A Multiple Risk Factor Perspective on the Prediction of Literacy Acquisition and Learning Difficulties for Spanish Children Ages 4-6 and 5-7

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Introduction

- Purpose: Investigating the predictive power of a Multidimensional Longitudinal Approach within a prevention-oriented RtI model.
- That is, assessing genetic family risk, early linguistic and cognitive skills on Spanish literacy acquisition and learning difficulties.
- Reading Difficulties are produced by <u>oral languages deficit</u>, not only phonological deficit (Bishop & Snowling, 2004; Catts et al., 2005; Ramus et al., 2013)
- Comorbidities, the co-ocurrence of two or more developmental disorders is greater than expected (Pennington, 2006; e.g.: as SLD, Math Disorders, ADHA, DMCD, etc.), and, finally
- Complementary or alternative <u>visual perception</u> or attentional deficit must be considered (Valdois et al., 2012; Facoetti et al., 2006).

Hypotheses

- Our early risk detection procedure will reach predictive values similar to the MLS.
- Similar set of predicting variables as other MLS.

General procedure

Assessment

sessions

Novembe

Februar

May

Main Studies with a Multidimensional Longitudinal Design: variables and with precision indexes

Studies	Variables / Predictors		Indexes (%)		
Elbro et al. (1998) Danish, 6 yo, Kinder	Letter KnowledgeInicial Phoneme DeletionPhoneme Identification	Speech accuracyPhoneme Discrimination	Sensitivity: 78 Specificity: 79		
Pennington y Lefly (2001) 5 yo, English	 Letter Knowledge IQ Speech Perception Phonological Awareness 	ST- Verbal MemoryRANReading historial	Sensitivity: 69 Specificity: 76		
Puolakanaho et al. (2007) Finish	 Family Risk & Letter Knowledge at 3½, 4½ y 5½ were predictors at 7 yo RD; Phonological Awareness & RAN additional predictors at 4½ y 5½, respectivily 		Age 3.5 4.5 5.5	28,30 37,00 41,30	92,1 88,8 91,4
Thompson et al. (2015) English	 Model 2/3 Preschool predictors: family risk; additional: Letter Knowledge, Phonological Awareness, RAN & Executive Functions. Beginning School predictors: Oral language skills; additional: motor skills 		Age 3.5 4.5 5.5	2.4 36.4 44.7	100 96.7 95,3

Objective

- Transference between scientific knowledge and schools.
- Testing MLS approaches as part of a decision making Rtl system built from within educational settings.

Challenge:

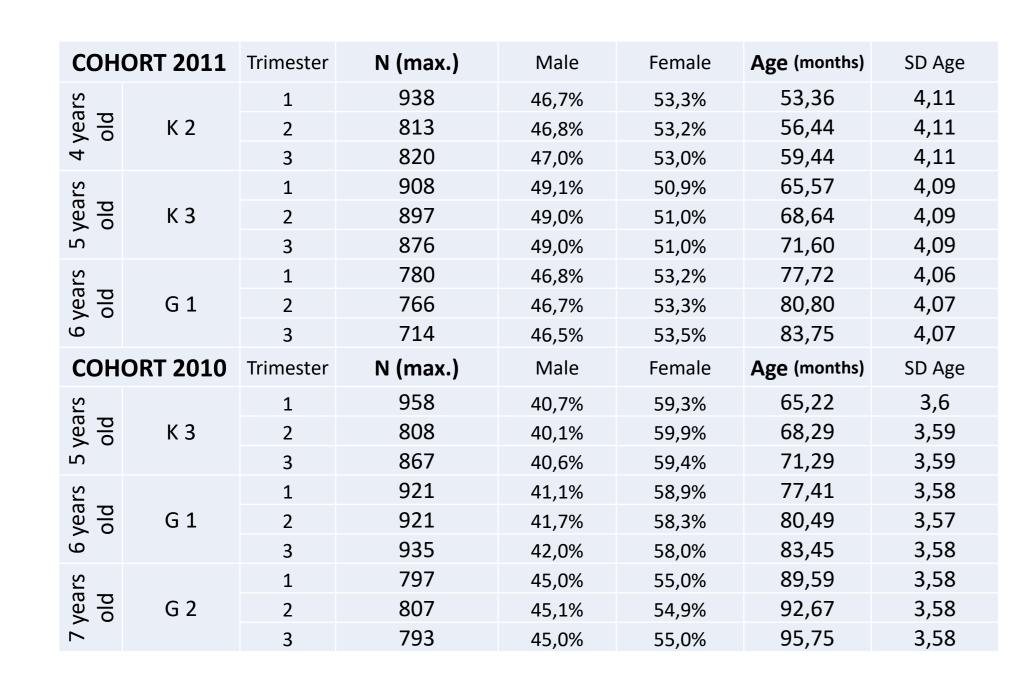
Transfer evidence-based proactive strategies by

- Collaboration between research teams & schools:
- to develop a system adjusted to the real conditions of schools &
- to guarantee a permanent updating of evidence based practice.

A research and transfer instrument, the Leeduca Internet Platform (www.leeduca.uma.es).

Method

Sample description



30-40 min/session

LEEDUCA INTERNET

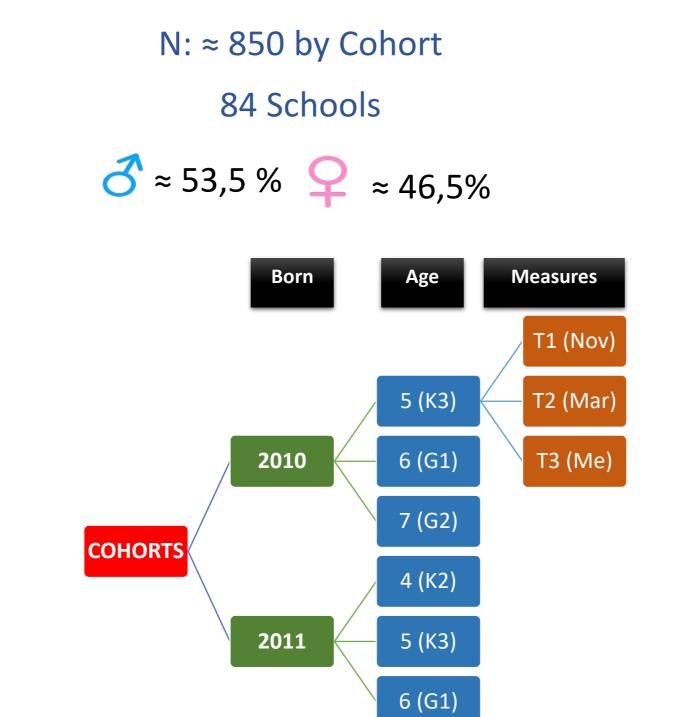
PLATFORM

ask presentation & Data collection

EVALUATORS

Practitioners & Students

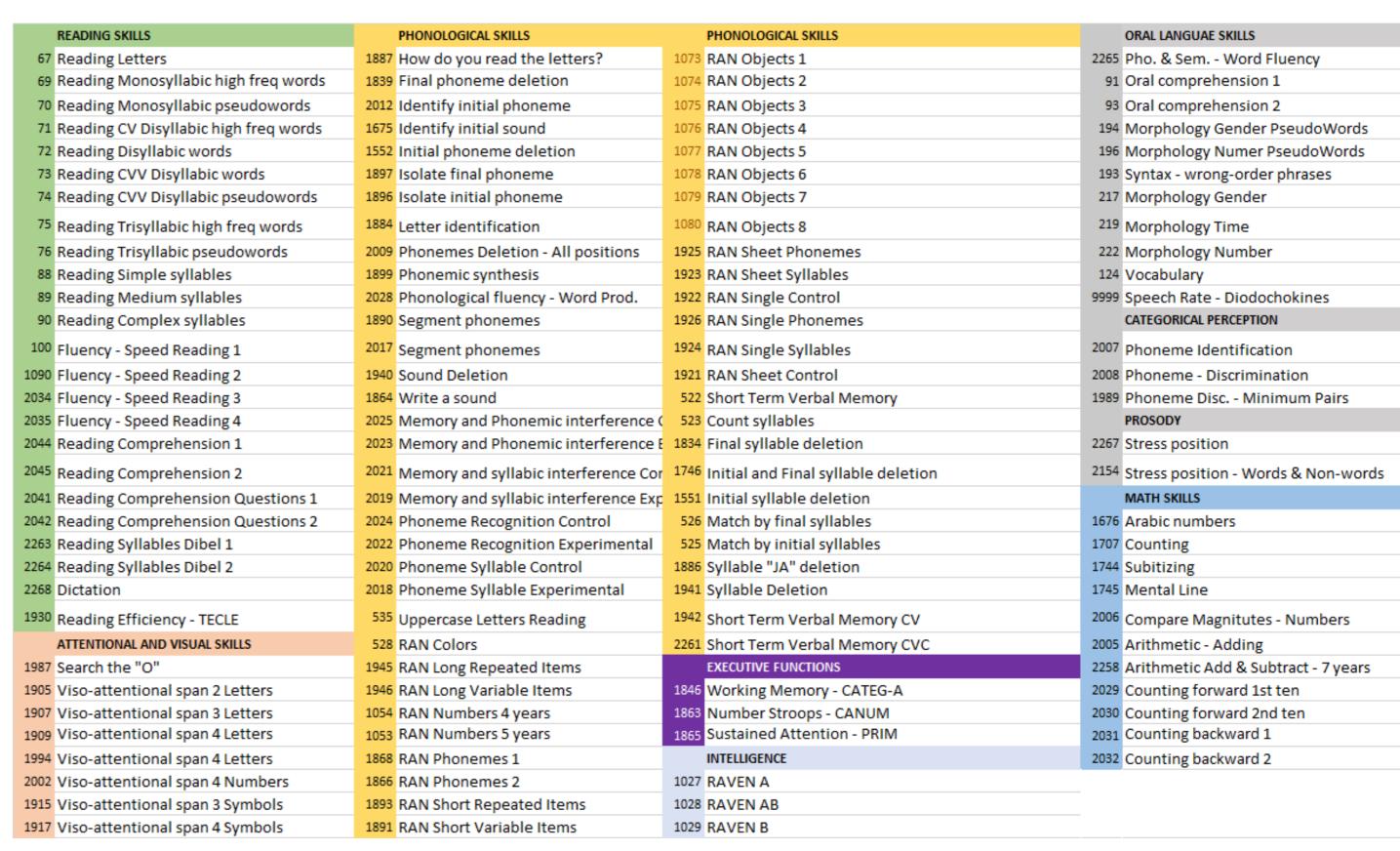
(Previous instructions sessions)



Labels

- Labels were computed with scores below the 30th percentile in Letter Knowledge, Syllable, Word and Pseudoword Reading, Orthographic Decision, Text Speed Reading and Text Comprehension measures.
- Measures were taken on the last two sessions of Grade 1 (2011 Cohort – 4-6 y-o) or **Grade 2** (2010 Cohort – 5-7 y-o).

Tasks list

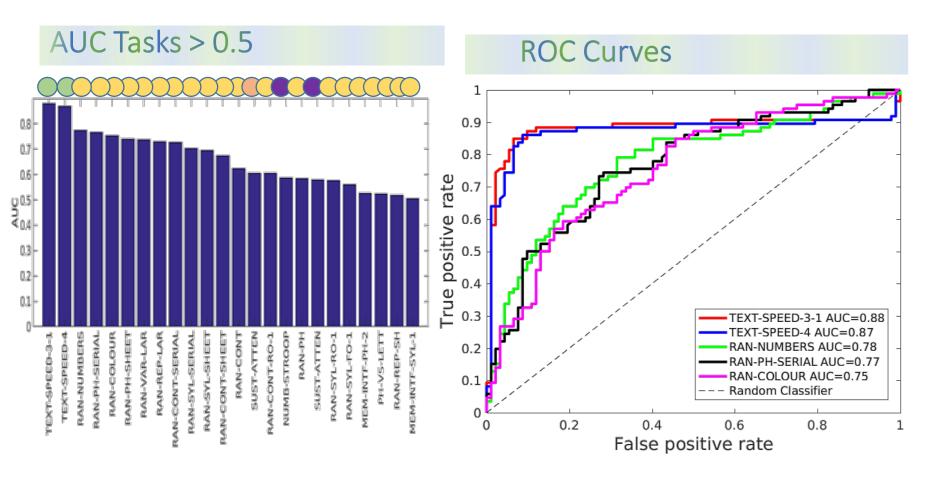


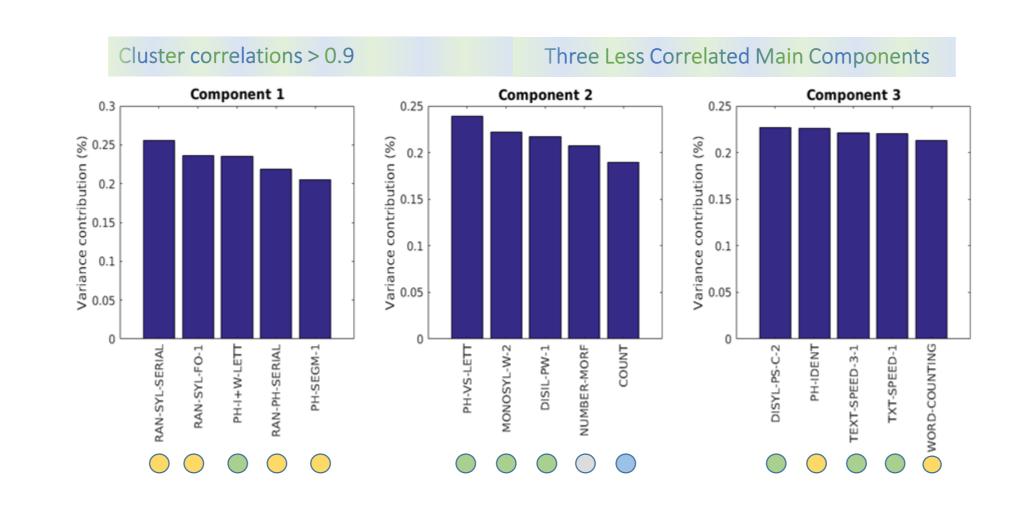
Analysis procedure: a first data driven approach

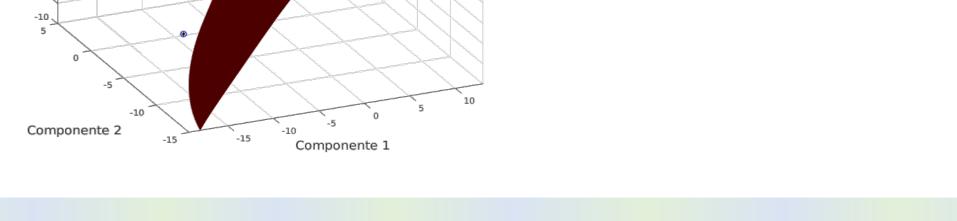
- Tasks with Area Under Curve < 0,5
- Building Cluster 3 main Components
- Applying Support Vector Machine

Results

2010 Cohort – Global prediction







3 Main Components Classification & Support Vector Machine

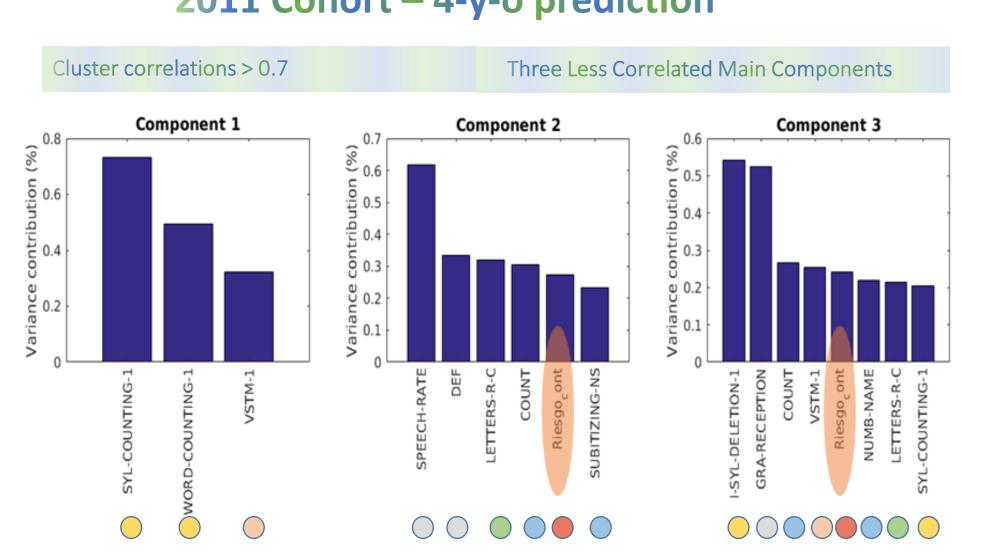
Controles
Riesgo dislexia

Vectores soporte
 Superficie de decision

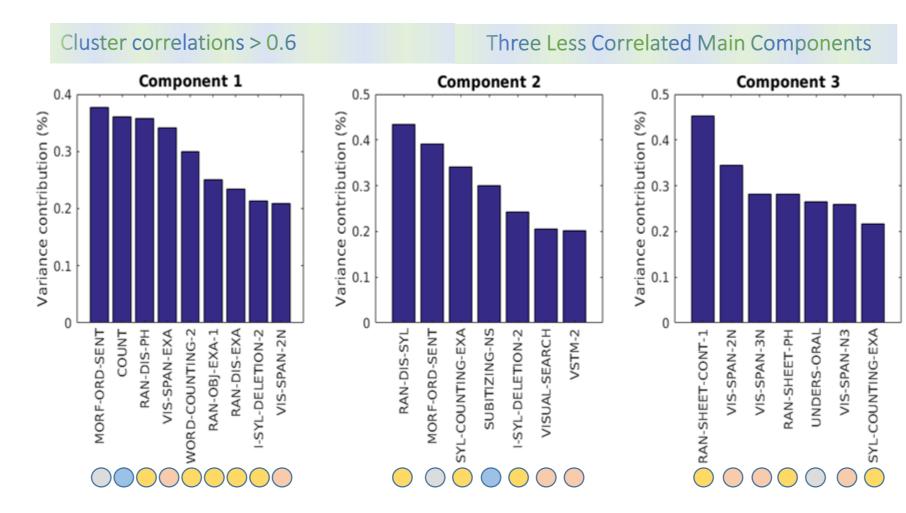
Cross validation (kfold means = 5)

Precision: 0.97 ± 0.04 Sensitivity: 0.95 ± 0.05 • Specificity: 0.99 ± 0.03

2011 Cohort – 4-y-o prediction







Prediction indexes of the Main Multidimensional Longitudinal Studies



Discussion

Both hypotheses have been confirmed

- 1. The early risk detection procedure has yielded predictive values similar to MLS.
- 2. Variables with significant statistical contribution to prediction have been similar to previous MLS, but
 - The family risk did not achieve high prediction values \rightarrow ¿Questionnaire?
- Labels versus diagnostic-Labels \rightarrow our labels improve in Grade 2
- Others: Ran tasks have shown a prominent role compared to phonological awareness, so a deeper review is needed.

This study is only a first approach to the data analysis and there are some new procedures that can be addressed:

- Building composite measures and review cluster correlations.
- Applying analysis procedures implemented by Puolakanaho et al. (2007) and Thompson et al (2015).
- Applying more theoretically driven analysis, like cross-lagged analysis
- markers Our plan is to follow-up this two cohorts next year, so new

labels could be established and new analyses carried out.

Or Examining comorbidities between different conductual

Conclusions

- With all due caution and prudence, these first analyses and results could be considered a positive starting point.
- The implementation of our MLS approach as part of a decision-making RtI system has shown successful.
- A remarkable feature of this study is that it was achieved from within the school context.
- So, it is expected that in a short time we will be able to transfer our two-step assessment system:
 - A universal early risk detection procedure A full assessment procedure for at risk-children