. Dictation				-				-
Analytical	1. Letter knowledge	.78*	.79*	.92*	.86*	.90*	.71*	.82*	.77*
	2. Segmenting	-	.75*	.78*	.81*	-	.82*	.88*	.84*
	3. Reading words		-	.71*	.78*		-	.93*	.77*
	4. Reading a short text			-	.82*			-	.75*
	5. Dictation				-				-
Analytical-synthetic	1. Letter knowledge	.62*	.54*	.73*	.51*	.54*	.21	.63*	.63*
	2. Segmenting	-	.60*	.61*	.80*	-	.33	.75*	.75*

3. Reading words	-	.57*	.60*	-	.49	.49
4. Reading a short text		-	.70*		-	1.000*
5. Dictation			-			-

Note: * $p < .01$

As it can be seen in Table 3, the types of knowledge that correlated with each other, in all the classes at the end of the school year, were segmental awareness, letter knowledge and dictation.

Level of segmental awareness and letter knowledge and children's strategies to read and write. Group differences

Our research questions in this case required a qualitative analysis that allowed patterns between the variables to emerge. To conduct this analysis we created two matrixes (Miles & Huberman, 1994) for each assessment time, with five columns, where the different levels of phonological segmentation were placed, and several rows in which children's strategies when reading a word, a short text or writing a dictated word were displayed as well. In these matrixes, which took the final form of tables (see tables 4 and 5), we located the children from each group and calculated percentages of children in each cell. We decided to highlight in grey the highest percentage of children in a cell for each task, so that specific patterns could be observed.

Thus, the level of segmental awareness at which children in our sample were able to begin to read and write can be found in Table 4.

The turning point between the use of non-conventional procedures for reading (non-reading or attributing an idiosyncratic meaning) and the use of procedures approximating to conventional reading and writing (decoding, representation of some of the conventional sounds of the words), corresponds to category 3, where the pupils segmented the last part of the words into phonemes. A little over half of the pupils who isolated syllables ($n = 12$; 17.7%) or some intrasyllabic component ($n = 9$; 13%) failed to recognise either the words or the text, and represented unconventional sound values in their writing. However, 2.9% ($n = 2$), of the children who segmented words into syllables tended to decode, in spite of recognising a low average number of letters ($M = 7.94$), while 4.3% ($n = 3$), succeeded in understanding at least one word containing the letters they knew. Faced with the text in the context of an image, most of the pupils, recognising the average number of letters mentioned above, attributed an idiosyncratic meaning to the text or said they could not read it ($n = 16$; 23.1%). In addition, two children (2.9%) who segmented intrasyllabically, were able to read a word and the short text.

In category 3 (isolating phonemes at the end of the word), the average number of letters recognised was twice that in the two previous categories ($M = 16$). The same result was found in regard to the percentage of pupils who tried to decode but failed to give the correct meaning ($n = 5$; 7.2%) and those who read the words in the conventional manner ($n = 6$; 8.7%), and in writing, with the children beginning to represent conventionally at least one of the sounds comprising the syllable ($n = 10$; 14.5%). Conversely, in the exercise where the text was accompanied by an image, greater difficulties were encountered in achieving conventional readings, even though some of the children decoded ($n = 5$; 7.2%), while others said they did not know what the text said or labelled it ($n = 8$; 11.5%).

The use of more conventional reading and writing procedures increased with the ability to segment words phonetically. The children who segmented words into phonemes, with the exception of consonant clusters such as /tr/ (category 4), tended to read words ($n = 9$; 13%),

tried to understand the meaning of the word or text by decoding it ($n = 6$; 8.7%) and produced syllabic-alphabetic writing (representing in writing one or more of the syllables of a word, while writing only one of the letters for the other syllables) ($n = 9$; 13%).

Children who were able to isolate all of the sounds of a word ($n = 6$, category 5), recognised a large number of letters ($M = 24$); read, in general, either of the two kinds of type; and wrote alphabetically, and in some cases even represented the sounds of the different types of consonant clusters.

Table 4: Percentage of pupils in the different categories of the tasks in the first assessment ($n=69$)

		Phonological segmentation				
		1. Syllables	2. Intrasyllabical y	3. Final phonemes	4. Phonemes except consonant clusters	5. All the phoneme s
Reading words	1. Does not recognise letters. Attributes a label	17.7	13	7.2	4.3	
	2. Decodes, does not combine letter sounds	2.9	1.4	7.2	8.7	1.4
	3. Decodes, understands the word	4.3	2.9	8.7	13	7.2
Reading a short text	1. Does not recognise letters. Attributes a label	23.1	13	11.5	7.2	
	2. Recognises letters but attributes a label		1.4	2.9	7.2	
	3. Decodes, does not combine letter sounds	1.4		7.2	8.7	
	4. Attributes a label, considers the letters and reads the text		2.9			
	5. Decodes, reads text			1.4	5.8	8.7
Dictation	1. Writes unconventionally	15.9	10.1	4.3	2.9	
	2. Syllabic writing	8.7	4.3	14.5		
	3. Syllabic-alphabetic		2.9	4.3	13	
	4. Alphabetic without consonant clusters				7.2	4.3
	5. Alphabetic with consonant clusters				2.9	4.3

At the final assessment (Table 5), very few of the pupils segmented syllabically ($n = 3$) or intrasyllabically ($n = 8$). By this time, the pupils recognised more than twice as many letters as at the start of the school year ($M = 16$), tended to read the words and the text, and wrote at different levels.

In addition to recognising a high average number of letters ($M = 21$), the children who segmented the phonemes at the end of the word ($n = 6$, category 3) tended to be successful in reading the words and the text in the context of the image and to write alphabetically or syllabically. The children in category 4 (segmentation into phonemes, excepting consonant clusters) followed a similar pattern to those in the previous category, although they wrote alphabetically without representing the consonant cluster sounds. However, when reading words and a text in the context of an image, some of them ($n = 4$; 6.2% in the former case; $n = 6$; 9.4% in the latter) decoded without managing to understand the meaning.

In category 5 (isolating all the phonemes), the pupils ($n = 27$) recognised almost all the letters ($M = 26.5$), read and wrote conventionally, and represented the consonant clusters.

Table 5: Percentage of pupils in the different categories of the tasks and mean of letters recognised in the last assessment ($n=64$)

		Phonological segmentation				
		1. Syllables	2. Intrasyllabically	3. Final phonemes	4. Phonemes except consonant clusters	5. All the phonemes
Reading words	1. Does not recognise letters. Attributes a label	1.5	1.5			
	2. Decodes, does not combine letter sounds	1.5	3.1	3.1	6.2	
	3. Decodes, understands the word	1.5	7.8	6.3	25	42.2
Reading a short text	1. Does not recognise letters. Attributes a label	1.5	1.5			
	2. Recognises letters but attributes a label		1.5	3.1	1.5	
	3. Decodes, does not combine letter sounds		6.3		9.4	
	4. Attributes a label, considers the letters and reads the text					
	5. Decodes, reads text	3.1	3.1	6.3	20.3	42.2
Dictation	1. Writes unconventionally	1.5				
	2. Syllabic writing		4.7	3.1		
	3. Syllabic-alphabetic	1.5	3.1	1.5	3.1	
	4. Alphabetic without consonant clusters	1.5	4.7	3.1	17.2	3.1
	5. Alphabetic with consonant clusters			1.5	10.9	39

The data appear to indicate that when learners are able to segment words into phonemes and recognise a certain number of letters, they have a basis for conventional reading and writing. In spite of this, however, our data also point to the fact that, with a syllabic or intrasyllabic type of segmental awareness and the possibility of recognising some letters, children can begin to read some words –five children in the first assessment, and six in the last assessment-. On the other hand, for some pupils, being able to segment words and recognise letters is not enough for them to be able to read; in spite of the fact that they tend to decode, they are unable to combine the sounds they produce into a unit.

Influence of the preschool teachers' instructional approaches on pupils' learning

The descriptive statistics (mean scores and standard deviations) for all the tasks, groups and assessment moments are shown in Table 6.

Table 6: Descriptive statistics for the tasks and the two assessment moments

Group		Letter knowledge (max. 29)		Segmenting (max. 5)		Reading words (max.3)		Reading a short text (max. 5)		Dictation (max. 5)	
		M	SD	M	SD	M	SD	M	SD	M	SD
Synthetic	First	8.50	4.548	1.95	.945	1.80	1.005	1.45	1.145	1.65	.670
	Last	22.40	5.154	3.20	1.322	2.80	.489	4.65	1.089	3.95	.945
Analytical	First	17.21	7.757	3.38	1.408	2.04	.806	2.95	1.680	2.83	1.404
	Last	22.73	5.841	4.18	1.053	2.59	.590	3.91	1.411	4.14	1.125
Analytical-synthetic	First	12.16	5.265	2.84	1.179	1.92	.909	2.04	1.240	2.20	1.190
	Last	24.95	2.968	4.36	.953	2.95	.213	4.50	.964	4.68	.716

As can be seen in Table 6, children from all the different classrooms made substantial progress between the first and the last assessment.

In order to identify more specifically the possible influence of the teachers' methodology on the pupils' learning, non-parametric tests were performed at the beginning and end of the school year for more than one class (Kruskal-Wallis H Test). In addition, a Mann-Whitney U Test was carried out on the tasks that turned out to be statistically significant. Tests were also performed to see whether there were any differences in the progress made by the pupils in the different classes on the tasks used in the study.

At the start of the school year, there were numerous differences between the synthetic class and the analytical class. The *a posteriori* comparisons regarding the majority of the tasks -other than reading words-, were significant, with the mean ranks higher in the analytical class: *number of letters* ($Z = 3.52, p < .001, r = .53$), S(synthetic): 15.05; A(analytical): 28.71; *segmentation task* ($Z = 3.39, p = .001, r = .51$), S:15,48; A:28,35; *reading a short text in context* ($Z = 3.51, p < .001, r = .53$), S:15.13; A: 28.65; *dictation* ($Z = 2.96, p = .003, r = .45$), S: 16.40; A: 27.58.

A comparison of the synthetic class and analytical-synthetic class revealed significant differences on the *reading a short text* task, with the pupils in the analytical-synthetic (AS) class performing better ($Z = 2.66, p = .008, r = .40$), S: 17.42; AS: 27.46.

No significant differences were found between the analytical class and analytical-synthetic class, showing that these two groups were quite similar in their level of knowledge for the different tasks assessed.

At the end of the school year, the pupils belonging to the synthetic class showed less skill in isolating phonemes in words than those in the analytical class. They made less complete and less thorough segmentations -*segmentation task* ($Z = 2.61, p = .009, r = .40$), S: 16.52; A: 26.02-.

In addition, significant differences were found between the performances of the children in the synthetic and analytical-synthetic classes on the *dictation* and *phonological segmentation* tasks, the former not performing as well as the latter. The means were as follows: for the *segmentation task* ($Z = 3.12, p < .002, r = .48$), S: 15.57; AS: 26.89; and for the *dictation* ($Z = 3.25, p = .001, r = .50$), S: 15.68; AS: 26.8.

A comparison of the scores obtained by the pupils on the final assessment and those obtained on the initial assessment reveals statistically significant differences ($p < .01$) between the synthetic and analytical classes. These differences indicate that the synthetic class made more progress than the analytical class on the following tasks: *number of letters recognised* ($Z = 4.20, p < .001, r = .65$; S: 29.83; A: 13.93); *reading a text* ($Z = 3.941, p < .001, r = .61$; S: 29.15; A: 14.55) and *dictation* ($Z = 2.94, p = .003, r = .45$; S: 27.15; A: 16.36).

Similar differences were also found between the analytical-synthetic class and the analytical class: *number of letters recognised* ($Z = 4.03, p < .001, r = .61$; AS: 30.30; A: 14.70); *reading a text* ($Z = 3.047, p = .002, r = .46$; AS: 28.23; A: 16.77) and *dictation* ($Z = 2.974, p = .003, r = .45$; AS: 28.14; A: 16.86). These results indicate that children in the analytical-synthetic class improved more than the analytical class during the school year.

However, no statistically significant differences were found between the synthetic and analytical-synthetic classes, pointing to the fact that the children in both groups had a similar level of knowledge for the different tasks assessed.

DISCUSSION

Taking into account that this study is based on a comparison of natural groups and a fine-grained identification of children's reading, writing and segmental awareness procedures and strategies, the results enable us to highlight certain interesting trends regarding the research questions we set ourselves.

First, there are significant relationships among phonological segmentation, letter knowledge, the reading of different materials and dictation in Catalan. In general, the links coincide with those found by various studies in Spanish (Casillas & Goicoetxea, 2007; Vernon & Ferreiro, 1999).

However, these relationships appear to be influenced by the type of educational approach to which the pupils are exposed and the particular stage the children are at in the learning process. This is what the results of the different classes point to. The tasks among which relationships were found on the final assessment in all three classes were phonological segmentation, letter knowledge and dictation. Reading was variously related to the other types of knowledge.

From the patterns we identified from the qualitative analysis, Catalan children need to be able to segment words into phonemes orally -even if they do not succeed in doing so completely-

and to recognise about ten consonants and the vowels in order to use decoding in reading and conventionally represent some of the sounds present in words when they write.

In spite of this, in our sample, the ability to identify syllables phonologically, together with the ability to recognise some letters, would seem to be sufficient to begin to read certain words. Evidence was found in children who had a low level of phonological awareness (enabling them to segment words orally into syllables or intrasyllabically), but could read some words conventionally. This means that in Catalan, segmental awareness enabling a child to isolate all the phonemes could not be, in principle, a prerequisite for beginning to read, as has already been shown by a number of studies in Spanish (Casillas & Goicoetxea, 2007; Carrillo, 1994; Jiménez & Ortiz, 2000). These findings are consistent with Spencer and Hanley's (2004) results with Welsh children, and provide fresh empirical support to the notion that the type of segmental awareness required for reading is a variable depending on the relative shallowness of the orthography in question, rather than a universal constant, despite more evidence is still needed.

Our results seem to indicate that other aspects besides segmental awareness and letter knowledge intervene in reading. In spite of their ability to recognise letters and decode, some pupils failed to read successfully because they did not blend the sounds resulting from decoding.

Our study has also enabled us to observe the relationships between segmental awareness and writing. The results indicate that segmental awareness is related to the possibility of writing in ways nearer to conventional writing. It is related to reading as well, although less obviously, especially when it is a matter of reading decontextualised words. This closer relationship between segmental awareness and writing has been observed in other studies on languages with relatively shallow orthographies, such as Catalan and Hebrew (Teberosky, Tolschinsky, Zelcer, Gomes de Morais & Rincón, 1993), Greek (Tafa & Manolitsis, 2008) and Portuguese (Silva & Alves-Martins, 2003). The greater regularity of grapheme-phoneme correspondences between particular sounds and graphemes in languages with a more regular orthography than English may lead to phonological analysis being developed with greater certainty in writing (Rego & Bryant, 1993; Richgels, 2001; Vernon, 1998; Vernon & Ferreiro, 1999). This would be in keeping with the relationships that emerged in our study between segmental awareness, dictation and letter knowledge, which were correlated in all three classes on the final assessment. The links between the three types of knowledge also coincide with those found by Casillas and Goicoetxea (2007). Undoubtedly, the reflections the learners engage in regarding the speech sounds in order to link them to the particular graphemes and represent them in writing, presuppose an increasingly accurate and precise level of phonological awareness.

It is also useful to identify the influence of the teachers' instructional approaches on their pupils' performances. Despite the fact that we expected that by the end of the school year the pupils in the synthetic classroom would have developed a much higher level of segmental knowledge than the children in the other two classes, the data obtained, have forced us to rethink this. The performances of the children in the synthetic class on the segmentation task –and concomitantly on the dictation– were the poorest of the three at the end of the school year. On the other hand, these pupils were the ones who read words conventionally and most easily. These data match those obtained in a study in Brazil in which children were identified who could read without difficulty even though they segmented words into units larger than phonemes (Gomes de Morais, 2004).

There are several possible interpretations of this low level of segmental awareness. Firstly, if, as the class teacher explained, the children were given little writing practice in class, the learners had fewer opportunities to develop high levels of segmental awareness, at least by

this route. Secondly, as Lazo, Pumfrey and Peers (1997) have indicated, the earlier the capacity for phonological segmentation is developed, the more opportunities there are for improving it. This class' results may therefore be a consequence of their late induction into the process of analysing and reflecting on the sound units of speech. The analytical and analytical-synthetic classes displayed a more detailed segmental ability than the synthetic class. As Leybaert and Content (1995) and Thompson, Fletcher-Flinn and Cottrell (1999) have pointed out, this may be explained by the fact that the children in these classes are given writing tasks favouring the development of such awareness.

In general, even assuming that the final assessment may show a ceiling effect in some of the tasks, the pupils who made least progress were those in the analytical class. In the case of reading, these results, which are consistent with those of other studies (Artiles, 1997; Dahl & Freppon, 1995; Jiménez & Guzmán, 2003) might be due to the fact that the teacher favoured the use of more global procedures that were not adequate for understanding the way the alphabetic system functions and were not very useful when it came to reading unfamiliar texts.

The children in the analytical-synthetic class, in contrast, made a greater and more balanced progress in both reading and writing between the two assessments. An analytical-synthetic approach to teaching reading and writing would therefore, according to our study and others conducted in other countries (Goigoux, 2000; Sowden & Stevenson, 1994; Xue & Meisels, 2004), favour more comprehensive learning of both instruments. This result was to a certain extent expected, since such an instructional approach is most consistent with the processes of acquiring written language.

The results of this study allow us to suggest different implications for early teaching of reading and writing in a language with a fairly shallow orthography. On the one hand, more systematic teaching of reading can begin at a level of segmental awareness enabling children to identify syllables or intrasyllables. Writing, in terms of the graphic representation of sound elements, can also begin at the syllabic level of segmental awareness, although making a start on conventional writing requires identifying all the sounds and their graphic correspondence.

In addition, the practice of writing as an activity involving the analysis of the speech elements may favour a better awareness and identification of sounds, something that can also be fostered by teaching.

These differences between reading and writing lead us to insist on the importance of devoting specific attention to each one, setting tasks dealing with what is particular to each of them. Our data point to there being certain kinds of knowledge those preschool teachers can foster in their pupils, such as the ability to recognise units bigger than letters, such as syllables, to help them join up the sounds and access the meaning of the texts. To do this, recognising pupil's skills and knowledge at the start of the teaching process appears as an inescapable necessity (McIntyre, Rightmyer, Powell, Powers & Petrosko, 2006) for introducing the types of knowledge children require: letter knowledge and knowledge of the procedure for blending the different sounds they decode.

It would also seem advisable to employ a variety of materials for reading and for achieving different ends, and to intervene in such a way as to foster the adoption of different strategies taking children closer and closer to conventional reading. Reading decontextualised material that can be recognised favours the adoption of phonological strategies for establishing phoneme-grapheme correspondences, allowing the emergence of a generative strategy (Alegría, 1997; Share, 1995) making conventional reading possible.

Any study has limitations, and ours is no exception. Although we had sixty-nine participants, the fact that they belonged to only three classrooms with different instructional perspectives,

minimises the power to detect effects and more clear patterns in children's early literacy development. Qualitative matrixes allowed us to identify several patterns and tendencies, but more research is needed to provide greater support for the conclusions that we have drawn. Another limitation is related to our aim of favouring external ecological validity, which had several implications. First, despite the fact that the selection of the classes was conducted from a variety of schools, it implied avoiding selecting the groups randomly so that specific approaches could be identified. Therefore, we can not assure that the sample is representative of all Catalan schools. Second, the tasks proposed to the children could have been more diverse at the end of school to allow differences to be more contrasted. However, similarly to Sharp, Sinatra and Reynolds (2008), we believe the fine-grained approach is a powerful means to understand the complexities and diversity of patterns that early literacy development may present.

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