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USING PARENTAL REPORT TO ASSESS EARLY LEXICAL PRODUCTION IN CHILDREN EXPOSED TO MORE THAN ONE LANGUAGE

Daniela Gatt, Ciara O'Toole and Ewa Haman

ABSTRACT

Limited expressive vocabulary skills in young children are considered to be the first warning signs of a potential Specific Language Impairment (SLI) (Ellis & Thal, 2008). In bilingual language learning environments, the expressive vocabulary size in each of the child's developing languages is usually smaller compared to the number of words produced by monolingual peers (e.g. De Houwer, 2009). Nonetheless, evidence shows children's total productive lexicon size across both languages to be comparable to monolingual peers' vocabularies (e.g. Pearson et al., 1993; Pearson & Fernández, 1994). Since there is limited knowledge as to which level of bilingual vocabulary size should be considered as a risk factor for SLI, the effects of bilingualism and language-learning difficulties on early lexical production are often confounded. The compilation of profiles for early vocabulary production in children exposed to more than one language, and their comparison across language pairs, should enable more accurate identification of vocabulary delays that signal a risk for SLI in bilingual populations. These considerations prompted the design of a methodology for assessing early expressive vocabulary in children exposed to more than one language, which is described in the present chapter. The implementation of this methodological framework is then outlined by presenting the design of a study that measured the productive lexicons of children aged 24-36 months who were exposed to different language pairs, namely Maltese and English, Irish and English, Polish and English, French and Portuguese, Turkish and German as well as English and Hebrew. These studies were designed and coordinated in COST Action IS0804 Working Group 3 (WG3) and will be described in detail in a series of subsequent publications. Expressive vocabulary size was measured through parental report, by employing the vocabulary checklist of the MacArthur-Bates Communicative Development Inventory: Words and Sentences (CDI: WS) (Fenson et al., 1993, 2007) and its adaptations to the participants' languages. Here we describe the novelty of the study's methodological design, which lies in its attempt to harmonize the use of vocabulary checklist adaptations, together with parental questionnaires addressing language exposure and developmental history, across participant groups characterized by different language exposure variables. This chapter outlines the various methodological considerations that paved the way for meaningful cross-linguistic comparison of the participants' expressive lexicon sizes. In so doing, it hopes to provide a template for and encourage further research directed at establishing a threshold for SLI risk in children exposed to more than one language.

1. INTRODUCTION

A small expressive vocabulary in young children is considered to be the first warning signal of delayed language development (Ellis & Thal, 2008). In turn, early language delay may be the most obvious indication of later language impairment (Paul & Roth, 2011). However, the immense variability characterising language development in young children makes it difficult to predict the evolution of early language difficulties (Ellis & Thal, 2008). For instance, substantial proportions of late talkers have been reported to spontaneously overcome their language learning difficulties completely (e.g. Dale et al., 2003; Rescorla et al., 2000). In contrast, a series of research findings attest to late talkers' continuing speech and language difficulties through the preschool years (see Paul & Roth, 2011). Difficulties with language development may continue to manifest themselves in a subtle form in adolescence (Rescorla, 2009, 2013; Tomblin, 2008) or may even become more persistent and marked with increasing age (Rutter, 2008). It is therefore best to consider limited word production in young children as a 'red flag' for potential Specific Language Impairment (SLI) (Ellis & Thal, 2008), the latter being diagnosed when children's persistent difficulties in language are discrepant with broadly typical abilities in other areas of cognitive, physical and socio-emotional development.

1.1 A CROSS-LINGUISTIC INVESTIGATION OF EARLY LEXICAL PRODUCTION IN CHILDREN EXPOSED TO MORE THAN ONE LANGUAGE

One of the challenges in dealing with bilingual children is the investigation of early lexical production across a series of language pairs, with a view to expanding the limited knowledge base on indicators of language delay in young children exposed to two

languages. The relevant methodology adopted in this chapter[1] is based on the premise that the identification of early language delay relies heavily on the measurement of emergent lexical production as one aspect of linguistic competence. In this chapter, we document the productive vocabulary skills of young children exposed to varying bilingual environments, as a first step towards identifying normative measures for specific language pairs. We also aim to compare findings across the different bilingual contexts considered, with a view to identifying general vocabulary development trends in children exposed to more than one language.

The current chapter outlines the challenges posed by the measurement of early vocabulary production across different groups of children receiving bilingual exposure. It is purely methodological in approach, describing potential solutions for the assessment of young children for whom the effects of bilingual exposure may be readily confounded with the symptoms of language delay. In so doing, it paves the way for a series of planned publications which will present empirical findings generated by the research design documented here.

This is probably the first cross-linguistic endeavour to address early lexical development across various bilingual contexts and language pairs. The collective analysis of findings to be obtained for different language pairs has an important contribution to make to language acquisition theory. Importantly, it should help to clarify whether lower-end lexical production scores are specific to the language pairs being learnt, social contexts or other external variables or whether they are more generally evident across designed languages and contexts.

[1] The methodological design was planned within COST Action IS0804 Working Group 3 (WG3)

To ensure viability of cross-linguistic comparison, individual language pair studies call for a uniform methodological design. The latter also has to reflect considerations emerging from the empirical literature regarding the evaluation of early expressive vocabulary in children exposed to more than one language. This chapter starts with a review of theoretical viewpoints relevant to the identification of delay and risk for continuing language impairment in young children. This appraisal then leads to a set of guiding principles for assessing lexical expression in children exposed to different language pairs, which we present in the following section. These strategies should assist the measurement of early lexical expression across various bilingual contexts, facilitating subsequent cross-linguistic evaluation.

1.2 Identification of Language Delay and Risk for Language Impairment

Different criteria are used to identify constrained lexical development. For instance, on the MacArthur-Bates Communicative Development Inventories (CDIs) (Fenson et al., 2007) and its first edition (Fenson et al., 1993), children are typically identified as late talkers when their vocabulary size falls below the tenth percentile for age. Moreover, Rescorla (1989) posited fewer than 50 words of spoken vocabulary at 24 months or, alternatively, the absence of two-word combinations at the same age, as indicators of language delay.

When employed in isolation, the comparison of young children's lexicon size to established clinical thresholds does not shed light on whether the identified delay will resolve or persist. Outcomes of the Early Language in Victoria Study (ELVS), which draws on a large community sample, clearly illustrate this point. Bavin and Bretherton

(2013) report that late talker status, assigned to children whose expressive vocabulary scores fell at or below the U.S. tenth percentile on the CDI: Words and Sentences at 2 years, only explained 23.6% and 30.4% of the variance in receptive and expressive language outcomes respectively at 4 years. Moreover, although 37.7% of late talkers identified at age 2 continued to have language difficulties at 4 years, 8.9% of non-late talkers unexpectedly presented with impaired language skills at age 4. While highlighting the limited predictive value of expressive vocabulary skills, these findings underscore the relevance of collecting biological and environmental information. Indeed, factors that co-occur with delayed language development can be indicative of increased risk for longer-term difficulties, warranting consideration (Paul & Roth, 2011). For example, Klee et al. (2000) found that by adding parental concerns or more than six ear infections during the first two years of life to Rescorla's (1989) delay criteria, the positive predictive value of 24-month-old screening increased. A positive family history of language delay, male gender, prematurity and low birth weight have also been consistently and significantly associated with the late emergence of language (Nelson et al., 2006; Reilly et al., 2009; Taylor et al., 2013). On the other hand, social and environmental risk factors, such as parental education, family size and birth order, have been less consistently linked to long-term language impairment in the empirical literature (Nelson et al., 2006). Nonetheless, there is a body of research findings that shows parental socioeconomic status (SES) to be closely associated with language learning difficulties. For instance, Tallal et al. (1991) reported that children presenting with SLI and having a positive family history also came from families with a lower SES. More recently, Chiat and Roy (2012) cited a substantial amount of evidence showing children from socioeconomically disadvantaged

backgrounds to perform significantly lower than their more advantaged peers on language measures.

Although it is established that SES is related to child-directed speech, in turn influencing children's early lexical expression (Hoff, 2003; Rowe, 2008), there is disagreement in the literature as to when experiential factors start to impact language learning. Reports of significant effects of SES on expressive vocabulary as early as 18 months (Fernald et al., 2013) contrast with findings that show language outcomes at 24 months to be largely unrelated to social, family and environmental factors (Reilly et al., 2009; Zubrick et al., 2007). Nonetheless, Reilly et al. (2009) pointed out that the associations between the latter factors and diagnosed language impairment in older children may well be different, highlighting the need for further longitudinal research that addresses their predictive value. These considerations necessitate a holistic approach to assessment that not only evaluates early vocabulary production but also takes into account other risk markers for continuing language impairment.

1.3 The use of parental report to gather vocabulary data

The clinical thresholds for limited vocabulary development outlined in the previous section draw on parental report measures of children's expressive vocabulary skills. In fact, the parental report method is often chosen when measures of young children's lexical expression and emergent grammar are sought. It differs from the parental diary method, the latter frequently involving comprehensive note-taking and intensive recording of individual children's productive language (Behrens, 2008). Parental report, on the other hand, makes available protocols that encourage parents to focus on specific

aspects of available language skill. Similar to the parental diary method, it draws on parents' or main caregivers' direct and intensive contact with young children across a range of daily settings **(**Feldman et al., 2005), thus facilitating experiential reporting of early language abilities. Parental report has the added advantage of not relying on memory, as it focuses only on current language behaviours and encourages the recognition of vocabulary items, rather than their recall. Parents are typically provided with a comprehensive list of vocabulary items and asked to identify the words their children produce spontaneously.

Patterson (2000) reports on a substantial body of evidence that confirms the validity and reliability of parental reports of young children's early language skills. However, parents may under- or over-estimate their children's vocabulary and emergent grammar skills, particularly when they come from low socio-economic minority backgrounds (Roberts et al., 1999). There is also evidence showing that structured parental reporting of early vocabulary production underestimates expressive lexical abilities when compared to more comprehensive diary records (Mayor & Plunkett, 2011; Robinson & Mervis, 1999). Acknowledging the potential shortcomings of parental reports of lexical ability, Fenson et al. (1994) maintained that outcomes are best seen as indices rather than exhaustive measures of children's lexical repertoires. Accordingly, the strength of such vocabulary measures lies in their potential for comparison, enabling the ability of individual children and/or groups to be gauged in relation to others' performance. The MacArthur-Bates CDIs (Fenson et al., 2007) and the Language Development Survey (Rescorla, 1989) are frequently used parental report tools that provide normative data,

allowing children's reported expressive vocabulary skills to be measured up against expectations for their age.

1.4 Identification of vocabulary delays in bilingual children

When objective normative data and standardised assessments are non-existent, early detection of limited word production is hampered. This is often the case with children in bilingual contexts, whose early vocabulary delays may be the first warning signal of bilingual language impairment (Gatt et al., 2008), but are frequently overlooked as 'the child is bilingual' (O'Toole & Hickey, 2013). For children exposed to two languages, there is an urgent need for evidence documenting emergent vocabulary production skills so that the level of lexical expression that signals language delay for specific language pairs may be identified and disentangled from typical bilingual development.

Exposure to more than one language adds a series of challenges to early assessment practices, over and above those adopted for monolingual children. Firstly, the amount of exposure received in each language varies across children, with empirical evidence showing it to be strongly related to the corresponding vocabulary size (see Hoff et al., 2012; Patterson & Pearson, 2012; Pearson et al., 1997; Thordardottir, 2011). In addition, vocabulary knowledge is likely to be distributed across both of the child's languages, so that some vocabulary is language-specific and some is shared (Bedore et al., 2005). Thus, exposure to more than one language increases the normal variation expected in vocabulary development. As a result, difficulties with language learning cannot be readily picked up on the basis of limited word production alone. Exposure to two languages produces differences in lexical expression that may easily be confounded with

vocabulary delays. Early identification demands a clear distinction between core language-learning deficits and differences in language development that stem from bilingual exposure.

Very little is known about the threshold of bilingual vocabulary size that suggests a potential language learning difficulty. Certainly, the bilingual child's vocabulary production in each language separately cannot be compared to monolingual norms (Thordardottir, 2005). Yet, many studies continue to use the monolingual norms as a basis for comparison (see Hoff et al., 2012). The bilingual child's level of development in only one of her/his languages may appear to be at-risk when compared to monolingual norms for the same language, since measurement of single-language skill under-estimates overall language ability (Bedore & Peña, 2008). Nonetheless, recent findings suggest that monolingual and bilingual children's level of ability in a particular language may be compared, provided that equivalent amounts of exposure to that language are received by both groups (De Houwer, 2010). In a study by Thordardottir (2011), expressive vocabulary scores of five-year-old children receiving bilingual exposure to French and English were compared to the scores of monolinguals matched for SES and non-verbal cognition. Results showed that unbalanced bilinguals receiving more than 60% exposure in one language performed comparably to the corresponding monolingual group on expressive vocabulary. In contrast, balanced bilingual children had significantly lower vocabulary sizes when compared to monolinguals. These results imply that by the age of five years, over 60% cumulative exposure to one language supports achievement of a monolingual level of performance in that language. Amount

of exposure therefore determines whether the comparison of bilingual children's single-language performance to monolingual norms may be relevant.

Core language-learning difficulties manifest themselves across the board in all language-related activities encountered by the child rather than limiting themselves to one of the languages being learnt (e.g. Armon-Lotem, 2012; Bedore & Peña, 2008; Kohnert, 2010). Thus, difficulties restricted to one of the bilingual child's languages are not sufficient to indicate impaired language processing ability, although they may imply insufficient exposure to that language (Pearson et al., 1997). With young children receiving bilingual exposure, therefore, accurate identification of early language difficulties hinges on acknowledging vocabulary skills in both languages. Accordingly, Patterson and Pearson (2012) hold that assessment of bilingual vocabulary production must address the totality of expressive vocabulary distributed across both languages. This approach to assessment necessitates dedicated measures that tap into the child's composite lexical repertoire. In a study of expressive vocabulary development in Spanish-English bilingual children in the United States, Pearson et al. (1993) proposed two measures that fulfilled this purpose. Total Vocabulary (TV) represented the sum of English and Spanish *words* reported for each child. Total Conceptual Vocabulary (TCV) counted the *concepts* shared between languages so that translation equivalents, or words from both languages having the same meaning, were counted only once. In recent years, TV and TCV scores have been widely employed to quantify the totality of early lexical expression in children receiving bilingual exposure while gauging the extent of lexical overlap emerging between each of their languages.

The popularity of these double-language measures has triggered a constructive debate on their measurement properties. For instance, Patterson and Pearson (2012) point out that semantic immaturities may not allow children to realise that synonyms across languages are equivalent, leading to a different conceptualisation for both terms. In such cases, TCV scores would underestimate the child's conceptual knowledge since equivalent labels would not overlap but have different conceptualisations. They use the example of a child saying 'boat' for one type of boat and 'barco' in Spanish for a very different type. Patterson and Pearson (2012) therefore recommend that TV scores are the preferred bilingual vocabulary measures for infants and toddlers, since they count all sound-meaning pairings as different concepts. Thordardottir et al. (2006) called attention to the fact that TCV measures would be less appropriate for children whose proficiency in two languages is relatively balanced. Lower TCV scores, resulting when children know many translation equivalents, would act as a false alarm for language delay when comparison to monolingual norms is attempted (see Section 1.5).

From a different perspective, Bedore et al.'s (2005) study evaluated the classification accuracy of monolingual, total and conceptual scoring approaches when measuring the expressive vocabularies of typically-developing Spanish-English children in the United States. The participants came from different backgrounds, namely Spanish-dominant (using Spanish over 80% of the time), English-dominant (using English over 80% of the time), bilingual Spanish (using Spanish 50%-80% of the time) and bilingual English (using English 50%-80% of the time). Findings showed conceptual scoring to have the best potential for accurately identifying participants as typically-developing, suggesting

that it would also reduce misidentification of language impairment in children receiving bilingual exposure.

Taken together, the theoretical viewpoints and empirical findings on TV and TCV scores attest to the strengths and weaknesses of both measures, suggesting that each one has value in gauging vocabulary skills that span two languages.

1.5 Bilingual and monolingual lexical development: similarities and differences

The introduction of TV and TCV measures prompted a series of investigations that evaluated the expressive vocabulary shared between the two languages of bilingual children in relation to monolingual control groups. The evidence on bilingual vocabulary acquisition in relation to monolingual development is inconclusive. Similarities between TCV and monolingual scores have been reported for young Spanish-English bilinguals (Pearson et al., 1993) and German-English bilinguals (Junker & Stockman, 2002). Thordardottir et al. (2006) identified significantly lower TCV scores in bilingual French-English children when compared to English monolingual vocabulary counts. In contrast, the smaller monolingual French vocabularies were similar in size to the bilingual conceptual lexicons. It is possible that bilingual conceptual scores approximate monolingual vocabulary scores more consistently in children having unbalanced proficiency (Thordardottir et al., 2006). This tentative explanation assumes the relationship between double-language and monolingual measures to be influenced by the extent of overlap in conceptual knowledge between the child's two languages. More

recently, Poulin-Dubois et al. (2012) found the expressive vocabularies of 24-month-old monolingual children speaking French or English to be larger than the total vocabulary size of bilingual peers having French or English as their first language (L1), although this difference was not statistically significant.

Inconsistent findings do not necessarily imply a slower rate of vocabulary development in bilinguals, but point towards other variables that might impinge on bilingual vocabulary growth. Environmental variables determining language exposure patterns may potentially contribute to the discrepant results (Thordardottir et al., 2006). For example, Pearson and Fernández (1994) suggested that children's levels of exposure to their two languages may vary according to whether they learn both languages in the same or different contexts, and whether they receive exposure from the same or different individuals who may be monolingual or bilingual. Thordardottir et al. (2006) identified the specific language pair being learnt as another potentially relevant factor, such that the various combinations of languages to which young children are exposed may result in different rates of lexical acquisition.

1.6 WANTED: CLINICAL THRESHOLDS FOR CHILDREN EXPOSED TO MORE THAN ONE LANGUAGE

There is a growing body of research that addresses expressive vocabulary measurement in children exposed to more than one language, although the focus is noticeably on simultaneous bilingual children. Two approaches to assessment are suggested in this domain, both of which address the need for objective criteria to guide the detection of

delay. The comparison of double-language measures, and specifically conceptual scores, to monolingual norms has been proposed as one route to the identification of early language delays (Junker & Stockman, 2002). However, evidence documenting limited comparability of conceptual and monolingual vocabulary scores has reduced the value of this suggestion (see Thordardottir et al., 2006). Another approach also draws on available monolingual norms, comparing them to the lexicon size in each of the languages of simultaneous bilinguals. De Houwer's (2010) findings for children exposed to Dutch and French from birth suggest that the comparison of single-language vocabulary scores to monolingual normative data for the respective languages may be sufficient to identify lower-performing children whose language-learning difficulties span both languages.

It cannot be excluded that monolingual reference measures may also be useful in the assessment of young children who are markedly dominant in one language because exposure to the second language (L2) is as yet limited, or whose L2 ability becomes established after the first language (L1). Remarkably, there is no empirical evidence that substantiates this proposal for young children who are as yet monolingual but are likely to develop sequential bilingualism at a later stage, or who are already sequential bilinguals. For these children, comparison of vocabulary ability in the dominant language to monolingual norms for the same language, if available, may provisionally gauge language performance and signal need for in-depth monitoring. Further, for languages and language pairs lacking normative data, the possible presence of delay may be identified through cautious reference to clinical thresholds established for other

languages, such as Fenson et al.'s (1993, 2006) tenth percentile scores at monthly intervals and Rescorla's (1989) criterion of fewer than 50 words at 24 months, both intended for American English-speaking children (Gatt et al., 2013). In all cases, however, the utilisation of monolingual data sidesteps the limited availability of customised norms against which the performance of young simultaneous or (potential) sequential bilinguals should be evaluated. This stems from the limited research addressing the typical rate of development and the accompanying range of variation in these groups of children. Clinical identification of potential language impairments is therefore hindered. This fact points towards an imminent need for objective clinical thresholds that can differentiate potential SLI risk from the normal variation that accompanies bilingual exposure. For languages and language pairs that lack developmental norms and for which large-scale standardisation research is not immediately possible, an important first step towards establishing reference measures for lexical expression is the collection of mean, minimum and maximum vocabulary scores for small samples of typically-developing children at specific ages (Gatt et al., 2013). A preliminary delineation of the normal distribution of vocabulary size would allow lower-performing children to be identified and monitored.

Research findings show the prevalence rate of primary language delay to be approximately 6% of the childhood population (Law et al., 2000). As we should not expect the incidence of language delay in children receiving bilingual exposure to be any different, this suggests that up to 6% of (potentially) bilingual children are also at risk for language-learning difficulties. In turn, composite vocabularies that fall within the lowest

6% of the size range might signal core language deficits. On the other hand, the CDI threshold for small lexicon size that signals risk for persistent language impairment is the lower tenth percentile (Fenson et al., 2007), which translates into approximately 1.5 SD below the mean. These contrasting values highlight the absence of a gold standard for identifying early language delay (Law et al., 2000; Nelson et al., 2006). They also point towards the relevance of normative data that are specific to the language(s) being acquired in the early years. Taking into account the total expressive vocabulary spanning both languages avoids over-identification of children performing poorly in one language only. Furthermore, comparison of productive vocabulary measures across children exposed to different bilingual environments allows insight as to whether lower-end scores are specific to the language pair being learnt or are common to various bilingual settings.

2. METHODOLOGY

The methodological design described in this section incorporates conclusions derived from the research literature regarding the measurement of early lexical development in children exposed to bilingual environments. Following an outline of criteria for participant recruitment, an account of the proposed methodology, including tools and procedures for data collection and analysis, is given. This research design also reflects our recommendations for optimal evaluation of productive vocabulary skills in young children receiving bilingual exposure, as well as comparison of findings across language pairs and contexts. The assessment guidelines we propose can be applied to other studies

utilising CDIs and CDI adaptations across various bilingual contexts. We exemplify the recommended methodology by describing the design of a cross-linguistic CDI study implemented in the COST Action, the results of which will be presented in a series of subsequent publications. This study involved six sub-groups of participants who received exposure to one of the following language pairs: Maltese and English, Irish and English, Polish and English, French and Portuguese, Turkish and German as well as English and Hebrew.

2.1 Criteria for Participant recruitment

Criteria for participant recruitment are a key consideration for a study aiming to demonstrate the gains in lexical production expected within the normal range of development, across different language pairs and bilingual contexts.

2.1.1 Age

According to Rescorla (1989), expressive vocabularies that count less than 50 words at 24 months signal a delay in language development, which in turn is a risk marker for continuing language impairment (Paul & Roth, 2011). This empirically tested threshold suggests that protracted language growth may be identified with confidence at the onset of children's third year of life. This could be an outcome of the decrease in variability in lexical production that accompanies the 24-month age point. CDI normative data for American English children reveal increasing variability in word production up to the age of 24 months, following which the range of variation in vocabulary scores shows a consistent drop (Fenson et al., 1993, 2007). In a cross-linguistic CDI study by Bleses et

al. (2008), monolingual children learning a range of languages were all reported to use over 150 words at 24 months, based on median scores. With evidence suggesting that most children at this age produce a substantial number of words, the resulting variance in vocabulary measures would be expected to decline. For this reason, we chose to consider 24 months as the lowest age point in our study. This does not imply, however, that younger children should not be considered in similar investigations. Since there is a need to identify delayed language development as early as possible (Law et al., 2000), studies aiming to establish a threshold of risk for language impairment may opt to include children exposed to two languages who are younger than 24 months. The upper end of the age range should not be excessively restricted either. We suggest that the upper end of the age range may go beyond the 30-month margin intended for the vocabulary checklist of Fenson et al.'s (1993; 2007) CDI: Words and Sentences (CDI: WS) form and its adaptations to other languages, which are recommended as data collection tools (see Section 2.2.1 for a descriptive account of the CDI: WS and its adaptations for use with monolingual and bilingual children). The higher variability in vocabulary production that is expected in bilingual populations, coupled with the extensive numbers of words made available to caregivers when bilingual or parallel monolingual checklists are employed, should minimise the possibility of a ceiling effect on participants' composite vocabulary scores (see Section 2.2.1 for more detail on available vocabulary assessment tools and Table 1 for total numbers of checklist entries available for each language pair). We therefore propose that participants are recruited up to the age of 36 months, while acknowledging that monolingual normative data for the CDI: WS and its adaptations, where available, do not usually surpass the 30-month-age point, although

this can vary across languages (see Dale & Penfold, 2011). Following these considerations, the age range of participants selected for our study was 24 to 36 months, although limited data were also collected from children aged between 19 and 23 months in three sub-studies, and from 37-month-olds exposed to another language pair.

Table 1. Research tool 1: components of vocabulary checklist adaptations – L1 and L2 vocabulary and conceptual vocabulary per semantic category, where concept counts represent the sum of L1 and L2 words minus the number of translation equivalent pairs across each language pair (for bilingual Maltese-English and Irish-English adaptations, the number of non-specific language words (NSL) is included)

SEMANTIC CATEGORIES	COMPONENTS OF VOCABULARY CHECKLIST ADAPTATIONS																			
	MALTESE-ENGLISH				IRISH-ENGLISH				POLISH-ENGLISH			German-English			Hebrew-English			French-Portuguese		
	Maltese	English	NSL	Conceptual	Irish	English	NSL	Conceptual	POLISH	ENGLISH (UK)	Conceptual	GERMAN	TURKISH	Conceptual	HEBREW	ENGLISH (US)	Conceptual	FRENCH	PORTU-GUESE	Conceptual
Sound effects, animal sounds	6	0	19	25	0	0	13	13	12	12	18	0	13	13	15	12	17	13	21	25
Animals	28	22	0	34	41	41	7	48	43	43	55	27	41	47	46	43	52	43	44	59
Vehicles	17	6	0	17	9	9	8	17	14	14	19	15	14	21	15	14	18	14	18	20
Toys	16	8	0	20	16	15	4	20	18	18	25	13	20	27	22	18	24	18	21	28
Food and drink	75	19	2	79	51	51	10	61	66	68	94	33	66	78	68	68	92	73	77	104
Clothing	35	11	0	35	29	29	3	32	24	28	35	22	32	43	29	28	34	32	49	56
Body parts	22	6	4	27	28	27	0	28	26	27	33	21	27	32	26	27	31	28	37	42
Body care / functions	--	--	--	--	--	--	--	--	--	--	--	11	--	11	--	--	--	--	--	--
Small household items	65	17	3	73	48	48	5	53	48	50	69	34†	33	76	47	50	53	56	90	96
Furniture and rooms	42	6	0	45	30	30	0	30	31	33	48	0	27	--	31	33	37	33	39	54
Outside things	31	8	0	33	38	38	0	38	30	31	42	14	37	39	29	31	34	31	36	48
Places to go	13	5	1	17	20	20	2	22	18	22	29	0	25	25	19	22	27	23	33	42
People	18	10	4	25	24	24	6	30	27	29	36	15	32	37	17	29	29	28	32	38
Games and routines	23	7	5	32	28	28	3	31	19	24	32	9	40	43	30	25	41	26	34	54
Occasions	3	2	0	5	--	--	--	--	--	--	--	--	--	--	103	103	119	--	--	--
Action words	70	8	0	72	95	95	0	95	114	110	155	34	146	171	--	--	--	102	122	170
Descriptive words	31	10	1	35	62	62	0	62	33	65	86*	23	61	72	46	63	73	65	61	89
Adverbs	--	--	--	--	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	--
Adverbs - places	--	--	--	--	--	--	--	--	16	--	--	--	--	--	--	--	--	--	--	--
Words about time	27	24	0	26	12	12	0	12	18	12	22	0	13	13	14	12	17	11	19	19
Pronouns	32	25	0	29	20	18	0	20	17	25	32**	15	21	32	12	25	25	23	37	48
Prepositional pronouns	--	--	--	--	24	--	0	24	--	--	--	--	--	--	--	--	--	--	--	--
Demonstrative pronouns	--	--	--	--	--	--	--	--	9	--	--	--	--	--	--	--	--	--	--	--
Question words	9	7	0	9	7	7	0	7	13	7	13	3	12	12	10	7	10	7	8	9
Modal adverbs	--	--	--	--	--	--	--	--	8	--	--	--	--	--	--	--	--	--	--	--
Prepositions and locations	28	27	0	27	32	32	0	32	15***	27	52****	--	--	--	13	26	23	26	31	37
Pre-/Postpositions	--	--	--	--	--	--	--	--	--	--	--	16	21	28	--	--	--	--	--	--
Quantifiers and articles	16	16	0	17	18	17	1	19	20*****	17	29	0	23	23	10	17	17	14	27	33
Numbers / quantities	--	--	--	--	--	--	--	--	--	--	--	6	--	6	--	--	--	--	--	--
Helping verbs	3	0	0	3	17	14	0	17	9	21	28	8	--	8	--	21	21	18	7	19
Negatives	2	1	0	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Connecting words	15	5	0	15	7	7	0	7	9	7	13	--	--	--	--	6	6	6	10	9
Prepositions / connectors	--	--	--	--	--	--	--	--	--	--	--	0	7	7	--	--	--	--	--	--
Total	627	250	39	701	658	624	61	718	670	690	965	319	711	864	602	680	803	690	853	1099

*in computing the conceptual vocabulary count, translation equivalent pairs considered include items in the *Adverbs* category of the Polish adaptation

** in computing the conceptual vocabulary count, translation equivalent pairs considered include items in the *Demonstrative Pronouns* category of the Polish adaptation

***category only includes prepositions in the Polish adaptation

**** in computing the conceptual vocabulary count, translation equivalent pairs considered include items in the *Adverbs – places* and *Modal adverbs* of the Polish adaptation

*****does not include articles

†*Small Household Items* and *Furniture and Rooms* are merged into one semantic category in the German adaptation

2.1.2 Minimal exposure to L2

In selecting participants for our study, we also applied the criterion of a minimum of 6 months' exposure to L2. Given that the youngest children taking part in the study were 24 months old, this condition essentially meant that all children were exposed to their second language at least by 18 months. The children's ages at onset of L2 exposure led us to consider the debate in the literature as to what constitutes simultaneous and sequential bilingualism. For example, McLaughlin (1984) proposed that exposure to two languages before 3 years of age constitutes simultaneous bilingual development while De Houwer (1995) employed a more stringent criterion of exposure to two languages within one month of birth. More recently, Pearson (2013) stipulated that both simultaneous and sequential bilingualism are possible during the first three years of life. While simultaneous bilingual children regularly experience two languages concurrently, sequential bilinguals' L1 becomes established before L2. This implies that, in sequential bilinguals, regular exposure to L2 commences only after the child receives consistent and substantial input in another language (L1) from very early on.

Alongside *timing* of initial exposure to two languages, *amount* of exposure to each language is another factor that appears to be directly related to the mode of bilingual development. For instance, a child receiving input primarily in one language and minimal exposure to the majority language at societal level would not be engaging in simultaneous bilingual development, despite concurrent exposure to two languages. Limited exposure to L2, the majority language, would imply monolingual development with potential for sequential bilingualism at a later stage. This is typically the case with infants and toddlers

from immigrant environments, who have limited access to L2 until their regular involvement in nursery or day care settings brings them in regular contact with L2 as the medium of communication. A similar outcome would be expected in settings where, despite the presence of bilingualism at a societal level, parents prefer one language for communicative exchanges in the home. Establishing a minimal amount of exposure to both L1 and L2 is therefore warranted when selecting participants. We suggest that an important participant selection criterion should be a minimal period of six months' exposure to L2. Longitudinal findings reported by Pearson et al. (1997) showed the proportions of vocabulary produced in each language by young bilingual children to reflect changes in the language environment with a delay of one month. We therefore deduced that the criterion of at least six months' bilingual exposure should ensure that children's developing lexical systems respond to the bilingual input received. As a result, the children whose lexical production was assessed in our study had all been receiving L2 input for a minimum of 6 months. They were either exposed simultaneously to both languages in their immediate environment from birth or else received input primarily in one language at home, with exposure to L2 occurring through child care, television programmes as well as L2-speaking relatives and friends among others, thus paving the way for sequential bilingualism in the near future. The amount of L2 exposure received varied across language pairs.

2.1.3 NUMBER OF REPORTERS

Most studies using parental report for assessment of early lexical production involve one reporter for each child. We suggest that expressive vocabulary skills in L1 are reported on

by the main caregiver, provided that this person's language capabilities support reading of the vocabulary checklist and, where relevant, recognition of words as components of the child's lexical repertoire. In the event that the main caregiver has bilingual competence, L2 word production can also be reported. The validity of this method has been established in other bilingual studies where one reporter was used to report on the child's development in both languages (Marchman & Martínez-Sussman, 2002). Otherwise, it may be delegated to a person who regularly uses L2 as a medium of communication with the child and can therefore gauge the child's lexical expression in the language. Although the involvement of two or three adults in rating the same child's vocabulary skills has been recommended in both monolingual environments (De Houwer et al., 2005) and bilingual ones (De Houwer, 2010) to enhance reliability of measures, this can be problematic. Vocabulary norms typically draw on data generated by a single informant per child. If multiple informants are claimed to significantly change the results for individual children, norms based on such composite measures should be derived in addition to single informant norms. However, multiple reporters are usually not easily available. In most language contexts, having more than one informant per child may result in smaller sample sizes. It is easier to recruit children who have one caregiver willing to complete the vocabulary assessment. In the light of these facts, the option of having multiple reporters may be abandoned in favour of maximising the chances of identifying larger samples of children and therefore of increasing the statistical power of subsequent analyses. In our model study, this was an important consideration given the aim of identifying the normal distribution of children's lexicon sizes within and across different language pairs. We suggest that the number of participants should be considered to be more important than

having multiple informants for one child. Nonetheless, the involvement of multiple reporters is recommended in situations where an informant is not familiar with both of the child's languages, to ensure that the vocabulary data reported for each of the child's languages is accurate. Such instances would lead to multiple-informant data for specific children being analysed together with single-informant measures for other participants within the same sample. This methodological limitation would be compensated for by reported vocabulary data that are sufficiently reliable for each of the children's languages.

2.1.4 Language exposure patterns

Participants can have a variety of language exposure patterns, highlighting the diverse bilingual environments that young children may experience. This heterogeneity should not undermine methodological rigour as it reflects the reality of acquiring more than one language. It can also ensure that outcomes for the individual sub-studies provide comparable reference measures for the various language pairs and types of bilingual context addressed. In addition, the diversity of language-learning settings should make available an opportunity to observe whether thresholds for limited lexicon size identified for each group are specific to the language pairs being investigated or suggest a universal trend. Information regarding the length of children's exposure to L1 and L2 as well as their social environment (including SES), family language usage, language dominance and age of initial exposure to L2 should be collected through a detailed questionnaire. Such a questionnaire was developed for the COST Action IS0804 study and is described in Section 2.2.2 below.

2.2 METHOD AND TOOLS

The methodological design presented here seeks to generate two types of data. Expressive vocabulary measures are the primary focus. Developmental and language background information for each child complements the lexical data, placing them in context. In the model study, participating parents were asked to provide information on the words produced spontaneously by their child in daily contexts by ticking the relevant words on a vocabulary checklist, details of which are given in Section 2.2.1. Parents were also asked to report on specific aspects of their child's development and language environment by completing a questionnaire (see Section 2.2.2).

2.2.1. RESEARCH TOOL 1: VOCABULARY CHECKLIST ADAPTATIONS

Since adaptations of the CDI: WS (Fenson et al., 1993, 2007) are now available for 61 languages (Dale & Penfold, 2011), we suggest that this is the optimal tool for research considering early lexical expression in bilingual populations. The American English language version of the CDI: WS, intended for children aged 16 to 30 months, incorporates a 680-item word production checklist and questions on the use of words in Part I (Words Children Use), together with an appraisal of emergent morphological and syntactic skills in Part II (Sentences and Grammar). A review of the research literature spanning the numerous publications related to the CDIs shows relatively high concurrent correlations between CDI expressive vocabulary scores and standardised and/or naturalistic measures across various samples of children, including children with delayed language and from low SES groups (Law & Roy, 2008). Similarly, predictive validity studies have shown high associations between CDI vocabulary scores and subsequent

outcome measures based on parental report, direct observation or both (Miller et al., 1995; Reese & Read, 2000). The growing stock of CDI adaptations to languages other than American English, as attested by the outcomes of a survey of authorized adaptations (see Dale & Penfold, 2011), has been the driving force behind a series of cross-linguistic efforts addressing early language development. Earlier attempts at comparing monolingual children's performance in English and Italian (Caselli et al., 1995; Caselli et al., 1999) have been followed up with more extensive studies that capitalise on the wider availability of CDI adaptations for various languages. For example, Bleses et al.'s (2008) study examined early vocabulary development in Danish children in relation to findings reported for CDI versions in 18 languages. Within-language and cross-language comparisons have been markedly facilitated by the recent launch of the web-based CLEX (Cross-Linguistic Lexical Norms) project (Jørgensen et al., 2010), which has brought together norms for several CDI adaptations.

In addition to the abundance of studies investigating lexical expression in monolingual children through the various CDI adaptations, there is a small body of evidence that documents use of the CDI: WS and/or its adaptations to measure the expressive vocabularies of children exposed to more than one language. Often, these studies compare the composite expressive vocabularies of bilingual children to the single-language vocabulary scores obtained by monolingual children (see Section 1.5). For instance, the series of investigations of the lexical development of Hispanic toddlers exposed to American English and Spanish by Pearson and colleagues (Pearson & Fernández, 1994; Pearson et al., 1993; Pearson et al., 1995; Pearson et al., 1997) incorporated earlier versions of the English CDI vocabulary checklist as well as the Spanish CDI adaptation in

parallel. Similarly, in Poulin-Doubois et al.'s (2012) investigation of the expressive lexical abilities of young children exposed to either French or English as L1 and to English, French, Hebrew, Turkish or Italian as L2, parents reported on their children's vocabularies by completing separate vocabulary checklists according to the language input received. The finding that measures of expressive L1 vocabulary and total vocabulary generated by parental report were strongly correlated with receptive vocabulary scores obtained through direct assessment, served to validate the methods and tools employed. Separate checklists have also been used to explore the similarities between single-language vocabulary measures obtained for bilingual children and those expected for children developing monolingually in the same language. For example, Tan (2010) employed standardised CDI vocabulary checklist adaptations to Singapore English, Mandarin and Malay in parallel to measure the vocabulary skills of children exposed to English, Mandarin or Malay, or a combination of these and other languages. Another study employing separate but parallel American English and Spanish CDI checklists showed that reported bilingual vocabulary measures could predict children's lexical abilities in spontaneous and structured contexts (Marchman and Martínez-Sussman, 2002).

In addition to the use of two vocabulary checklists in parallel, measurement of word production in children exposed to two languages has also employed single bilingual checklists, as in the case of the Maltese-English (Gatt, 2007) and Irish-English (O'Toole & Fletcher, 2010) versions. A Welsh-English CDI adaptation is also in preparation (see Dale & Penfold, 2011). Single bilingual checklists are considered appropriate in these settings as parents are usually competent in both languages, although possibly to varying degrees, and bilingualism is always present in children's language-learning contexts. Although

bilingual CDI versions are relatively scarce, the ample range of monolingual CDI adaptations now available is expected to bolster the investigation of expressive lexical development in a range of language pairs. Despite the numerous adaptations, there is a paucity of research evidence documenting expressive vocabulary skills in young children brought up in bilingual environments. The investigation described here represents an attempt at reducing this gap in the empirical literature. It differs from previous studies on early bilingual or multilingual acquisition in a single context (e.g. Poulin-Dubois et al., 2012; Tan, 2010) in attempting to bring together findings on vocabulary development in children exposed to different language pairs in diverse contexts.

Unlike other studies within COST Action IS0804, the cross-linguistic measurement of early lexical expression does not make use of novel assessments devised purposely for the study. Instead, the enquiry to which we relate in this chapter capitalises on tools that had been previously validated. This allows more effort to be directed towards ensuring uniformity in the methodological design and analytical procedures employed across the individual sub-studies. Our design employs original or adapted monolingual CDI vocabulary checklists utilised in parallel, or bilingual versions (as in the Maltese and Irish situations), depending on availability as well as on family and social contexts[2]. This allowed the measurement of productive vocabulary in L1, or both L1 and L2, depending on the extent of bilingual exposure received. Indeed, the lack of bilingual assessments often necessitates the pairing of monolingual protocols in order to obtain a reasonable estimate of bilingual ability.

2.2.1.1 Comparing CDI adaptations used to study bilingual lexical development

[2] References to language-specific adaptations of the CDI employed in this study can be found in Appendix 1.

When employing bilingual or single language CDI adaptations in bilingual contexts for the purpose of cross-linguistic investigation, a detailed comparison of the contents of the protocols used is essential. We suggest that the semantic categories and the respective number of words and concepts for the checklist adaptations employed in each sub-study are compared. As we shall be showing in subsequent publications, the use of absolute measures of vocabulary production can be revealing in its own right (see also Section 3.1). Side-by-side tabulation of the contents of each checklist adaptation employed therefore provides a baseline for statistical comparison. Table 1 illustrates this exercise for the IS0804 WG3 CDI study. The components of monolingual checklists/checklist adaptations used in parallel are listed alongside each other for easy identification of the L1 and L2 items presented to caregivers of children in each language pair sub-group.

2.2.2 Research tool 2: Questionnaires

Recent empirical literature on L2 acquisition in childhood has emphasised the relevance of information related to developmental and language input variables for a holistic appraisal of emergent bilingual skills. For instance, Paradis et al., (2010) reported that details on the early milestones, current L1 abilities, behaviour and activity preferences as well as family history of children learning English as L2 differentiated typically-developing from language-impaired school-aged children. Furthermore, in an investigation addressing individual differences in children's acquisition of vocabulary and verb morphology, Paradis (2011) identified length of L2 exposure and richness of L2 input as significant predictors of lexical and morphosyntactic development in children aged between 4;10 and

7;0 years. The link between language background and bilingual development has been previously acknowledged by various other researchers. For instance, among the findings of a series of studies on Hispanic-English children aged between 5 and 10 years growing up in Miami was the significant effect of frequency of input on vocabulary development (Oller & Eilers, 2002). Interestingly, in a three-year longitudinal study on L2 English acquisition among Chinese child and adolescent immigrants, Jia and Aronson (2003) identified age of onset of L2 input as one of the environmental factors that contributed to language proficiency changes. Younger arrivals eventually became dominant in English while older arrivals maintained their L1 Chinese dominance. Together, these findings point towards the relevance of environmental and developmental factors to the study of bilingual acquisition. We suggest that cross-linguistic investigations of early lexical development in children receiving bilingual exposure consider language background and developmental details as important pieces of information that place vocabulary data in a meaningful context. Following this guideline, we designed a parental background questionnaire which is now described in detail.

The Questionnaire for Parents of Bilingual Children: Infants and Toddlers Version (PaBiQ-IT) (Gatt, O'Toole & Haman, 2011) was prepared especially for the purposes of the investigation we relate to in this chapter. It is a version of the Questionnaire for Parents of Bilingual Children (PaBiQ), used within COST Action IS0804 (see Tuller, this volume), that is suitable for use with younger children. The questionnaire format was closely based on the Beirut-Tours Questionnaire (Tuller & Messarra, 2010), which was created and piloted by French and Lebanese members of COST Action IS0804 and was in turn based

on the Alberta Language and Development Questionnaire (ALDeQ) (Paradis et al., 2010) and the Alberta Language Environment Questionnaire (ALEQ) (Paradis, 2011). The latter three questionnaires were purposely designed to assess language and environmental background in bilingual populations, but were intended for school-aged children. Our questionnaire adapted the Beirut-Tours protocol for use with children younger than three years. Several components of the original protocol were retained while others concerning the child's school language environment were replaced with questions focusing on potential risk markers for language impairment in early childhood. The latter were considered to be of greater significance to younger children. Areas of development thus addressed included eventful pre- and perinatal histories, age at first word production, the absence of word combinations, parental concerns regarding language development, the presence of specific medical conditions, as well as history of frequent colds, allergies and/or ear infections. Parents were also asked to report on the language exposure pattern typically received by their child i.e. whether the child was exposed to one language only, or one language with some words in another language, or approximately equal proportions of two languages, or two languages and an additional language. These questions were accompanied by others derived from the Beirut-Tours Questionnaire, targeting general information about the child, developmental history, languages used with and by the child, education and occupation of the parents, as well as family history of speech, language and/or literacy difficulties. Most questions were intended to elicit a yes/no response or a tick next to the most appropriate descriptor. Other questions required parents to provide specific details such as the child's birth weight, or the age at which first steps were taken. In some instances, parents were invited to elaborate on their responses. For example, they

were asked to briefly describe their concerns about the child's language development or to specify any medical conditions that the child presented with.

The changes made to the Beirut-Tours Questionnaire led to a substantial reduction in length. In fact, the PaBiQ-IT did not address the child's exposure to languages according to context, current skills in verbal comprehension and expression including speech intelligibility, vocabulary repertoire, grammatical and conversational ability, activities per week in each language and languages spoken at school, among others. The omission of most of these components was motivated by their limited relevance to the target age range or to the focus of the study. In hindsight, however, eliciting an account of the total waking hours spent by each child in different language environments would have provided more detail on the proportion of L1 and L2 exposure that the participants received. Besides current language exposure, questions addressing the sum of children's exposure over each year of life would have supplied useful information on *cumulative* exposure (see Unsworth et al., 2011; Unsworth, 2013). These data would have not only served the purpose of better defining the language input patterns received by each group of participants, but would have also allowed measures of expressive lexicon size to be linked directly to amount of cumulative exposure to each language, leading to more realistic expectations for vocabulary production. Regretfully, these notions only emerged when implementation of our model study was well underway. Appraisal of outcome is therefore not possible, although collection of such information could be considered in future CDI studies involving children receiving bilingual exposure.

The PaBiQ-IT was first developed in English and then translated to other languages[3] (see Appendix 2 for the English version of the questionnaire). COST IS0804 (2011) subsequently developed the PaBiQ, which is a short version of the Beirut-Tours Questionnaire (Tuller & Messarra, 2010) (see Tuller, this volume, for more detail on the PaBiQ). Although our questionnaire was already in use at the time, researchers who joined the investigation at a later stage could choose either version to employ in their language pair study. Methods of completion varied across individual studies. Like the ALDeQ and the ALEQ, the Beirut-Tours adaptation was intended for face-to-face administration to parents, with responses written on the form by the interviewer. This procedure was motivated by the needs of the population on which the tool was initially tested. There were, however, no contraindications for presenting the questionnaire to parents in written format for completion without interviewer intervention. In fact, our questionnaire adaptation for younger children was sent and received by mail, thus requiring unassisted written completion by caregivers, or administered through face-to-face or telephone interviews. Section 2.3 describes the procedure followed in the model CDI study.

2.3 PROCEDURE

In our model study, parents of children aged 24 to 36 months who were exposed to two languages were contacted through immigrant or bilingual communities, associations, websites, newspapers, preschools and population databases. When parents expressed an initial interest in the study, they were sent an information letter and consent form by mail, together with a copy of the vocabulary checklist adaptation/s and PaBiQ-IT or the PaBiQ.

[3] References to language-specific adaptations of the PaBiQ-IT employed in the study can be found in Appendix 1.

Two vocabulary checklists were forwarded for every child, one for each language s/he was exposed to, with the exception of children for whom a vocabulary checklist was available in a bilingual format, in which case one checklist that incorporated both languages was circulated (see Section 2.2.1). For most sub-studies, two versions of the questionnaires were sent, reflecting the target languages. In some instances, however, the questionnaire was forwarded in a single language version which caregivers could respond to with ease. The information letter introduced the aims of the study and described the involvement that it would entail. Parents were invited to complete the checklist and questionnaire if they consented to their child's participation in the study. Contact details of the researcher/s were provided so that specific queries could be clarified. The front page of every vocabulary checklist adaptation included a set of guidelines to assist completion, supplemented by examples that aimed to minimise misinterpretation. It was emphasised that only vocabulary items produced spontaneously were to be reported, conforming to the standard requirement of CDI completion. The forms were to be returned to the researcher/s in the self-addressed envelopes provided or in person, depending on the specific circumstances of the study. Some questionnaires and checklists were completed during face-to-face or telephone interviews. Caregivers could opt for anonymity if they wished, with choice of method of completion being determined by characteristics of the specific participant groups or individuals. Factors such as caregivers' expectations, as laid down by cultural norms, and educational and literacy levels, were taken into account. For instance, if the main caregiver was suspected or reported to present with literacy difficulties, an interviewer's assistance in completing the forms was necessary. The next section outlines the variables yielded for analysis by the vocabulary checklists and

questionnaires. Subsequent papers (in preparation) will review the data emerging from this study.

3. PROPOSED DATA CODING SYSTEM AND ANALYSIS

We describe the data coding system and subsequent analysis adopted in our study to exemplify the implementation of the guidelines outlined above. Data for each language pair were coded separately and then pooled into a common database for collective analyses. A structured approach to the scoring of vocabulary checklist and questionnaire data allowed findings from the individual studies to be collated and compared cross-linguistically. This section describes the measures that would need to be derived from vocabulary and background data to be employed in inter-group comparisons.

3.1 CHECKLIST MEASURES

With bilingual vocabulary measurement being an issue for debate (see Section 1.4), the choice of scoring approach for the present study was far from straightforward. Weighing the various arguments in favour and against total and conceptual scoring led to the conclusion that deriving both TV and TCV scores for each child would

- allow for the possibility of comparing conceptual scores to monolingual norms, depending on availability of the latter
- compensate for the measurement error inherent in conceptual scoring should semantic immaturities be present
- pave the way for identification of a threshold indicating composite lexicon sizes falling at the lower end of the normal range

- enable the derivation of common scores for children having different bilingual backgrounds.

Checklist words available for each language pair, whether on separate or bilingual inventories, were mapped onto each other so that the available translation equivalent pairs were identified. By subtracting the number of translation equivalent pairs from the TV count comprising all available checklist words for each language pair, the maximum TCV score possible for each language pair was established. A relevant technical paper by Pearson (1992) provided these guiding principles for the mapping procedure. Every vocabulary checklist adaptation listed a different number of words, leading to concerns regarding the comparability of raw scores across individual studies. The option of expressing TV and TCV counts for each child as a proportion of the respective maximum scores possible for each language pair was explored. This approach to measurement controlled checklist length effects and allowed cross-linguistic comparison of results. Unexpectedly, however, use of percentage scores also revealed anomalies. Specifically, TCV percentage scores tended to be higher than TV percentages since the TCV counts were often expressed as a proportion of a smaller total. Conversely, when raw scores were considered, TCV was always smaller than TV. These issues led to the conclusion that the computation of raw mean scores was also of value as it allowed deeper insight into the language-specific trends in expressive vocabulary development. Monolingual vocabulary scores were also derived in order to gauge the relative dominance of each of the child's languages. These were then expressed as a percentage of the L1 and L2 vocabulary items available on the respective checklists across language pairs. In instances where the number of L2 checklist words was much smaller than the L1 lexical items, the L2 word proportion

scores turned out to be higher than the percentage of L1 words. Again, this outcome pointed towards the relevance of including mean raw L1 and L2 word counts alongside proportion scores, for a more comprehensive account of children's vocabulary production in each of the languages to which they were exposed.

Not all words reported by parents could be confidently tallied as L1 and L2 words. Initially, a separate coding category was set up for cognate terms, which were identified as words having the same historical language source (Li Wei, 2000) e.g. *mama* and *mummy*. Coding attempts, however, revealed that there were several words other than cognates that could not be assigned L1 or L2 status. It was therefore decided that a more comprehensive count of non-specific language (NSL) words would also be computed for every child. Based on a measure proposed by Gatt (2010), this score represented the sum of

- cognate terms
- homophones, that is, word forms that sound similar in the child's L1 and L2 so that they cannot be clearly attributed to either language; these included onomatopoeic terms that were not language-specific e.g. the sound effect *moo*
- proper nouns e.g. the child's name
- lexical items indicated as family-specific words in the relevant vocabulary checklists. For instance, the CDI: WS and its adaptations flag children's body part names for male and female genital organs as words that vary across families. When ticked, such lexical items could not be counted as L1 or L2 words since the relevant lexical entries do not specify the actual word used by the child.

Lexical items that fitted these criteria were therefore excluded from the L1 and L2 vocabulary counts and tallied separately. The sum of L1 vocabulary, L2 vocabulary and NSL words represented the TV count. Further vocabulary measures were employed to represent the number of lexical items reported in each semantic category (see Table 1 for a list of semantic categories appearing across all vocabulary checklist adaptations). For each child, vocabulary scores were accompanied by background measures that attempted to quantify aspects of the child's development and language input. These questionnaire measures are described in the next section.

3.2 Questionnaire measures

In exploring the clinical significance of low expressive lexicon size in monolingual children, biological factors as well as environmental and social variables assume importance in predicting the risk of persistence of early language difficulties (see Section 1.2). It seems reasonable to expect a similar trend in children exposed to two languages. By complementing lexical scores with additional measures of child-internal and child-external variables, we hoped to enhance the identification of lower levels of vocabulary size that are likely to evolve into persistent language impairments as children grew older. Factoring in data related to variables other than vocabulary size in statistical analyses should help to disentangle language difference from delay, leading to better identification of SLI risk. Thus, it is recommended that measures derived from questionnaire data related to child's gender, birth order, family history of language difficulties, birth weight, health problems (including ear infections) as well as parental concerns about language

development, are used as additional variables in the analysis of lexicon size. With regard to children's ear infections, we opted to code only the questionnaire responses indicating frequent occurrences or otherwise rather than actual number of episodes (see Question 2.8 d) in the PaBiQ-IT, Appendix 2). From the data gathered in our study, we deduced that caregivers would be more accurate when reporting on general rather than specific frequency of occurrence. This coding decision also allowed conformity with the data generated by a similar question in the PaBiQ which was concerned only with the presence or absence of frequent ear infections.

Research studies show parental education and occupation to relate to the outcomes of early vocabulary delays, although the strength of the evidence varies (Section 1.2). Ellis and Thal (2008) hypothesised that the risk for persistent language difficulties grows as the number of associated risk factors increases, which highlights the importance of including all potential factors in the relevant statistical models. Therefore, in our study, the highest level of education achieved by each child's mother and father was also recorded. Parental occupations were coded on the basis of the European Social Survey Round 5 Occupation Codes (Norwegian Social Science Data Services, 2010). An additional code category of 0 was set up to cater for parents who were homemakers or unemployed. It was also decided that for parents currently on maternity or paternity leave, habitual occupation would still be coded if this was reported in the questionnaire. Since there was no question directly addressing this issue, data corresponding to the homemaker category might have included parents fulfilling this role both on a temporary and on a permanent basis.

An additional variable was frequency of the child's exposure to L1 and L2, which was expected to impact directly on the size of children's L1 and L2 vocabularies (see Section

1.5). Since the pattern of bilingual exposure received by each child is likely to account for a proportion of the variance in lexicon size, amount of exposure is a crucial piece of information to include in the analysis of measures. A preliminary attempt at data analysis revealed that more of the available questionnaire measures related to language exposure should be included to better explore their role as variables influencing vocabulary production. Therefore, the frequency of main caregivers' L1 and L2 input was also coded, adding to the information on the extent of children's exposure to each language. This was supplemented by details on the language use patterns in child-directed communicative exchanges and among household members. The latter information sought to gauge the extent of mixing in children's input, so that this could be analysed in relation to the proportions of L1 and L2 employed in children's vocabularies.

We acknowledge that responses to questionnaire items are subject to interpretation by caregivers, particularly when interviewers do not assist completion. A case in point is the range of responses elicited by the question addressing the child's age at initial L1 exposure. Although most caregivers established this to be in the range of 0 and 2 months, others reported the ages of 6 to 9 months, which seems to be a highly unlikely occurrence. It might have been the case that parents were interpreting this question as to when the child began to respond to or use language as opposed to being exposed to language, which happens from birth. Such responses point to the need for a caveat concerning the accuracy of questionnaire responses completed independently by caregivers. Although assisted completion would be likely to enhance the reliability of questionnaire data, the involvement of interviewers would considerably increase the demands on human

resources required for data collection. We therefore suggest that researchers attempt to balance accuracy and feasibility in the design of similar studies.

4. Conclusion

The present chapter's motivation was primarily methodological, in that it intended to provide a discussion of variables and measures which should be considered when lexical thresholds for identifying early language delays in children exposed to specific language pairs in different bilingual contexts are to be identified. We have documented tried and tested solutions to methodological problems arising in the cross-linguistic investigation of early lexical acquisition in children receiving bilingual exposure, conducted within the framework of COST Action IS0804. The course of action described in this chapter hopes to represent a feasible proposal for unravelling the effects of bilingual development and core language-learning difficulties on productive vocabulary skills. Moreover, the reported methodology represents a cross-linguistic endeavour that tests the universality of identified thresholds across various language pairs. The considerations outlined in this chapter hope to guide the design of further cross-linguistic studies that address early lexical development in bilingual contexts, with the aim of producing a wider range of bilingual norms that facilitate identification practices. Objective thresholds that guide the prompt detection of risk for persistent bilingual impairment should instil confidence in decisions regarding the provision of early intervention services. For young children struggling to acquire the two languages they are exposed to, this represents an important step towards diminishing the adverse effects of continuing deficits.

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APPENDIX 1

ADAPTATIONS OF THE MACARTHUR-BATES COMMUNICATIVE DEVELOPMENT INVENTORIES (CDI)

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ADAPTATIONS OF THE PABIQ (SEE TULLER, THIS VOLUME) AND PABIQ-IT

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APPENDIX 2

QUESTIONNAIRE FOR PARENTS OF BILINGUAL CHILDREN: INFANT AND TODDLER VERSION (PABIQ-IT)*

To be completed by the child's main caregiver i.e. the person who spends most time with the child

Please specify your relationship to the child e.g. mother, father, grandmother etc. _____

Today's date _____

1. General Information about the Child

1.1 Birth Date: _____1.2 Place of birth: _____

1.3 If place of birth is not country of residence, date of arrival in country of residence: _____

1.4 Gender: MALE or FEMALE (please circle)

1.5 Birth order (please circle): 1st born (oldest) 2nd born 3rd born 4th born 5th born 6th born

1.6 Brothers and/or sisters (if any):

Birth order	Birth date	Sex (Male/Female)
1st born (oldest) brother or sister		
2nd born brother or sister		
3rd born brother or sister		
4th born brother or sister		
5th born brother or sister		

2. Child's developmental history

2.1 Were there any complications during pregnancy/at birth? YES or NO

If YES, please specify. _____

2.2 What was your child's birth weight? _____

2.3 How old was your child when he/she first walked? _____

2.4 How old was your child when he/she spoke his/her first word? _____

2.5 Does your child put words together to make short sentences? YES or NO

2.6 Do you have any concerns about your child's language? YES or NO

If YES, please describe briefly.

_____

2.7 Does your child present with any medical conditions? YES or NO

If YES, please specify.

_____

2.8 Has your child experienced:

a) Frequent colds: YES or NO b) Hearing loss: YES or NO c) Allergies: YES or NO

d) Frequent ear infections: YES or NO

If YES, how many ear infections did your child experience over the past year? 1 2 3 4 5 6

e) Grommet insertion: YES or NO

f) Other (specify): _____

* Short version of the Beirut-Tours Questionnaire (Tuller and Messarra, 2010), adapted from J. Paradis' (2007) ALEQ and ALDeQ questionnaires

2.9 Is your child exposed to:

	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X					
Language Y					
Other (specify)					
Other (specify)					

	Score/4
X	
Y	
Other	
Other	

2.10 At what age did this exposure begin?

	Age in months
Language X	
Language Y	
Other (specify)	
Other (specify)	

3. Languages used with and by the child

3.1 Main caregiver e.g. mother, father, grandparent. State your relationship to the child here _____

	Language YOU use with CHILD					**Language CHILD uses with YOU**				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other (specify)										
Other (specify)										

3.2 Does another adult regularly take care of your child (e.g. grandparent, babysitter, day care staff)? YES or NO

If YES, specify who this person is here _____ and complete the table below.

Use additional tables in Appendix (p.5) if other adults regularly take care of the child.

Language used by OTHER REGULAR CAREGIVER with CHILD						**Language used by CHILD with OTHER REGULAR CAREGIVER**				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other (specify)										
Other (specify)										

3.3 For each child in the family, complete a separate table. *Use additional tables in Appendix (p.6) if necessary.*

Language used by BROTHER/SISTER 1[4] with CHILD						**Language used by CHILD with BROTHER/SISTER 1**				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other										
Other										
Language used by BROTHER/SISTER 2[5] with CHILD						**Language used by CHILD with BROTHER/SISTER 2**				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other										
Other										

[4] Brother/sister 1 refers to the 1st born brother/sister in the table on page 1 (Section 1.5)
[5] Brother/sister 2 refers to the 2nd born brother/sister in the table on page 1 (Section 1.5

3.4 Tick the descriptor which best summarizes the language exposure pattern typically received by your child.

Language use DIRECTED TO CHILD	√
Language X only	
Mostly Language X with some Language Y words	
Approximately equal proportions of Language X and Language Y	
Mostly Language Y with some Language X words	
Language Y only	
Language X, Language Y and additional language/s	

3.5 Tick the descriptor which best summarizes the language pattern typically used in the child's home

Language use AMONG FAMILY MEMBERS	√
Language X only	
Mostly Language X with some Language Y words	
Approximately equal proportions of Language X and Language Y	
Mostly Language Y with some Language X words	
Language Y only	
Language X, Language Y and additional language/s	

4. Information about the child's mother and the father

4.1 Information about the mother

4.1.1 In which country and region (if applicable) were you born? _____

4.1.2 Are you currently working? YES or NO

If yes, what is your job? Where do you work? _____

4.1.3 Education:

		Number of years	**Further information**
Primary school	Yes / No		
Secondary school	Yes / No		
University	Yes / No		
Other professional training	Yes / No		

4.2 Information about the father

4.2.1 In which country and region (if applicable) were you born? _____

4.2.2 Are you currently working? YES or NO

If yes, what is your job? Where do you work? _____

4.2.3 Education:

		Number of years	**Further information**
Primary school	Yes / No		
Secondary school	Yes / No		
University	Yes / No		
Other professional training	Yes / No		

5. Difficulties

In each cell, please indicate YES or NO

	Child's siblings (any)	**Mother**	**Father**	**Father's family**	**Mother's family**
Difficulties at school					
Difficulties mainly with reading and spelling					
Repeated one or more grades in school					
Difficulties understanding others when they speak					
Difficulties expressing oneself orally (pronunciation, forming sentences, finding the right word, etc.)					

Appendix

Languages used with and by the child

For any other adult taking care of the child regularly, fill in the table and specify their relationship to the child (e.g. grandparents etc.) here: ADULT 1 = _____ (state relationship to child)

ADULT 2 = _____ (state relationship to child)

ADULT 3 = _____ (state relationship to child)

Language used by ADULT1 with CHILD						**Language used by CHILD with ADULT 1**				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other										
Other										
Language used by ADULT2 with CHILD						**Language used by CHILD with ADULT 2**				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other										
Other										
Language used by ADULT3 with CHILD						**Language used by CHILD with ADULT 3**				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										

	Language used by ADULT1 with CHILD					Language used by CHILD with ADULT 1				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Other										
Other										

For any other child in the family, please fill in the relevant table.

	Language used by BROTHER/SISTER 3[6] with CHILD					Language used by CHILD with BROTHER/SISTER 3				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other										
Other										

	Language used by BROTHER/SISTER 4[7] with CHILD					Language used by CHILD with BROTHER/SISTER 4				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other										
Other										

[6] Brother/sister 3 refers to the 3rd born brother/sister in the table on page 1 (Section 1.5)
[7] Brother/sister 4 refers to the 4th born brother/sister in the table on page 1 (Section 1.5)

	Language used by BROTHER/SISTER 5[8] with CHILD					Language used by CHILD with BROTHER/SISTER 5				
	0 Never	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**	**0 Never**	**1 Rarely**	**2 Sometimes**	**3 Usually**	**4 Always**
Language X										
Language Y										
Other										
Other										

[8] Brother/sister 5 refers to the 5th born brother/sister in the table on page 1 (Section 1.5)