

# Measuring early development of language skills: The European Portuguese MacArthur-Bates Communicative Development Inventories short forms

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## BACKGROUND & GOALS

Parental reports > a way of gaining knowledge on early language development in a feasible way covering the range of variation in large samples.



The MacArthur-Bates Communicative Development Inventories (CDI): one of the best-known and widely used parental reports (Fenson et al., 1993, 2007)

The long forms of the CDI showed limitations, restricted applicability and effectiveness in several research, educational and clinical settings (Fenson et al., 2000; Jackson-Maldonado, 2013)

Development of **SHORT FORM** versions of the CDI: as effective, reliable and valid, and more applicable in a variety of contexts (e.g., part of a long protocol, repeated administration, longitudinal studies, bilingual settings, quick assessment for clinical purposes, less dependent on educational background of caregivers)



European Portuguese CDI short forms (EP-CDI SFs)

a norming study of the EP population

## DEVELOPMENT OF THE EP-CDI SFs

The first published instruments for the assessment of language development in EP-learning infants and toddlers

A **new approach to the development of CDI short forms**: based on pilot studies + databases of spontaneously produced child speech and child directed speech + informed by prior knowledge of early language development + the language-specific patterns

PLEX5, Frota et al. 2012  
CDS-EP, Frota et al. 2013  
FrePoP, Frota et al. 2010



My language!

Frequency	EP-CDI SFI	EP-CDI SFII	Emergence	EP-CDI SFI	EP-CDI SFII
High	7% (8/90)	8% (8/99)	Early-appearing	6% (5/90)	10% (9/99)
Medium	72% (65/90)	67% (66/99)	Late-appearing	10% (9/90)	7% (6/99)
Low	20% (18/90)	25% (25/99)			

New item to assess the production of **complex words** and its developmental pattern (Vigário & Garcia, 2012)

Word format %	1s	2s	≥3s	Complex syllables	Penult stress	Final stress	Antep. stress
CS	28	47	21	13	41	26	0.9
CDS	41	47	12	11	41	18	0.4
ADS	26	44	30	15	56	16	2
EP-CDI SFI	19	61	20	15	61	19	1
EP-CDI SFII	20	53	27	18	63	14	4

Vigário et al., 2006  
Correia, 2010

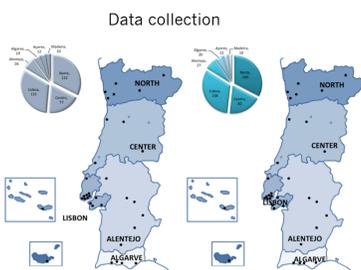
All the semantic CDI categories with similar semantic and morphosyntactic distributions, plus language specificities

## PARTICIPANTS & PROCEDURE

Population: 511,054 children between 0 and 4 years of age (INE, 2012); 7 regions x gender

Sample: G\*Power 3 medium effect size .25, significance .05 confidence interval .95

	CDI-I (407)		CDI-II (429)	
	H	M	H	M
Norte	67	65	71	69
Centro	39	38	42	40
Lisboa	87	84	71	87
Açores	13	13	14	13
Algarve	10	9	10	10
Azores	6	6	6	6
Madeira	5	5	5	5



Month	Participants EP-CDI SFI			Participants EP-CDI SFII		
	Boys	Girls	Total	Boys	Girls	Total
8	6	15	21	16	3	19
9	22	18	40	17	7	24
10	14	16	30	18	9	27
11	19	27	46	19	14	33
12	16	22	38	20	11	31
13	27	20	47	21	20	41
14	26	23	49	22	16	38
15	23	18	41	23	15	38
16	19	12	31	24	17	41
17	22	15	37	25	14	39
18	13	14	27	26	15	41
				27	11	38
				28	19	47
				29	18	47
				30	7	37

Table 1. Parental employment/educational status in the norming sample compared with the Portuguese population with children between 0 and 4 years of age (INE, 2012).

Parental employment status	CDI-I		CDI-II		Portugal
	N (407)	%	N (429)	%	
Highly qualified	244	59.95	256	59.67	32.09
Medium qualified	117	28.75	141	32.87	27.26
Low qualified and workers	15	3.69	12	2.80	29.40
Unemployed	15	3.69	20	4.66	10.82
Missing	16	3.93	0	0.00	

Normative sample: Monolingual EP children, no hearing loss, Down Syndrome or known cognitive deficits

**Data analysis:** Effects of age, gender and SES on language outcomes; percentile scores and fitted scores calculated through growth-curve modeling using the logistic function (Fenson et al. 2000; Fenson et al. 2007)

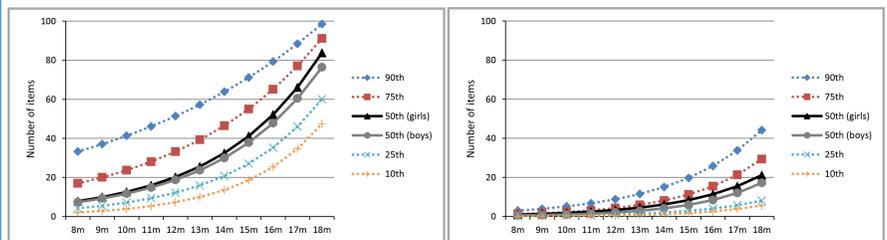
## RESULTS

**Reliability:**

Cronbach's coefficient alpha: .99

**Content and concurrent validity:** also assessed (Frota et al. 2006)

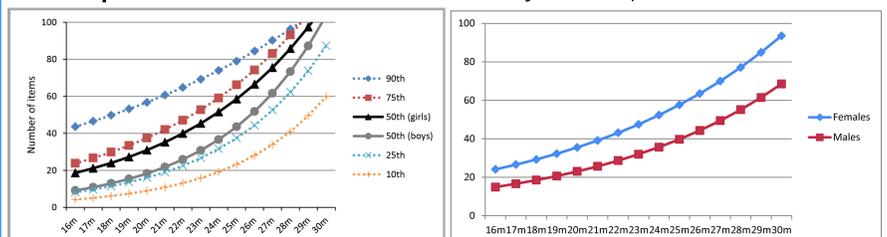
**Developmental trends - Infants:** receptive vocabulary >> expressive vocabulary



**Comprehension:** Main effects of age group\*\*\*, gender\*\*, and SES\*\* (medium>higher, lower)

**Production:** Main effects of age group\*\*\* and gender\*\*

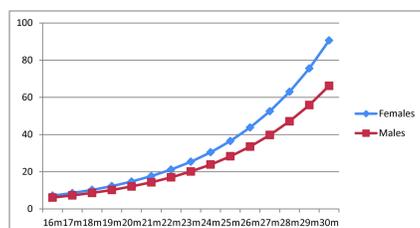
**Developmental trends - Toddlers:** Vocabulary and complex words



**Production:** Main effects of age group\*\*\* and gender\*\*\*

**Production of complex words:** Main effects of age group\*\*\* and gender\*\*

## RESULTS



Word combinations: Main effects of age group\*\*\* and gender\*\*

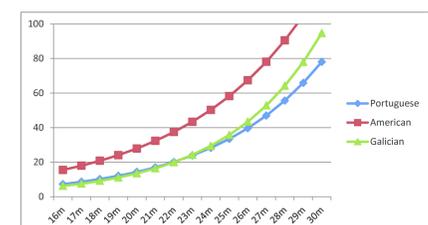
**Cross-language comparison:**

AE, Galician, Spanish, EP (Vocabulary)  
**Infants:** no effects of Language, no interactions, borderline effect of Gender for production (G > B)  
**Toddlers:** Main effect of Language\*\*\* and Gender\*\*\*

**Developmental trends - Toddlers:** Word combinations

**Strong correlations:**  
- Expressive vocabulary and production of complex words ( $r = .68, p < .001$ )  
- Word combinations and the vocabulary score ( $r = .76, p < .001$ )  
**Weaker correlation:**  
- Word combinations and age ( $r = .59$ )

Sensitivity of vocabulary growth as a measure of early syntactic development



Word combinations: Main effects of age group\*\*\* and language\*\*\* (EP=Galician)

## DISCUSSION

My language!

- New approach to the development of CDI short forms that produces reliable and valid CDI data
- Similar to findings for other languages: comprehension precedes production, steady increase of receptive vocabulary, acceleration in vocabulary growth in the 2<sup>nd</sup> year
- **Word complexity:** half of the children produce complex words by 26 mos
- **Word combinations:** acceleration by 22 mos (key age)
- **Vocabulary:** Ceiling effects only after 27 mos (for top half); No ceiling effects for word complexity & word combinations > EP-CDI SFs may be appropriate for use with at-risk or language-impaired children
- Effectiveness of the short form versions of the CDI to detect early grammatical development patterns (Fenson et al., 2000; Pérez-Pereira & Resches, 2007)
- **Gender differences:** Robust finding, already at the infant stage and increasing with age
- Very limited effect of SES
- **Across languages:** Robust gender differences regardless of language; developmental trends more similar in infants, strong differences in toddlers; differences across languages due to language-specific sound features

For further information and discussion

