

Emergent literacy and learning to write: A predictive model for Italian language

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The aim of the present study is twofold: (1) contribute to identifying a model for the variables that compose the emergent literacy construct and their relationships; (2) assess the predictive power of the emergent literacy model on early writing abilities in a transparent orthography language.

We examined emergent literacy skills in 464 children (mean age 5.5, range: 48-6.1) who were followed longitudinally until entering the 1st grade in primary school. Exploratory and Confirmatory factor analyses were used to address questions on the nature of emergent literacy skills and their possible relationships. Regression analyses were implemented to evaluate the predictive capability of an emergent literacy model on word writing competences. The factor analyses showed three factorial dimensions (phonological, conceptual knowledge on writing system and textual) and their relationship. The regressions showed a significant prediction of conceptual knowledge on writing system and of phonological abilities on early writing abilities.

Introduction

The term 'emergent literacy' is used to denote the idea that the acquisition of literacy is best conceptualised as a developmental continuum, with its origins beginning early in the life of a child, rather than an all-or-none phenomenon that begins when children start school.

Emergent literacy represents a research field in which different conceptualisations and methodologies converge. The expression 'emergent literacy' is derived from a paradigm shift in the scholar's conceptualisation of children literacy development. This expression appears in Clay's studies (1979, 1993) on children's emergent reading behaviours, suggesting awareness that literacy development begins in infancy within the informal settings of family and community, and it has been formalized by Teale and Sulzby (1986).

'Emergent literacy' presently refers to children's formal and informal contacts with spoken and written language before attending primary school (Chaney, 1994) and has broad areas of conceptual overlapping with the term 'early literacy', as it has been used by Neuman and Dickinson (2002).

The term emergent literacy can also be referred to as 'preliteracy', as used by van Kleeck (2004). This term encompasses the acquisition of code-related skills, such as the development of phonological awareness and alphabet knowledge. From this perspective, preliterate children may be learning about the form, content and use of literacy before having integrated this knowledge into conventional reading and writing skills.

From a developmental perspective, the foundational age for many children is from about 2 years of age, when the process of discovering symbolic systems begins. In this process, the child is an active discoverer, but adults also play a significant role helping him/her to build knowledge in a social way, through 'cognitive scaffolding' (Bruner, 1983). The adult plays a very important role facilitating the child in learning written language as a representational system of spoken language, as evidenced by numerous studies showing symbolic abilities in children before primary schooling (Bus, 2002; Bus, van IJzendoorn, & Pellegrini, 1995; Evans, Shaw, & Bell, 2000).

The idea that children grow up in literate societies and are, therefore, immersed in a notational environment, and thus have the opportunity to learn a great deal about notations before exposure to formal schooling, is also confirmed within different socio-linguistic contexts (Burge & Resnick, 1996; Ferreiro & Teberosky, 1979; Pontecorvo, Orsolini, Ravid & Tolchinski-Landsmann, 2002).

In the field of emergent literacy, an important issue is its relationship to formal literacy; relevant research has focused on this relationship. Comprehension of the relationship between written signs and meanings is a complex process that involves a multiplicity of skills and abilities. Children bring their previous knowledge and experiences to support the task of learning to read and write (Sénéchal & LeFevre, 2002).

The idea that literacy development is an ongoing phenomenon has received support from a number of researchers. Among these studies, the longitudinal studies of Bradley and Bryant (1983, 1985) and the recent meta-analyses conducted by Ehri and colleagues (2001) are of special importance. In their entirety, these studies provide an empirical foundation to the important predictive role of emergent literacy in formal learning. In fact, a reason for the increased interest in early literacy is the empirical evidence demonstrating the effect of early skills on the formal learning of reading and writing. Researches demonstrated the link between preschool children's abilities and performance during early schooling and in the following school grades (Cuningham & Stanovich, 1998; Juel, 1988).

On the whole, these studies confirmed the importance of single abilities, composing emergent literacy, in formal literacy, but they do not provide a general model of emergent literacy competences in preschoolers. Indeed, emergent literacy appears to consist of several cognitive abilities: phonological awareness (Lonigan, Burgess, & Anthony, 2000), knowledge of letters (Evans, Shaw, & Bell, 2000), knowledge about the functions of print (Purcell-Gates, 1996), language skills (Wagner et al., 1997), including the recontextualisation of language use (Cameron, Hunt, & Linton, 1996). These studies demonstrate the existence of significant connections only among some competences of preschool children and their performance in first schooling and in the following grades.

Significant progress in consolidation of the emergent literacy construct is demonstrated by three models of competences involved in emergent literacy.

Whitehurst and Lonigan (1998, 2002) on the basis of a complex longitudinal research, generated a structural model of the development of literacy skills from preschool through second grade. In their model, emergent literacy consists of two interdependent sets of skills: outside-in and inside-out. The outside units represent sources of information from outside the printed word that support children's understanding of the meaning of the print (e.g., vocabulary, conceptual knowledge and story schemas). The inside units represent sources of information within the printed word that support children's ability to translate print into

sounds and sounds into print (e.g., phonemic awareness and letter knowledge). As far as the predictive aspects are concerned, this model indicates that phonological skills in preschoolers are critical in first grade when reading involves mainly learning to decode words, while conceptual knowledge plays a significant role in the following grades when comprehension processes are involved in fluent reading (Whitehurst & Lonigan, 2002).

The model by Sénéchal, LeFevre, Smith-Chant, and Colton (2001) considers emergent literacy as a separate construct from oral language (vocabulary) and metalinguistic skills (phonological awareness). In this model it is proposed that emergent literacy is composed of two distinct components: children's conceptual knowledge about literacy (e.g., knowledge of the functions of print) and children's early procedural knowledge of writing and reading (e.g., invented spelling). The predictive power of this emergent literacy model has been verified only for reading; results show that just alphabet knowledge is associated with the acquisition of reading in first grade, both for words decoding and fluent reading, while conceptual knowledge about literacy is not predictive for formal literacy. Among the competences outside the model phonological awareness show prediction on reading acquisition in first grade (Sénéchal et al., 2001).

Because of these models have been developed with English-speaking children learning an alphabetic and non-transparent writing system, the extension of these concepts of emergent literacy to children learning transparent writing systems is not appropriate. So Pinto, Bigozzi, Accorti Gamannossi, and Vezzani (2008) build up an emergent literacy model for transparent orthography language with Italian-speaking children. This model considers emergent literacy in a wider meaning in a multidimensional perspective of the construct, taking into account all the components evidenced by Whitehurst and Lonigan (1998) and Sénéchal and colleagues (2001). Pinto and colleagues (2008) examined emergent literacy skills in a large sample of preschoolers, through exploratory and confirmatory factor analyses they developed a model consisting of four factorial dimensions: phonological, textual, orthographic and cognitive-linguistic, significantly correlated among them, except for phonological and orthographic factors which are independent one to another (Pinto et al., 2008). These results are in line with a multidimensional view of emergent literacy, where general and specific aspects are integrated, according to Whitehurst and Lonigan (1998). The predictive power of this model has not been verified.

The existing models have mainly explored the emergence of reading abilities empathizing the importance of specific aspects (as like phonological spelling and alphabet knowledge) and their links to literacy to the detriment of more general conceptual knowledge competences. Literature does illustrate no theoretical model focussed on the emergence of writing capabilities. Indeed, the acquisition of adequate orthographic competences constitutes a crucial stage for achieving advanced writing abilities. The rapid and correct mastery of sound-sign transposition is a necessary (even if not sufficient) condition for the beginner writer to access the phase in which coding becomes instrumental and a non-ambiguous medium of semantic, syntactic and textual components of written language. On the other hand, the persistence of orthographic difficulties risks compromising the advanced writer's development, directly because of the expansion and persistence of memory load, constituting an obstacle to access the instrumental level with evident consequences in school performance which implies writing, and indirectly due to a drop in motivation, easily related to postponed "writing knowledge", which useful for text construction (Mason & Boscolo, 2004). Models on reading and writing acquisition do report the important connections between the beginning of writing abilities and the following acquisitions both in writing and in reading (Frith, 1985; Goswami & Bryant, 1990). There also are large empirical studies that support the importance of early identification of difficulties in the first phases of literacy in order to overcome them.

Briefly, studies on emergent literacy show some limitations: there is not a unitary vision of the construct, which appears to be described more or less extensively and its dimensions need to be redefined; the predictive aspects are scarcely investigated and limited to reading abilities, so it requires more empirical evidence on the emergent literacy construct and its association with early writing competence.

The aims of the present longitudinal study are:

- (1) to build an emergent literacy model for Italian children and, in particular, to verify the relevance of the different components involved in the emergent literacy process and the nature of the relationships among them;
- (2) to verify the predictive links between the emergent literacy competences in preschool children and their competences in initial formal writing and in particular in words writing.

Our expectation, in line with models by Whitehurst and Lonigan (1998) and Pinto and colleagues (2008), is that emergent literacy variables are spread on a large chart of competences, both general (linguistic and textual) and domain specific (phonological and orthographic). As far as predictive aspects are concerned, according to models which investigated emergent literacy prediction on early reading in first grade we expect likewise that general competences would not be predictive of early writing. Moreover we expect that also phonological awareness would be predictive of early writing because it requires to transpose sounds in signs. But at the same time we believe to find the influence of specific conceptual knowledge on writing system, because the act of writing implies the productive action of a specific task which is associated to specific competences.

Method

Participants

In Italy, formal instruction of reading and writing begins in primary school when children are 6 years-old. Ninety-five percent of 5 years-old children attend pre-school where they have informal, daily contact with the symbolic sense of language. According to the official programmes¹, the activities conducted in pre-school that specifically address language enhancement are: conversations, narration of personal events or small stories, comprehension of oral and written narratives, use of a metalanguage (analysis of phonological and semantic similarities among words, attention focussed on assonances and rhymes, use of language of the mind, etc.).

Emergent literacy abilities have been assessed in 464 children (228 males and 236 females), mean age 5.5 (range: 4.8-6.1), attending 6 predominantly middle-class pre-schools located in the outskirts of Florence. Parents and school authorities, as well as the children themselves, gave consent to participate in the study.

A sub-sample (259 children: 118 males and 141 females) attending primary school has been followed longitudinally and tested after four months of schooling, when the bases of the writing system are acquired and children are expected to spell about 50 words, according to the objectives of the official programmes in Italian primary schools.

Materials and procedure

This longitudinal study is articulated in two phases (see Table 1):

- In the first phase, children attending their last year of pre-school were examined during the months of April and May. Their emergent literacy abilities were measured through individual administration of tests that measure general abilities and specific tasks to assess competences that, according to the literature, are constituents of the emergent literacy construct.
- In the second phase, children attending first grade in primary school were examined during the month of December. Their early instrumental competences in writing were assessed through group administration of specific writing tasks.

Table 1

Research design

(1) First phase – Kindergarten	(2) Second phase – Primary school
Test TCR	
Test of language comprehension	Self-dictation
Identification and production of sound patterns	Numbers writing
Conceptual knowledge on orthography	Words dictation
Story production	Non-words dictation

(1) *First phase* (pre-school)*Test TCR* (Test of Relational Concepts) (Edmonston & Thane, 1988)

This test evaluates, in children from 3 to 8 years old, the knowledge of 56 terms referred to concepts (for example: space, time, quantity, equality, union, etc.). The examiner gives to the child tables with three pictures each and for each one the child has to indicate the picture corresponding to a sentence pronounced by the examiner. Linguistic performance was scored following the TCR test procedure. Standard scores ranged from 0 to over 60.

Test of language comprehension (Rustioni Metz Lancaster, 1994)

This test evaluates syntactic comprehension: the child is given tables with four pictures each and for each table he/she is asked to indicate the picture corresponding to the sentence pronounced by the examiner. The scores, ranging from 0 to 5, provide an index of language comprehension in preschool aged children.

Identification and production of sound patterns (adapted from Dowker & Pinto, 1993)

Three tasks were administered and the order of the three conditions was counterbalanced. Each answer given by the children was tape recorded and a transcript was produced for analyses by two independent judges.

Task 1 Rhythm: the child was asked to listen to two verbal stimuli (one containing an alliteration and a similitude, the other containing an alliteration and a limerick) and to produce something similar. The children's production are coded according to their ability to produce rhythmic recurrences: no rhythm (score 0), one rhythmic structure production (score 1), two rhythmic structure production (score 2).

Task 2 Rhyme: the child was asked to listen a verbal stimulus containing a rhyme device and to produce something similar. The children's productions were coded according to their ability to produce rhymes: no rhyme (score 0), one rhyme (score 1), two or more rhymes (score 2).

Task 3 Alliteration: the child was asked to listen to a verbal stimulus containing an alliteration device and to produce something similar. The children's productions were coded according to their ability to produce alliterations: no alliteration (score 0), one alliteration (score 1), two or more alliterations (score 2).

Agreement between the judges: 97%; cases of disagreement were resolved through discussion.

Conceptual knowledge on orthography (adapted from Ferreiro & Teberosky, 1979)

This task measures children's knowledge on concepts as words, words boundaries, word morphology, directionality of print and their functioning in written language.

Each child was asked to “write as he/she knows” and to “tell what he/she wrote following with the finger” three different sets of items were given by the experimenter. Each answer given by the children was tape recorded and a transcript was produced for analyses by two independent judges. Data coding was conducted according to the coding system adapted by Accorti Gamannossi and Bartoli (2005).

- Conceptual knowledge on orthographic notation
 - Would you try to write down the words you know?
 - Would you like to draw an apple? Now would you try to write down the name of what you drew?

For each item, the child’s performance was valued with scores ranging from 0 to 2 as follows: drawing (score 0), use of forms similar to letters (score 1), use of sequences of letters (score 2); the mean score of the two items was then considered.

- Conceptual knowledge on orthographic variation of sound quantity
 - Would you like to write down the longest word you know? And now the shortest word you know?
 - Would you like to write rainbow (arcobaleno in Italian) and king (re in Italian)?

For each item, the child’s performance was valued with scores ranging from 0 to 2 as follows: drawing (score 0), sequences of letter of the same length (score 1), sequences of letters of different length (score 2); the mean score of the two items was then considered.

- Conceptual knowledge on orthographic variation of phonemic units
 - Would you like to draw a boy (bambinO in Italian) and a girl (bambinA in Italian)? Now would you try to write down the name of what you drew?
 - The picture of a cat is shown to the child, then he/she is asked “Would you try to write down cat (gattO in Italian)?” Then the picture of three cats is shown to the child and he/she is asked “Would you try to write down cats (gattI in Italian)?”

For each item, the child’s performance was valued with scores ranging from 0 to 2 as follows: drawing (score 0), no variation of the final sign (score 1), variation of the final sign (score 2); the mean score of the two items was then considered.

Agreement between the judges: 98%; cases of disagreement were resolved through discussion.

Story production (from Pinto, 2003)

To explore textual ability each subject was given a story production task. The task was administered individually out of the classroom in a well lighted place without any kind of distractions. The instructions given to children were: “Would you like to tell me a story?”

Each story told by the children was tape recorded and a transcript was produced for analyses by two independent judges following the parameters: *structure*, *cohesion* and *consistency*.

To analyse story *structure*, we used the model by Spinillo and Pinto (1994) which considers eight fundamental elements (title, conventionalised story opening, characters, setting, problem, central event, resolution, conventionalised story closing), the presence, absence or/and combinations of these elements allowed for rating of the stories into five categories, indicating varying levels of structural complexity, as shown in Table 2.

To analyse levels of *cohesion* in stories, categories proposed by Halliday and Hasan (1976) were used: causal cohesives, indicating cause-effect relationships among the elements in the story (e.g., then, thus, because, so, for that, consequently, etc.) and temporal cohesives, indicating a chronological sequence in the story (e.g., once upon a time, when, never, before, at the end, suddenly, etc.). On the basis of the number of cohesives used in the children’s stories, in proportion to the number of words used, three increasing levels of cohesion were individuated: absent, low, medium and high, corresponding to scores ranging from 0 to 3.

Table 2

Story structure coding (Spinillo & Pinto, 1994)

Level	Definition	Score
	no telling	0
First level – non-story	simple descriptions of actions without any characteristic of narrative style, such as conventionalised story opening or closing. The production is often very short and sentences have few grammatical variations among them	1
Second level – sketch story	introduction of the setting and the main character, conventionalised story opening is often present, but both problem and resolution are missing	2
Third level – incomplete story	elementary narrative structure, setting and characters are introduced, often with conventional story opening and closing, but a central event is missing	3
Fourth level – essential story	non-essential structural elements, such as setting, are missing	4
Fifth level – complete story	all eight elements are included, only a title is considered optional	5

Agreement between the judges: 99%; cases of disagreement were resolved through discussion.

Agreement between the judges: 93%; cases of disagreement were resolved through discussion.

To assess story global *consistency*, the children's stories were evaluated according to coherence between sentences (adaptation from Shapiro & Hudson, 1997). The number of incoherencies, proportional to the total number of sentences, produced four score categories (ranging from 0 to 3), indicating growing levels of consistency (absent, medium and high).

Agreement between the judges: 85%; cases of disagreement were resolved through discussion.

(2) *Second phase* (primary school)

Self-dictation

To evaluate fluency in words writing we used a self-dictation task: children were asked to write the most number of words they knew in 10 minutes (adapted from Boschi, Aprile, & Scibetta, 1992). Each word written was given a score of 1, the sum of the words written by the child (numbers of written words) gives a fluency score of words writing.

Numbers writing

To evaluate fluency in numbers in letters writing we used a number writing task: the children were asked to write-out numbers in letters, progressively, in one minute's time (from Tressoldi & Cornoldi, 1991). Each written number was given a score of 1, the sum of the numbers written by the child (numbers of written numbers) gives a fluency score of numbers writing.

Words dictation

To evaluate orthographic correctness we used a words dictation task: the children are asked to write a list of 18 words (*mano, casa, nido, mondo, lampo, piume, bambina, mattina, insetto, domenica, giornata, frattura, bagno, vasca, foglia, giglio, scherzo, pugnale*) (from Sartori, Job, & Tressoldi, 1995). Each incorrect grapheme in the written word was given a score of 1, the final task score is given by the proportion of total written words and errors giving a correctness score of words writing.

Non-words dictation

To evaluate orthographic correctness we used a non-words dictation task: the children are asked to write a list of 9 non-words (*dorta, bepre, tazio, chida, rigli, cimana, binamba, tambilina, sirbolone*) (from Sartori, Job, & Tressoldi, 1995). Each incorrect grapheme in the written non-word was given a score of 1, the final task score is given by the proportion of total written non-words and errors giving a correctness score of non-words writing.

Results

A model of emergent literacy

To create an emergent literacy model and to verify the relevance and the connections of the different components involved in the model, data analyses were performed through several steps.

First of all, the normality assumptions for the emergent literacy variables were verified, and in those cases in which a variable distribution did not seem to be a Gauss curve, the appropriate monotone increasing transformations were applied.

Consequently, an Exploratory Factor Analysis (EFA) on emergent literacy variables was carried out on a sample of 464 subjects. Principal Axis Factoring (PAF) as an extraction method was used, and as rotation criterion, a Promax procedure was followed. At a later time, the measures pertaining to the factors with a low Cronbach's Alpha were eliminated, and the EFA was carried out again.

The final resulting factorial structure was verified through the Confirmatory Factor Analysis (CFA).

Differently from the Principal Components Analysis (PCA), PAF is a form of factor analysis that gathers together the least number of factors obtained from the common variance into a set of variables, while the most common PCA extracts factors from both the common and unique variances of a specific group of variables (Thompson, 2004). PAF utilizes the same strategy as PCA, but this strategy is applied to a correlation matrix where all the elements on the principal diagonal are not correlation coefficients equal to 1, as in the PCA, but estimated communalities through an iterative procedure (usually R^2 is assumed to be a good estimation of variable communality). For this reason, PAF is preferred to PCA, as it considers just covariation among the variables and not the total variance. Because of this difference, it is theoretically possible with PAF, but not with PCA, to add variables to the model without changing the original model variables' factorial loadings. A Promax rotation is a factorial axes oblique rotation strategy that is simpler to implement than a direct rotation strategy, such as Direct Oblimin. For this reason, it is often utilised with large data sets. An oblique rotation is coherent with our hypotheses, assuming that the dimensions underlying emergent literacy variables are correlated with one another.

The EFA carried out on emergent literacy variables initially showed four dimensions. The first dimension was connected to phonological competence measures (rhythm production, alliteration production and rhyme production), the second with textual competences (textual structure, textual consistency and textual cohesion), the third with conceptual knowledge on writing system (conceptual knowledge on orthographic variation of phonemic units, conceptual knowledge on orthographic notation and conceptual knowledge on orthographic variation of sound quantity) and the last one with cognitive-linguistic competences (Rustioni's Test and TCR). The fourth dimension, however, was constituted only by two measures (Rustioni's Test and TCR), and it had a very low Cronbach's Alpha (.16). Thus, its measures were excluded from the analyses, and the EFA was again implemented. The descriptive analyses and the correlation coefficients are shown in Table 3.

Table 3

Intercorrelations, means and standard deviations for scores on nine measures of emergent literacy model

Measure	2	3	4	5	6	7	8	9	<i>M</i>	<i>SD</i>
1. Rhythm production	.77	.71	.22	.18	.23	.04	.04	.13	3.00	1.25
2. Alliteration production		.60	.21	.15	.19	-.16	-.15	-.03	.76	.46
3. Rhyme production			.15	.10	.14	.04	-.02	.13	1.29	.63
4. Textual structure				.72	.56	.17	.18	.11	2.92	1.38
5. Textual consistency					.41	.16	.16	.11	2.02	.87
6. Textual cohesion						.02	.03	.17	1.75	.92
7. Conceptual knowledge on orthographic variation of phonemic units							.66	.40	2.32	.86
8. Conceptual knowledge on orthographic notation								.32	2.68	.35
9. Conceptual knowledge on orthographic variation of sound quantity									1.86	.29

Finally, three factorial dimensions emerged: phonological, textual and conceptual knowledge on writing system.

With regard to the three factors' internal consistency-reliability, Cronbach's Alpha was computed for each one. This coefficient assumed good values for all three factors: phonological competence ($\alpha=.78$), textual competence ($\alpha=.78$) and conceptual knowledge on writing system ($\alpha=.62$). The first factor includes scores related to phonological abilities and accounts for 28.68% of the whole common variance. The second factor includes scores related to textual competence abilities and accounts for 19.95% of the common variance. The third factor includes conceptual knowledge on writing system and accounts for 13.30% of the common variance.

The textual competence factor is significantly correlated to phonological ($r=.26$) and conceptual knowledge on writing system factor ($r=.20$), but phonological and conceptual knowledge on writing system factors are not correlated to each other ($r=.03$).

To evaluate the model's goodness of fit, through a CFA, several indexes were measured: together with the chi-square test, which has the limit of being sensitive to sample size, the CFI (Comparative Fit Index) was considered. Usually values higher than .90 are considered satisfactory (Bagozzi & Baumgartner, 1994; Bentler, 1990). Moreover, the SRMR (Standardized Root Mean square Residual) was calculated, values lower than .08 show satisfactory adequacy (Hu & Bentler, 1999). Thus, differently from the emergent literacy model of Sénéchal and colleagues (2001), our model was tested not only through an analysis of correlation coefficients between components, or one series of single regression analyses, but by means of Structural Equation Modelling (SEM), in which the statistical fit of the model multiple regression equations were verified at the same time.

The results showed that, although the chi-square statistic was significant, the ϕ^2 coefficient (that is χ^2/df) was 4.06 (less than 5), the critical score suggested by some authors (Kline, 1998). The others goodness of fit indexes were satisfactory: CFI=.96, SRMR=.05. Moreover, the loadings of any indicators were significant. As was the case with exploratory factor analysis, the three factors were correlated, except for the phonological and conceptual knowledge on writing system factors, which showed no significant correlation.

The emergent literacy model demonstrated by our analyses is shown in Figure 1.

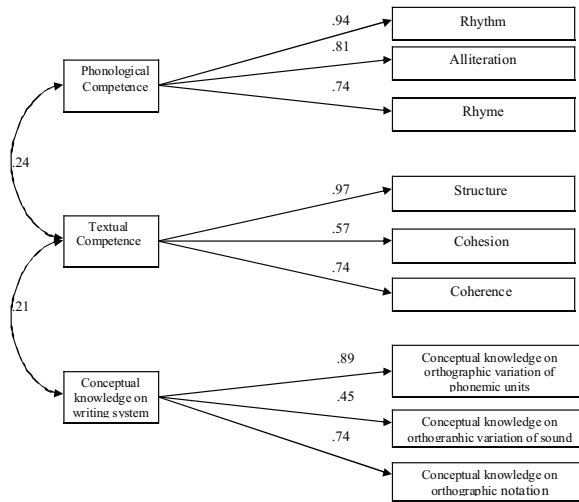


Figure 1. Emergent literacy model: Confirmatory Factor Analysis (CFA)

From emergent literacy to early writing: A predictive model

In a successive step, to evaluate the predictive capability of each emergent literacy dimension (phonological competence, textual competence and conceptual knowledge on writing system competence), four stepwise regression analyses, with the four formalized alphabetization variables (fluency in words writing, fluency in numbers writing, correctness in words dictation, correctness in non-words dictation), were carried out on a longitudinal subsample consisted of 259 participants. This type of regression analysis permits an independent variable to be considered as a predictor only if it explains a minimum amount of total variance, and for this reason is preferred to the standard regression. For each independent variable included in the regression analyses, Cohen’s f^2 coefficient was calculated (Cohen, 1988) to quantify the effect size.

The analyses revealed the results shown below (see Tables 4, 5, 6, 7 and 8).

Table 4

Intercorrelations, means and standard deviations for scores on four measures of the formal literacy

Measure	2	3	4	M	SD
1. Fluency in words writing	.57	-.29	-.30	102.00	56.37
2. Fluency in numbers writing		-.30	-.33	25.69	17.85
3. Correctness in words dictation			.72	13.35	3.37
4. Correctness in non-words dictation				7.85	2.13

Table 5

Hierarchical regression analysis summary for emergent literacy model predicting fluency in words writing

Measure	B	SEB	β	R^2	ΔR^2	f^2
Step 1						
Conceptual knowledge on writing system	.30	.04	.39*	.15*	-	.18

Note. * $p < .01$.

Table 6

Hierarchical regression analysis summary for emergent literacy model predicting fluency in numbers writing

Measure	B	SEB	β	R^2	ΔR^2	f^2
Step 1						
Conceptual knowledge on writing system	.28	.04	.36**	.12**	-	.15
Step 2						
Conceptual knowledge on writing system	.26	.04	.34**	.14**	.02	.16
Phonological competence	.06	.03	.13*			.01

Note. * $p < .05$, ** $p < .01$.

Table 7

Hierarchical regression analysis summary for emergent literacy model predicting correctness in words dictation

Measure	B	SEB	β	R^2	ΔR^2	f^2
Step 1						
Conceptual knowledge on writing system	-.29	.04	.37*	.14*	-	.16

Note. * $p < .01$.

Table 8

Hierarchical regression analysis summary for emergent literacy model predicting correctness in non-words dictation

Measure	B	SEB	β	R^2	ΔR^2	f^2
Step 1						
Conceptual knowledge on writing system	-.30	.04	-.38**	.14**	-	.16
Step 2						
Conceptual knowledge on writing system	-.29	.04	-.37**	.16**	.02	.17
Phonological competence	-.07	.03	-.14*			.03

Note. * $p < .05$, ** $p < .01$.

The four regression analyses suggested the importance of conceptual knowledge on writing system competence as a predictor of all the formalized alphabetisation variables. In addition, a medium effect size was associated to this variable in all the analyses. Indeed, Cohen's f^2 always resulted greater than or equal to .15 (Cohen, 1988). In fluency in numbers writing and correctness in non-words dictation, the phonological competence resulted significant, but the effect size was lower ($f^2 = .02$).

Discussion

A model of emergent literacy

Our analyses allowed us to individuate an emergent literacy model showing three factors (phonological competence, conceptual knowledge on writing system and textual competence) and the significant relationships among them. This data represents an important contribution to the identification of emergent literacy as a unitary and domain-specific construct: the child's approaching path to written language does not proceed with parallel, independent and diachronic acquisitions, but it is subtended by the contemporary, balanced and specific contribution of knowledge about the symbolisation code of written language and on textual structure of language. It is not possible to expect the emergence of literacy without a functional and simultaneous integration of the diverse cognitive operations given by the three factors that emerged though the analyses.

In our emergent literacy model general language abilities do not play a significant role, confirming the idea that this construct is domain-specific. In line with our expectations the factor of *phonological competence*, which is the child's ability to detect sound units in language flow and to intentionally handle them, concurs to the model. The competences underlying this factor deal with, according to the recent classification by Stanovich (2004), both superficial level (rhyme identification) and deep level (single sounds identification).

In our model, another important aspect emerged: the presence of a domain-specific factor of *conceptual knowledge on writing system*. Children who have higher scores in the conceptual knowledge on orthography have available in their memory the orthographic representation of the letters of a word and they are able to write them on a sheet of paper.

A further element in our model is the factor *textual competence* which indicates the child's ability to go beyond the single meaning unit transmitted by the word to construct a relationship network among words that are in the text. During development, each word is listened to and pronounced within a communicative linguistic context. However it is necessary to know the characteristics of that conventional genre to create a narrative text endowed of linguistic structure (the linguistic context) that is the network system allowing the comprehension of shared meanings. In cultures where reading and writing are important in everyday life, 'literate cultures', the relationship with oral and written texts plays an important role in the assistance that experts provide for non-experts. Thus children are involved in familiarization with written language starting from the early years (Carugati & Gilly, 1993).

Textual competence is a fundamental aspect of emergent literacy, as it helps the child to comprehend that literacy acts are shaped in formats different from oral language formats, that is writing is not the exact transposing of oral language.

After discussing the contribution of single factors to the emergent literacy construct, we consider the relationships existing among them.

Correlations among the factors show that emergent literacy is a complex relations system among knowledge on language, involving, at the same time, aspects present in oral language (phonological and textual) and specific patterns of written language. On one hand, emergent literacy shows important continuity elements with the oral code, but on the other, it introduces specific elements given by the special nature of the alphabetic code.

The independence between the *conceptual knowledge on writing system* and *phonological competence* factors provides a crucial empirical element that supports their discontinuity. Accessing the phonological level in oral language does not completely overlaps the conceptual knowledge on that particular graphic representation system that is writing.

The network of relationships shown by the model in its whole suggests that emergent literacy can be viewed as having been made by a central core constituted by the textual competence, from which two independent branches started up: phonological competence and conceptual knowledge on writing system. The connection will be made possible in formal literacy.

As far as existing literature is concerned, in our emergent literacy model general language abilities are not involved, according to Sénéchal and colleagues (2001) and otherwise by models developed by Whitehurst and Lonigan (1998) and Pinto and colleagues (2008). For the domain-specific abilities, phonological and textual competences are both included in the model, as evidenced by Whitehurst and Lonigan (1998) and Pinto and colleagues (2008) and differently from Sénéchal and colleagues (2001).

This model confirms the hypothesis that emergent literacy is a complex and specific construct. The new element evidenced by our model is the presence of the factor of conceptual knowledge on writing system, independent from phonology, but embedded in the emergent literacy competences.

From emergent literacy to early writing: A predictive model

As far as predictive relationships among abilities are concerned, our data show that the *conceptual knowledge on writing system* factor is a significant predictor of all the considered emergent writing abilities. The *phonological competence* factor emerges as predictive only in

fluency in numbers writing and in correctness in non-words dictation. On the other hand, the *textual competence* factor does not predict any of the emergent writing abilities we tested.

The predictive model of emergent literacy that we carried out shows that *conceptual knowledge on writing system* in preschool children is a crucial ability because it allows correct coding of written signs and is highly related to their competences in all early writing tasks.

To learn words writing, it is necessary to develop a sensitivity to the function of signs in written code. The abilities underlying this factor consist of the possibility to translate word and its sound components into orthographic signs (in various grades of conventionality), and to connect them each other. The ability to master the reciprocal influences of the signs that compose the word is particularly relevant because writing is not about reproducing an isolated element, a grapheme, but reproducing it inside an ordered string with other similar elements that are related one to the other. This aspect is a particular ability which accounts for the difference between writing single isolated graphemes and writing a whole word (for example to put in writing the graphemes “m” and “u” and writing “mum”).

This factor, which differs from the phonological one in preschool children, could contribute to explaining why some people with good phonological competence cannot read and write properly. The possibility of detecting different grades of conceptual knowledge on writing system before formal literacy enhances the studies which demonstrate that, in both children and adults, tasks evaluating orthographic processing are the basis of individual differences in formal literacy, even excluding the phonological elaboration variance (Cunningham & Stanovich, 1990).

When children deal with unknown external stimuli (non-word writing and writing numbers in letters), there is a significant influence of *phonological competence* that permits transition from the single phoneme sound to the correspondent sign. This result enhances literature (Ehri et al., 2001), which indicates that the possibility to detach the semantic level from the sound level in language is an essential step in the construction of the alphabetic code, which is purely conventional, posing the basis of development of the (conventional) correspondence between grapheme and phoneme.

Textual competence is a fundamental factor in our emergent literacy model, but it does not appear to be functional to learning alphabetic code in formal literacy. This data does not conflict with literature, because we measured initial writing (words writing). We can expect that this competence can have successive influence on children's advanced text writing abilities (Boscolo & Ascorti, 2004). In fact textual competence allows to understand that a code, as the alphabetic one, also operates at higher organizational which require conventionalisation, decontextualisation and meaning sharing.

On the whole, our predictive model of emergent literacy has important implications also in the relationship between reading and writing. In fact these two literacy activities are not similar: some young children can (emergently) read words that they can not write and vice versa. It seems that knowledge does not automatically transfer from one situation to another at least in the early stages of literacy.

Our model confirms for writing Whitehurst and Lonigan (1998) model which gives importance to phonological competence for reading. But on the other hand our model does not acknowledge predictive power to textual competence for writing. Nevertheless its influence on fluent writing in following grades it is not excluded, as shown for reading by Sénéchal and colleagues (2001). As a future research development, it would be interesting to verify the prediction of our model on first acquisitions in reading.

The novelty of our model is the fact that children's conceptual understanding predicted early spelling, but that storytelling ability does not. This data is newsworthy because the researchers investigating early narrative ability may over-estimate it's link to literacy and most researchers have investigated phonological spelling rather than conceptual knowledge.

It would be interesting to verify the solidity of emergent literacy prediction on advanced levels of writing abilities.

In our study we did not include a measure of alphabet knowledge, because in Italian school system alphabet knowledge is not given particular attention, it is in fact thought in

second grade. It would be interesting for future research to take account of this measure, in line with English language models.

On educational level, this model shows the importance of helping children to gain the insight that speech can be represented in writing. To this end, conceptual knowledge on orthography can help them to develop orthographic awareness that letters in written words represent conventional graphic segments in spoken words. Thus, we agree with Wong and Berninger (2004) asserting that teachers who encourage emerging writers to reflect upon the knowledge of writing system are fostering orthographic awareness.

Notes

- ¹ Orientamenti dell'attività educativa nelle scuole materne statali (Guidelines for educational programmes in State kindergartens) G.U. 15-6-1991, n. 139.

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Cet étude a deux bouts: (1) contribuer à identifier un modèle pour les variables qui composent le concept d'alphabétisation émergente et leurs relations; (2) vérifier le pouvoir prédictive du modèle d'alphabétisation émergente sur les premières habilités d'écriture dans une langue à orthographe transparente.

On a examinée les compétences d'alphabétisation émergente en 464 enfants (moyen âge 5.5) qui ont été suivis longitudinalement jusqu'à leur premier classe dans l'école élémentaire. Pour investiguer la nature des compétences d'alphabétisation émergente et leurs possibles relations, on a conduit des analyses factorielles exploratoires et confirmatives. On a implémentées des analyses de régression au fin d'évaluer la capacité prédictive du modèle d'alphabétisation émergente sur les compétences d'écriture des mots. Les analyses factorielles ont montré trois dimensions factorielles (phonologique, connaissance conceptuelle du système d'écriture et textuelle) et leurs relations. Les régressions ont indiqué une prédiction significative de la connaissance conceptuelle du système d'écriture et des habilités phonologiques sur les premières habilités d'écriture.

Key words: Early writing, Emergent literacy, Longitudinal study.

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Current theme of research:

Language psychology: child's linguistic development under different conditions and in cross-cultural perspective, emergent literacy, acquisition of reading and writing, functional analysis of child language, psychology of reading. Symbolic representation: endogenous and cultural factors in the development of pictorial representation, acquisition of skills in depicting objects, scenes from ages two to adulthood, under different conditions, blind drawing development. The development of interpersonal relationships: children's representation of close relationship (friendship; sibling etc.).

Most relevant publications in the field of Psychology of Education:

- Bombi, A.S., Pinto, G., & Cannoni, E. (2007). *Pictorial assessment of interpersonal relationships. A quantitative coding system of children's drawings*. Florence: Florence University Press.
- Cameron, C.A., & Pinto, G. (forthcoming 2009). Day in the life: Secure interludes with joint book reading. *Journal of Research in Childhood Education*.
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Current theme of research:

Development of metacognition and theory of mind. Communicative and linguistic development, with special interest in lexical competence development and its relations with reading comprehension. Learning disabilities: dyslexia's and disorthography's predictors. Attention Deficit Hyperactivity Disorder (ADHD): psychodiagnosis, educative treatment and school integration interventions. Teaching and learning processes: effectiveness of teaching methods. School integration of disabled children.

Most relevant publications in the field of Psychology of Education:

- Bigozzi, L. (2000). *Apprendimento e riabilitazione a scuola. Aspetti psicologici*. Roma: Carocci.
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Current theme of research:

Emergent literacy processes in preschool children: phonological, textual and orthographic competences in development of alphabetisation processes. Influence of context in children's oral and written productions. Ecological investigation of aspects of culture in the interactional construction of childhood in diverse global communities.

Most relevant publications in the field of Psychology of Education:

- Cameron, L., Accorti Gamannossi, B., Gillen, J., & Cameron, C.A. (forthcoming 2009). Two-year-olds' use of playful language and humour in family contexts. In C.A. Cameron & J. Gillen (Eds.), *A day in the life of a two-year-old: International perspectives of thriving young girls*. Houndmills: Palgrave Macmillan.
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Current theme of research:

Conceptions of learning in novice and expert teachers. Development of early literacy competences from preschool to primary school.

Most relevant publications in the field of Psychology of Education:

- Accorti Gamannossi, B., Vezzani, C., Bigozzi, L., & Pinto, G. (2007). Lo scrittore novizio di testi: Uno studio predittivo. *DiPAV – Quaderni. Quadrimestrale di psicologia ed antropologia culturale*, 18, 9-30.
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