

Literacy and Learning Symposium, University of Canterbury, New Zealand, 26-27 October 2017



## IDENTIFYING DELAYED BILINGUAL DEVELOPMENT EARLY:

### THE CASE OF CHILDREN GROWING UP IN MALTESE-SPEAKING FAMILIES

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## Why study bilingual language learning?

- 56% of the world's population speak 2 or more languages fluently.
  - 43% use two languages with equal fluency,
  - 13% speak three languages fluently.
- (European Commission Report, 2006)

- Some countries have 4 official languages (Luxembourg, Singapore)
- The most linguistically diverse country is Papua New Guinea where 820 of the world's 6,912 languages are spoken.

#### BUT

- What we know about the acquisition and breakdown of spoken and written language is overwhelmingly based on research studying monolinguals.

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## Bilingual research can inform theory

- Children speaking Samoan at home were compared with English only controls over 18 months from age 4 when they started schooling in English in Australia.
- Receptive and expressive vocabulary tasks evaluated acquisition of 4 word types:

	English	Samoan	
cognates:	<i>pen</i>	<i>peni</i>	P+ C+
matched nouns:	<i>spider</i>	<i>apogaleveleve</i>	P x C+
phrasal nouns:	trousers	<i>ofu vae u'umi</i>	P x C x
holonyms:	arm + hand	<i>lima</i>	P x C x

- The children acquired L2 lexical items earlier if their conceptual representation was similar to that of L1 (Hemsley, Holm & Dodd, 2012).
- Sapir-Whorf Hypothesis: structure of a language determines a native speaker's perception and categorization of experience.

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## A Problem

- Research findings in bilingual language acquisition are characterized by their heterogeneity:
  - Language pair (Spanish-English / Cantonese-English)
  - Age of acquisition of L2 (simultaneous / sequential)
  - Type of exposure (1 parent 1 language / home L1 school L2)
  - Language status
- There is a need, then, for research on young children's bilingual acquisition that focuses on stable bilingual societies where bilingualism is the norm.
- Such data would provide a point of reference by elucidating normal variation in bilingual language learning.

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## This presentation...

... is about expressive vocabulary skills in young children exposed to different language pairs prior to starting pre-school

### WHY?

- Vocabulary skills are important for children's school readiness and later academic success (Biemiller, 2003)
- Research has shown associations between bilingual children's vocabulary abilities in preschool and emergent literacy and reading skills (e.g. Davidson et al., 2011; Hammer et al., 2007, 2008; Rinaldi & Pérez, 2008)

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## Early vocabulary skills

- a core component of language learning
- an important warning signal for language delay

Primary language delay in young children is often identified through small expressive vocabularies that show limited growth (e.g. Desmarais et al., 2008; Dollaghan, 2013).

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## The evolution of language delay

- Although a substantial proportion of language delays resolve spontaneously, others persist (Ellis & Thal, 2008), evolving into an unexplained language difficulty.
- Developmental language impairment is associated with risk for longstanding academic, emotional and socioeconomic consequences (Bishop, 2014).
- Children with language impairment often present with associated literacy difficulties (McKean et al., 2017).

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## Individual variability

Marked individual differences in vocabulary development complicate the differentiation between clinically significant language delays and maturational lags (normal variation) (Ellis & Thal, 2008).

**Bilingual exposure** further compounds the variability characteristic of early vocabulary production.

- Bilingual input patterns and ensuing language competence are marked by *enormous heterogeneity* (Kohnert, 2010)

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## Parental report

Small expressive vocabularies are often identified through parent-based assessment of expressive vocabulary skills.

The parental report method has allowed vocabulary data to be collected from substantial numbers of children, shedding light on the extent of individual variation inherent in vocabulary development (Marchman & Fernald, 2013).

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## Multilingual CDI-based assessment

The MacArthur-Bates CDIs and their adaptations to several languages support cross-linguistic and bilingual vocabulary assessment by

- shedding light on aspects of vocabulary development that are shared across languages
- highlighting language-specific features  
(see Bleses et al. (2008) and Eriksson et al. (2012) for examples of large-scale CDI-based studies)
- allowing bilingual vocabulary measurement through the use of
  - two monolingual vocabulary checklists in parallel (e.g. Pearson et al., 1993, 1995; Cattani et al., 2014)
  - single bilingual checklists (Maltese-English (Gatt, 2010), Irish-English (O'Toole & Fletcher, 2010), Welsh-English)

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## Bilingual vocabulary measures

TOTAL VOCABULARY (TV)

- sum of words in both languages

TOTAL CONCEPTUAL VOCABULARY (TCV)

- sum of words in both languages, with equivalents counted once

There is a pressing need for bilingual reference measures and norms that allow objective evaluation of early vocabulary abilities in both languages for children raised bilingually.

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## Language use in Malta

The greater part of the Maltese population is bilingual

(National Statistics Office, Malta, 2014).

- Bilingualism manifests itself to different degrees (Vella, 2013).

Maltese is the preferred home language for 90% of the population aged 10 years+ (National Statistics Office, Malta, 2007).

Language contact phenomena occur at a societal level (Vella, 2013).

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## Young Maltese children's language input

Most young children are expected to receive predominantly Maltese exposure (based on Census data).

Societal language contact feeds into language use in adult-child dyads.

Maltese child-directed speech is associated with a specific pattern of language contact (Borg, 1988).

- Maltese-speaking adults interacting with young children typically engage in **lexical mixing**, inserting English lexical forms in Maltese syntactic frames (Gatt et al., 2016).

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## Maltese-dominant exposure

Elements of the weaker language (English) are often embedded in the dominant one (Maltese)

- fragmented exposure to English

- ➡ different from simultaneous bilingual exposure
- ➡ different from monolingual exposure
- ➡ **a distinct language-learning environment**

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## What do we know about the identification of vocabulary delays in Maltese children?

This presentation brings together selected findings from

- two cross-sectional studies based on two different cohorts of Maltese children
- one cross-sectional study that compares early bilingual vocabularies across language pairs

The Maltese participants in these studies

- received predominantly Maltese input in their homes
- showed general development that was uneventful.

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## Use of parental report in studies on Maltese children's vocabularies

- an adaptation of the vocabulary checklist of the MacArthur CDI: WS (Fenson et al., 1993) for Maltese children (Gatt, 2010)
  - bilingual format (Maltese words = 68.94%; English words = 27.29%)
  - 924 words, 24 semantic categories
  - recall section for each semantic category

Excerpt from the Maltese-English  
 CDI vocabulary checklist adaptation

3. VETTURI (ta' veru jew f'ugarelli)							
(aeroplani)	□	car	□	krejn	□	trakter	□
ajruplan	□	dghajsa	□	mutur	□	trakk	□
ambulanza	□	gaffa	□	premm	□	vagn	□
boat	□	helikopter	□	puorter	□	vann	□
bus	□	karcizza	□	roda	□	vapur	□
(chico chao) train	□	(karcizza) tal-kinja	□	skuter	□		□

VETTURI... Ohrajn...

Study 1\*

PARTICIPANTS (N = 44)

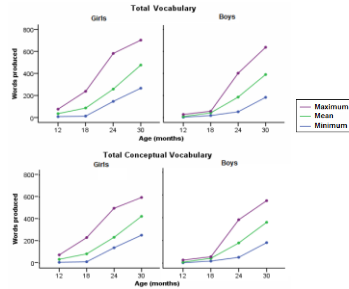
- 12 months: N = 11
- 18 months: N = 12
- 24 months: N = 11
- 30 months: N = 10
- approximately equal gender distribution

TOOLS

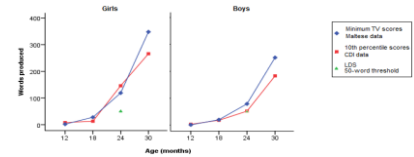
- Maltese-English CDI-WS vocabulary checklist adaptation
- developmental and language background questionnaire

\*Gatt, D., Grech, H., & Dodd, B. (2013). Early lexical expression in typically developing Maltese children: implications for the identification of language delay. *Clinical Linguistics and Phonetics*, 27(6-7), 459-71.

Means and ranges for vocabulary scores



Minimum scores compared with established thresholds for language delay



- CDI 10<sup>th</sup> percentile scores (Fenson et al., 1993) closely approximated minimum TV scores for Maltese children at
  - 12 months (girls)
  - 12 and 18 months (boys)

- The minimum score obtained by 24-month-old Maltese boys marginally exceeded the Language Development Survey (LDS) 50-word threshold (Rescorla, 1989).

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## Study 2\*

### PARTICIPANTS

- 23-27 months:  $N = 33$  (16 boys, 17 girls; mean age = 25.30,  $SD = 0.98$ )
- 30-34 months:  $N = 32$  (19 boys, 13 girls; mean age = 32.84,  $SD = 1.05$ )

### TOOLS

- Maltese-English CDI:WS vocabulary checklist adaptation
- Questionnaire for Parents of Bilingual Children: Infants and Toddlers Version (PaBIQ:IT) (Gatt, O'Toole & Haman, 2011)
  - demographic characteristics
  - language exposure

\*Gatt, D. (2017). Bilingual vocabulary production in young children receiving Maltese-dominant exposure: individual differences and the influence of demographic and language exposure factors. *International Journal of Bilingual Education and Bilingualism*. DOI: 10.1080/13670050.2016.1179255.

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## Descriptive statistics

Vocabulary measure	Age group (months)	Mean (SD)	Range
Total Vocabulary	23-27	229.79 (183.87)	25-696
	30-34	330.91 (183.24)	35-717
Maltese words	23-27	146.70 (143.80)	9-526
	30-34	206.31 (162.06)	8-549
English words	23-27	64.40 (39.41)	2-138
	30-34	103.25 (45.92)	23-213

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## Individual vocabularies at 23-27 months

TV	Expected English word score*	Observed English word score	Language dominance**	Observed Maltese word score	TV	Expected English word score*	Observed English word score	Language dominance**	Observed Maltese word score
25	6.82	2	M	12	192	52.40	77	E	90
44	12.01	23	E	9	222	60.58	41	M	158
44	12.01	13	E	18	255	69.59	97	E	139
47	12.83	11	M	24	277	75.59	119	E	131
55	15.01	21	E	17	296	80.78	55	M	223
56	15.28	34	E	11	301	82.14	102	E	178
63	17.19	15	M	42	317	86.51	94	E	107
65	17.74	27	E	26	321	87.60	98	E	202
66	18.01	29	E	24	330	90.06	90	M	217
85	22.20	46	E	24	394	107.52	103	M	271
101	27.56	26	M	61	419	114.35	73	M	319
103	28.11	51	E	39	479	130.72	124	M	325
110	30.02	58	E	41	533	145.46	114	M	391
114	31.11	28	M	70	536	146.27	114	M	401
137	37.39	54	E	71	585	159.65	113	M	436
141	38.48	52	E	76	696	189.94	138	M	526
174	47.48	83	E	72					

\*Expected English word score =  $TV \times 0.2729$

\*\*Proportionally adjusted language dominance

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## Individual vocabularies at 30-34 months

TV	Expected English word score*	Observed English word score	Language dominance**	Observed Maltese word score	TV	Expected English word score*	Observed English word score	Language dominance**	Observed Maltese word score
35	9.55	23	E	8	305	83.23	200	E	87
90	24.56	58	E	24	316	86.24	192	E	103
105	28.65	38	E	43	318	86.78	92	E	212
126	34.39	66	E	49	319	87.06	104	E	193
141	38.48	77	E	49	321	87.60	115	E	183
170	46.39	50	E	109	341	93.06	213	E	105
181	49.39	72	E	88	385	105.07	124	E	230
198	54.03	108	E	69	389	106.16	70	M	305
204	55.67	109	E	76	416	113.53	51	M	341
216	58.95	54	M	146	498	135.90	87	M	379
226	61.88	88	E	119	533	145.46	90	M	418
269	73.41	96	E	140	533	145.46	141	M	366
274	74.77	95	E	155	649	177.11	138	M	484
303	82.69	107	E	177	690	188.20	105	M	549
303	82.69	157	E	127	714	194.85	140	M	543
304	82.96	90	E	190	717	195.67	154	M	535

\*Expected English word score =  $TV \times 0.2729$

\*\*Proportionally adjusted language dominance

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## Language profiles of individual vocabularies

Vast differences in individual pairs of single-language vocabulary scores, despite general uniformity being reported in participants' language exposure.

For both age groups, substantial numbers of children showing 'English dominance'.

- Mean vocabulary scores did not emerge as reliable indicators of expected language dominance.
  - 23-27: Maltese 146.70 (143.80) / English 64.40 (39.41)
  - 30-34: Maltese 206.31 (162.06) / English 103.25 (45.92)

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## Study 3\*

### PARTICIPANTS

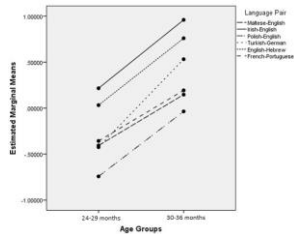
- 24-29 months:  $N = 125$ ; 30-36 months:  $N = 125$
- exposed to 6 language pairs
  - Maltese-English ( $N = 64$ )
  - Irish-English ( $N = 48$ )
  - Polish-English ( $N = 70$ )
  - Turkish-German ( $N = 19$ )
  - English-Hebrew ( $N = 20$ )
  - French-Portuguese ( $N = 29$ )
- exposed to L2 for a minimum of 6 months

### TOOLS

- 10 versions of the CDI:WS vocabulary checklist
- PaBiQ:IT
  - \*O'Toole, Gatt, Hickey, Miękisz, Haman, Armon-Lotem, Rinker, Ohana, dos Santos & Kern (2017). Parent report of early lexical production in bilingual children: a cross-linguistic CDI comparison. *International Journal of Bilingual Education and Bilingualism*. DOI: 10.1080/13670050.2016.1179256

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## Mean %TCV z-scores for each language pair



A 2 (age group) x 6 (language pair) mixed model ANOVA revealed a significant main effect of language pair ( $F(5, 238) = 8.1, p < .001$ ) and age group ( $F(1, 238) = 29.50, p < .001$ ).

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## Lowest and highest performing children

### 24-29 MONTHS

- 10<sup>th</sup> percentile = 44 concepts / 48 words
- $N = 14$

### 30-36 MONTHS

- 10<sup>th</sup> percentile = 96 concepts / 105 words
- $N = 12$

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## So, what do we know?

Children receiving Maltese-dominant exposure show immense variability in

- composite vocabulary scores (TV/TCV)
- single-language vocabulary scores.

	Age in months (N)	Mean vocabulary score	Potential clinical threshold (words)
STUDY 1	24 (11)	224.82 (TV)	52 (minimum)
	30 (10)	433.00 (TV)	183 (minimum)
STUDY 2	24-27 (33)	228.79 (TV)	25 (minimum)
	30-34 (32)	330.91 (TV)	35 (minimum)
STUDY 3	24-30 (138)	276.46 (TCV)	48 (10 <sup>th</sup> percentile)
	31-36 (112)	394.63 (TCV)	105 (10 <sup>th</sup> percentile)

The cross-language clinical thresholds for composite vocabulary size are a useful starting point for identifying potential bilingual language delays.

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## What do we need to know?

Given

- the variability noticeable in available scores for Maltese children
  - the distinctive nature of their language environment
- the need remains for data that document the Maltese childhood population's vocabulary skills more extensively.

Unavailability of standardised assessments for Maltese toddlers limit objectivity in the interpretation of direct assessment performance

- reliance on clinical judgement

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## What do we need to know?

### GROUP-LEVEL CDI VOCABULARY PERFORMANCE

- central tendencies and range of variation in substantially larger cross-sectional cohorts of children
- a lower-performance threshold that is more representative
- better understanding of the causes of variation

### INDIVIDUAL-LEVEL CLASSIFICATION ACCURACY

- gauging how individual children's reported vocabulary skills compare to performance on criterion-based reference measures

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## In addition...

- longitudinal studies to
  - chart stability of individual differences and smaller vocabulary sizes
  - examine influences of possible risk factors and their role in predicting vocabulary performance
- vocabulary checklist CDI adaptations, for Maltese children receiving
  - English-dominant
  - balanced bilingual exposure

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thank you!