

Research paper

THE DEVELOPMENT OF EARLY EXPRESSIVE VOCABULARY IN CHILDREN WITH DOWN SYNDROME

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Abstract. A delay in expressive language in children with Down Syndrome (DS) is common, and often a major challenge of the condition. This study aimed to investigate the early expressive vocabulary skills of Maltese children with DS, whose first languages were either Maltese or English, while taking into account chronological age. Language preference was further explored in the context of a bilingual environment. A multi-method design was implemented across seven participants whose language abilities ranged from the expression of single words in isolation to simple word combinations. The expressive vocabularies of four boys and three girls between 2;10 and 11;9 years were assessed through caregiver report, picture naming and language sampling. Performance of the children was analysed in relation to local findings on lexical production in typically-developing children. The study revealed that productive vocabularies of Maltese bilingual children with DS escalated with increasing age, notwithstanding inevitable individual variation.

Keywords: lexical development, Down Syndrome, bilingual, expressive vocabulary

1 Introduction

Down Syndrome (DS) is a chromosomal disorder caused by a third copy of chromosome 21 (Grant et al., 2010). The disorder is typically associated with physical and cognitive deficits, which may affect speech, language and communication at large (Kumin, 2003). Characteristics that impact communication include macroglossia, oro-motor hyper- or hyposensitivity, and intellectual disability (Kumin, 2003). Hearing loss as a result of recurring ear infections is common, which may delay the processing of complex auditory stimuli (Rondal, 2009). Moreover, impaired auditory-vocal short-term memory is known to account for limitations in lexical learning among children with DS (Jarrold, Nadel & Vicari, 2007).

Lexical, or vocabulary, acquisition makes up an integral part of language learning, and is ultimately a prerequisite for the development of other language domains (Gatt, Grech & Dodd, 2013). Rondal (2009) identified a delayed onset of babbling by two to three months in infants with DS, with the production of single words tending to emerge between two and three years. Hence, a significant delay is evident when considering the onset of expressive language in typical

development (Galeote et al., 2008). Children with DS present with limited pre-linguistic skills, namely eye contact, joint attention and functional playing skills (Kumin, 2003), which may contribute to their delayed lexical acquisition. Moreover, Feltmate and Kay-Raining Bird (2008) found receptive language skills to be a strength in language development, while expressive language was delayed.

Structural differences in the input languages received are expected to affect vocabulary development in typically-developing (TD) children exposed to varying language contexts. For example, in their study on TD Italian- and English-speaking children aged 0;8 to 1;4 years, Caselli et al. (1995) found no discrepancy in the onset and development of major grammatical categories, including nouns and verbs, but identified a slower rate of overall vocabulary growth in Italian children.

Differences in language development related to linguistic input received are expected across children with DS. In the context of bilingual input, Rondal and Buckley (2003) hold that the language pairs to which children with DS are exposed may also impel variation in lexical development. Likewise, differences in rate of lexical acquisition in TD children have been attributed to the language pair being learnt (Thordardottir et al., 2006). Importantly, Rondal (2009) claims that children with DS are capable of exhibiting features of bilingual competence. Feltmate and Kay-Raining Bird (2008) found first language (L1) proficiency to be similar in monolingual and bilingual children with DS, since both groups presented with equivalent receptive skills and expressive language delays. This indicates that bilingual exposure should not have a detrimental effect on language development in children with DS.

Children with DS growing up in Malta are exposed to societal bilingualism. The functional use of two linguistic codes occurs at a societal level, since both Maltese and English are official languages (Gatt, Letts & Klee, 2008).

The Down Syndrome Association Malta (2009) reported an average of 12 births with DS per year in Malta. Norms for typical lexical development have not yet been established for Maltese children, although developmental trends for expressive lexical acquisition have been investigated (Gatt et al., 2013), providing reference measures that allow more objective analysis of expressive lexical skills identified in Maltese children with DS.

This study is driven by the following research questions:

- How do Maltese children with DS perform on measures of expressive vocabulary?
- How does chronological age affect expressive vocabulary size in Maltese children with DS?
- What proportions of Maltese and English words are employed in these children's expressive vocabularies?
- To what extent do grammatical categories (content and function words) feature in their expressive vocabularies?

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2 Methods

2.1 Participants

Seven Maltese children with DS participated in the study. Two boys and one girl were English-dominant, while two boys and two girls were Maltese-dominant. The selection criteria were a diagnosis of DS, the linguistic level of each child¹ and primarily Maltese or English exposure. Table 1 lists the salient characteristics of the participants, who were identified and approached via their speech-language pathologists (SLPs). Permission to collect data was obtained from the Primary Health Care, Speech-Language and Education Departments in Malta prior to assessment. Ethical approval was obtained from the University of Malta Research Ethics Committee (reference number 029/2013).

Table 1. Participant characteristics depicted by gender, age, first language (L1) and venue of testing for each child (C)

C	Gender	Age (years; months)	L1	Venue
1	Male	2;10	English	District clinic
2	Male	4;4	Maltese	District clinic
3	Female	4;5	Maltese	District clinic
4	Male	4;5	English	District clinic
5	Male	5;4	Maltese	State school
6	Female	8;5	Maltese	District clinic
7	Female	11;9	English	District clinic

2.2 Research design and procedure

A methodological design comprising three methods for measuring lexical expression, namely parental report, picture naming and language sampling, was employed. A triangulation of methods was preferred to validate vocabulary data and avoid methodological bias (Bogdan & Biklen, 2006). Structured interviews targeting parents or guardians were also used to obtain background information on each child's general and language development. The duration of each session was approximately 15 to 20 minutes.

2.2.1 Parental report

Hoff (2012) found parent-based instruments to be widely used in the assessment of children's emerging vocabulary. Gatt et al. (2013) also claimed that parent-based information facilitates the process of identification of early vocabulary delays. A parent-based measure of the participants' expressive vocabulary skills was obtained through the use of a vocabulary checklist (VC), which is described in detail in the next section.

2.2.1.1 Vocabulary checklist

A detailed overview of each child's expressive vocabulary was obtained by using an adaptation of the VC of the first edition of the MacArthur Communicative Development Inventory: Words and Sentences (CDI: WS) (Fenson et al., 1993) for Maltese children, as formulated by Gatt (2010).

1 Each participant was able to produce at least single words, with simple word combinations being the upper limit considered.

The adaptation included both Maltese and English lexical items across 24 semantic categories, as well as words that are not considered Maltese- or English-specific, such as onomatopoeic sounds and across-language homophones (e.g. 'blue' and 'blu'). These words are referred to as Generic words in this study. The VC was given to the primary caregiver of each participant. Caregivers were expected to recognise and mark the lexical items produced spontaneously by the participants, while words not provided in the checklist were to be added in the recall section, as specified in the VC, following each semantic category.

The VC score, representing the total number of reported words, was broken down into smaller component scores. The first component score consisted of a differentiated sum of recognised and recalled words spontaneously produced by the child. The second was based on language classification of words as Maltese, English and Generic. A percentage of language classification scores across participants was calculated. Content words² and function words³ were then identified with reference to a classification system formulated by Gatt (2010).

2.2.2 Structured assessment

Gatt, Grech & Dodd (2014) hold that informal structured assessment tools are ideal alternatives to standardised tests in contexts where norms of early language development are not available. A structured, informal picture naming task (PNT) formulated by Gatt (2010) provided supplementary information on the children's vocabulary skills via direct assessment.

The PNT consisted of a booklet containing 18 coloured graphical representations of everyday objects, namely a ball, car, cat, baby, pair of shoes, dog, doll, aeroplane, telephone, glass, bicycle, egg, guitar, bird, spoon, hat, flower and comb. The picture items were revealed to the children by their caregiver or SLP, to avoid risks of performance anxiety due to unfamiliarity with the researcher. Their responses were recorded orthographically on a score sheet and also phonetically if deemed necessary by the researcher, namely when responses lacked intelligibility. An audio recording was obtained to support manual transcription and to ensure accuracy. Following analysis, a raw score of the number of items labelled appropriately and independently was computed. Percentages of Maltese, English and Generic words were then calculated across participants.

2.2.3 Language sampling

Language sampling allows deeper analysis of language use in unrestricted contexts (Shipley & McAfee, 2004). Moreover, naturalistic sampling is known to provide a measure of the child's "expressive potential" (Gatt et al., 2014). In the current study, language samples (LS) were obtained during a 10-minute play situation using a standard set of toys comprising a set of farm animals, namely a horse, pig, cow, sheep, donkey and goat, two bales of hay and a gate.

The LS was audio-recorded and transcribed orthographically, post-session, to determine the spontaneous production of lexical items in relation to the toys provided. Words produced on imitation were not considered. The utterances of each child were split into single words and tabulated in alphabetical order. In this way, the researcher was able to calculate the total number of words spoken on different occasions within each sample, to determine the token count. Words expressed more than once by the participant were grouped to calculate the number of different words used (types) by the child. Based on type counts, the proportions of Maltese, English and Generic word types were then calculated.

2 Words that refer to particular objects, attributes or actions such as nouns, adjectives or verbs.

3 Words that represent grammatical relationships between words and contribute to sentence structure, such as pronouns, prepositions and conjunctions.

2.2.4 Structured interviews

Besides the methods and instruments described above, intended to provide measures of the participants’ expressive vocabularies, structured interviews based on a background questionnaire for bilingual children (BQ) were intended to provide information on the participants’ general and language development. Frattali (1998) acknowledges the significance of using adult informants in measuring child development and disability. A structured face-to-face interview using the BQ was therefore administered to the primary caregiver of each child to gain insight on participants’ developmental milestones, hearing and feeding abilities, education and language exposure patterns, with the latter section adapted from the Language Background Questionnaire formulated by Gatt (2010). Specific focus was placed on the languages with which participants were addressed at home and school, as well as exposure through the media. This was intended to provide an outlook on the language environment of each child, which also allowed the analysis of vocabulary measures in context. During each interview, the child was left to interact with his/her SLP.

2.2.5 Data coding and measures

The total scores obtained in the VC, PNT and LS were analysed to determine the total vocabulary (TV) per participant. The TV was expressed in terms of overlapping and non-overlapping scores. The overlapping score consisted of the sum of all the words counted in each assessment measure (including the total number of words (tokens) produced in the LS), irrelevant of multiple occurrences across datasets, to provide insight on the talkativeness of each child. The non-overlapping count consisted of a composite score, which was made up of the number of different words available in the child’s vocabulary. Words reported more than once were computed in terms of a matching score, which evidenced the number of repeated words.

Similar performance across methods further confirmed validity and objectivity of findings. An auxiliary observer was employed to inter-transcribe a LS chosen at random, to verify the consistency and accuracy of transcripts, as suggested by Lammie Glenn et al. (2010). Agreement was 87% for tokens and 96% for types in the sample.

2.2.6 Data analysis

Analysis of data combined a quantitative approach using descriptive statistics to explore common trends in the participant group, and a qualitative account of individual performance. A tentative comparison with lexical development trends identified in TD Maltese children (Gatt, 2010) was also attempted.

3 Results

3.1 Individual analyses

C1, a boy who was primarily English-speaking, was 2;10 years at the time of testing. His expressive language profile consisted of a combination of key-word signing (based on Maltese sign language) and single words, many of which were not yet fully intelligible. According to the BQ, C1 attended an independent kindergarten school twice weekly. Exposure to television and stories was conveyed in English. C1 achieved a composite non-overlapping TV score of 19 words across the three assessment measures, which consisted mainly of English (55%) and Generic words (45%). A total of 10 content words and two function words were reported in the VC. Familiarity with colour terms was evident. Unintelligibility in the production of words was reported in the VC and also observed in the PNT. C1 often pointed at picture items and produced the social word ‘there’, instead of labels (see Table 2). Only one word was reported twice across measures, resulting in a matching score of 1. No evidence of expressive lexical items emerged in the LS.

Table 2. Performance on the picture naming task (PNT) per participant

Picture item	C1	C2	C3	C4	C5	C6	C7
Ballun/ball	✓	✓	✓	✓	✓	✓	✓
Karozza/car	there	✓	✓	✓	✓	✓	✓
Qattus/cat	NR	✓	miauw	NR	✓	✓	✓
Tarbija/baby	there	✓	✓	✓	✓	✓	✓
Zarban/shoes	NR	✓	✓	boots	✓	✓	✓
Kelb/dog	there	✓	✓	✓	NI	✓	✓
Pupa/doll	there	✓	pupi (dolls)	✓	✓	✓	✓
Ajruplan/aeroplane	✓	✓	✓	✓	NI	✓	✓
Telephone	✓	NI	✓	hello	✓	✓	✓
Tazza/glass	there	✓	KWS	drink	P	jar	NR
Rota/bicycle	there	✓	✓	NI	✓	✓	✓
Bajda/egg	there	✓	P	✓	✓	✓	✓
Kitarra/guitar	there	NR	NR	✓	✓	✓	✓
Ghasfur/pappagall/bird/parrot	✓	✓	✓	chicken	✓	✓	✓
Kučċarina/mgharfa (tea/table) spoon	P	NR	✓	✓	NI	✓	✓
Kappell/hat	NR	✓	✓	✓	✓	✓	✓
Fjura/flower	there	NI	✓	✓	✓	✓	✓
Petne/comb	NR	brush	xaghri (my hair)	✓	P	✓	brush

Key: NR = no response; NI = not intelligible; KWS = key-word signing; P = prompted; ✓ = correct response

C2’s language profile at 4;4 years consisted of simple word combinations, which reportedly emerged at approximately three years of age. He had one older sister who was TD. He attended a state school where both Maltese and English were used interchangeably. The child’s L1 was Maltese, although the incorporation of some English words in his repertoire was reported. Television programmes and story-telling were mostly provided in English. C2 achieved the highest composite score of 341 words among children in his age group (C3 and C4), of which 61% were Maltese, 16% English and 23% Generic. Maltese words were observed more frequently in the VC and PNT data than in the LS. The knowledge of both Maltese and English word forms to represent particular items, such as ‘ball’ and ‘ballun’, was reported in the VC. The child was observed to spontaneously label the picture of a ball in Maltese in the PNT. A total of 301 content words were reported in the

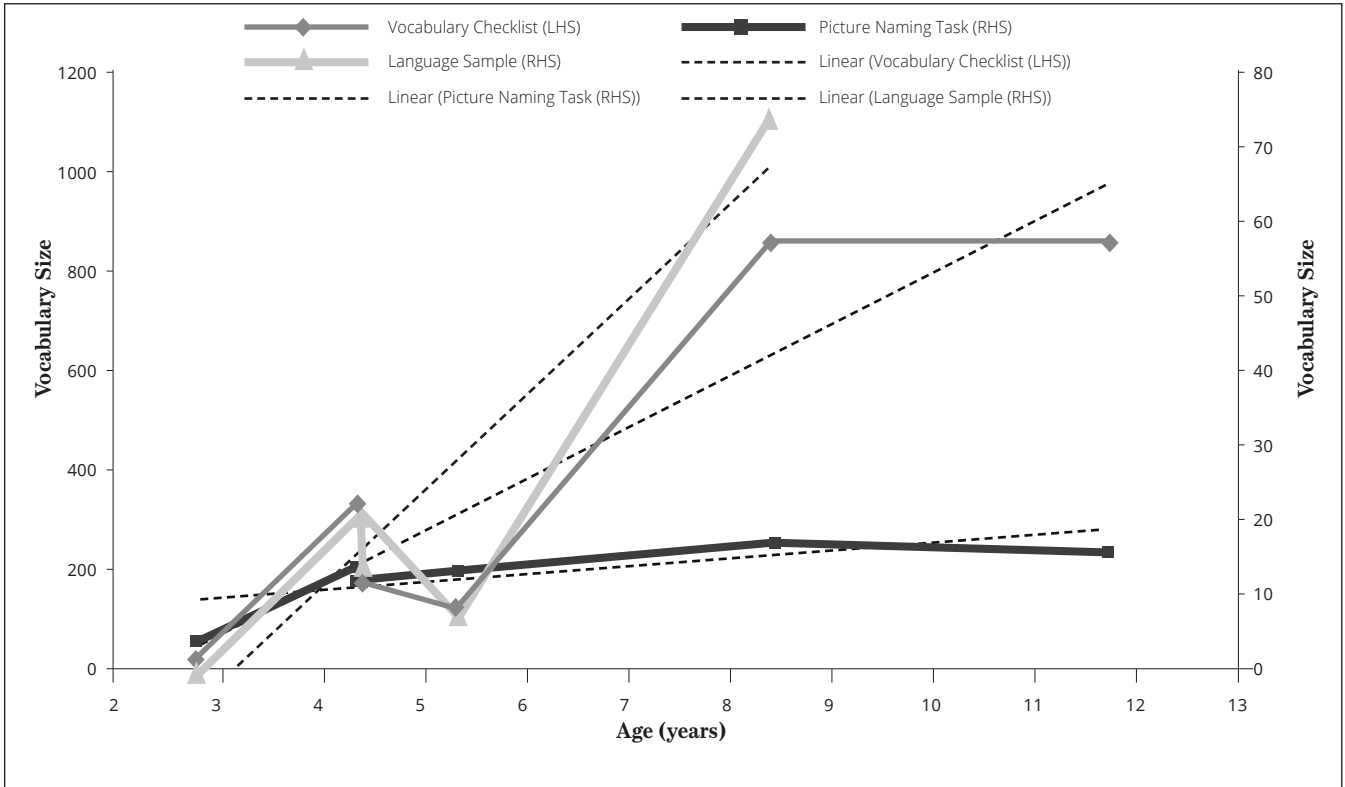


Figure 1. Vocabulary measures obtained through the vocabulary checklist (VC) plotted against the left hand side (LHS), and the picture naming task (PNT) and language sample (LS) plotted against the right hand side (RHS), including linear trend lines for the progression of vocabulary size across ages

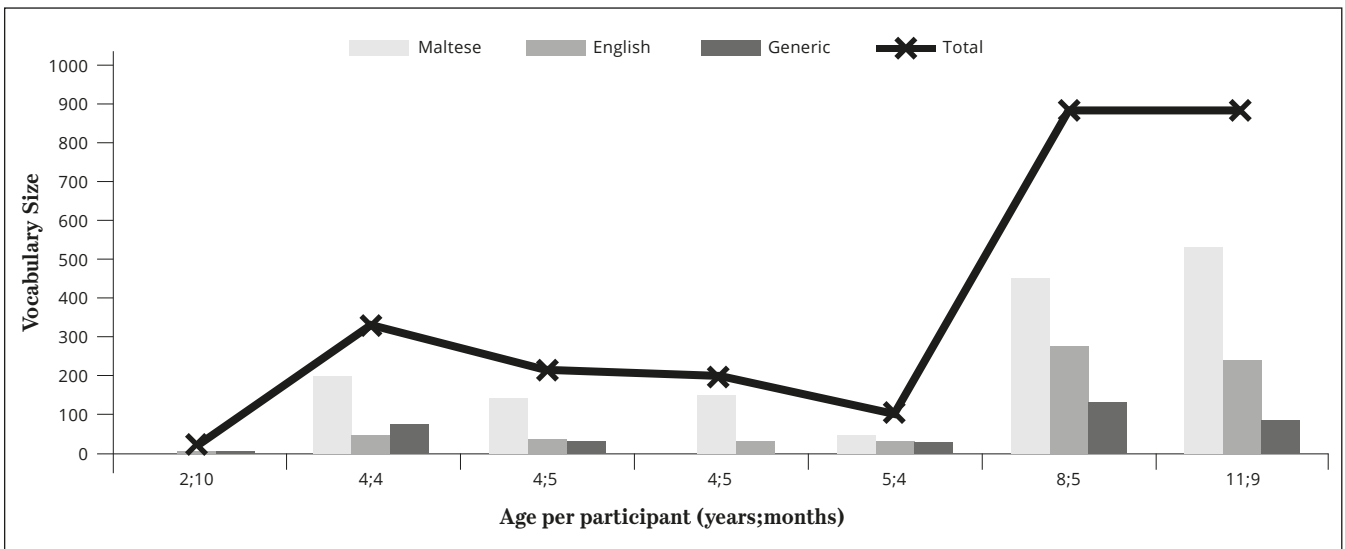


Figure 2. Total number of recognised and recalled words in the vocabulary checklist (VC), including language classification according to Maltese, English and Generic words, for each participant

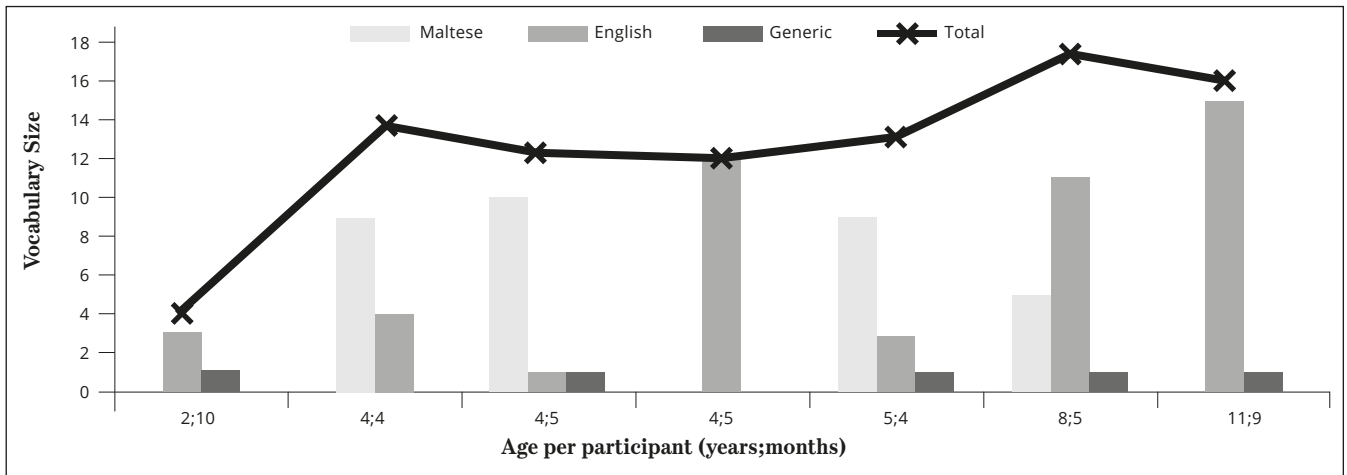


Figure 3. Total number of target words scored in the picture naming task (PNT), including language classification according to Maltese, English and Generic words for each participant

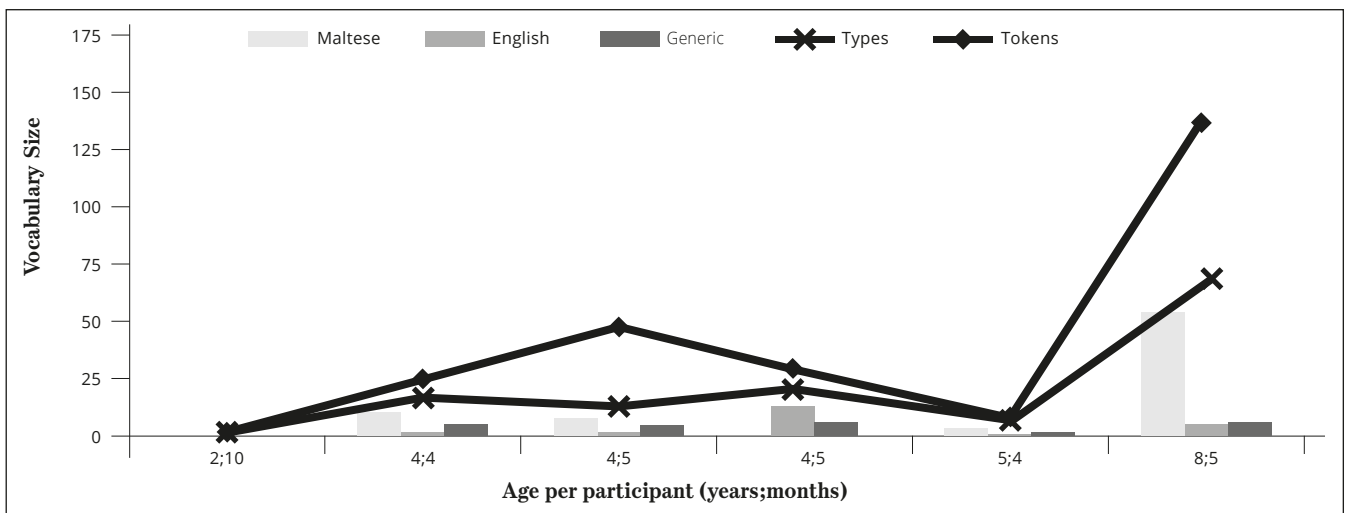


Figure 4. Number of types and tokens recorded in the language sample (LS), including language classification according to Maltese, English and Generic words for each participant

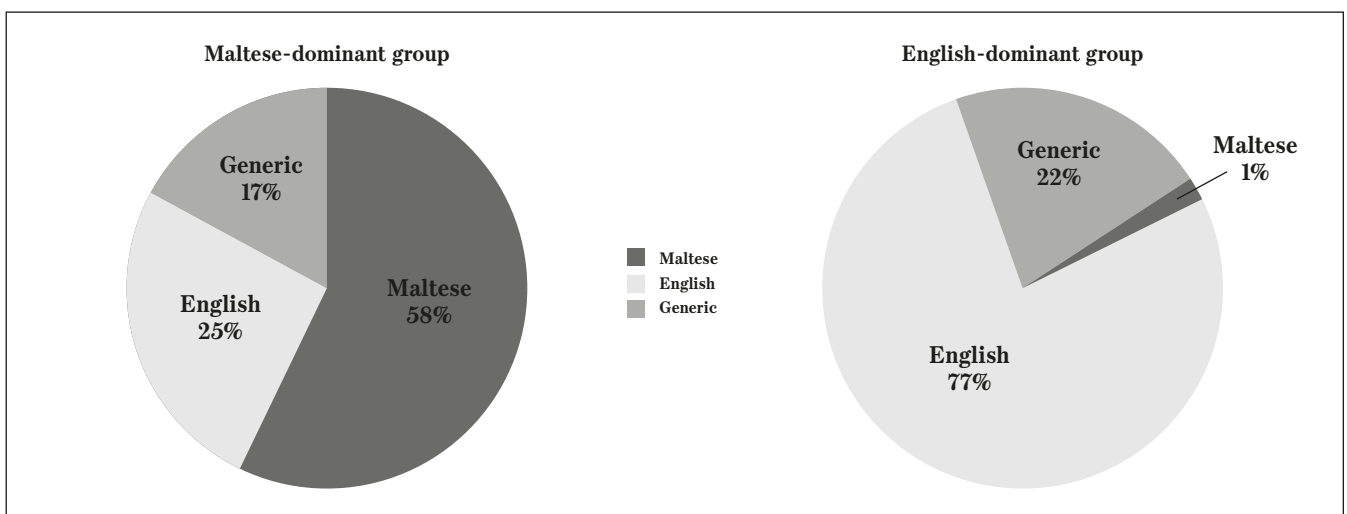


Figure 5. Percentage of words spoken according to different language classes for Maltese-dominant (N = 4) and English-dominant (N = 3) groups

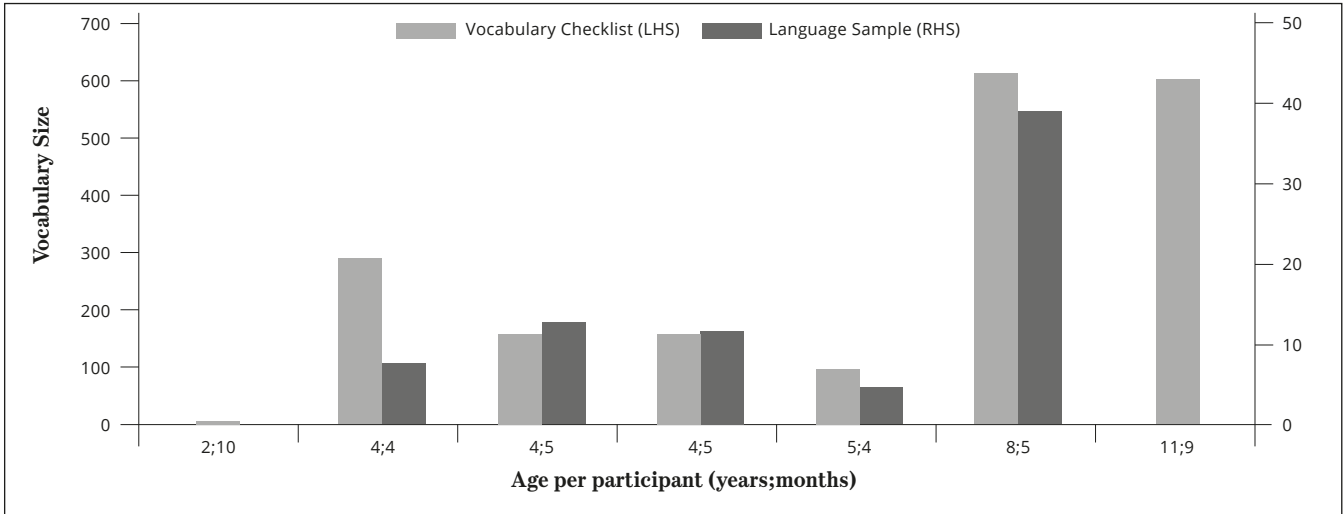


Figure 6. Content words recorded for each participant, with the vocabulary checklist (VC) scores plotted against the left hand side (LHS) and language sample (LS) scores plotted against the right hand side (RHS)

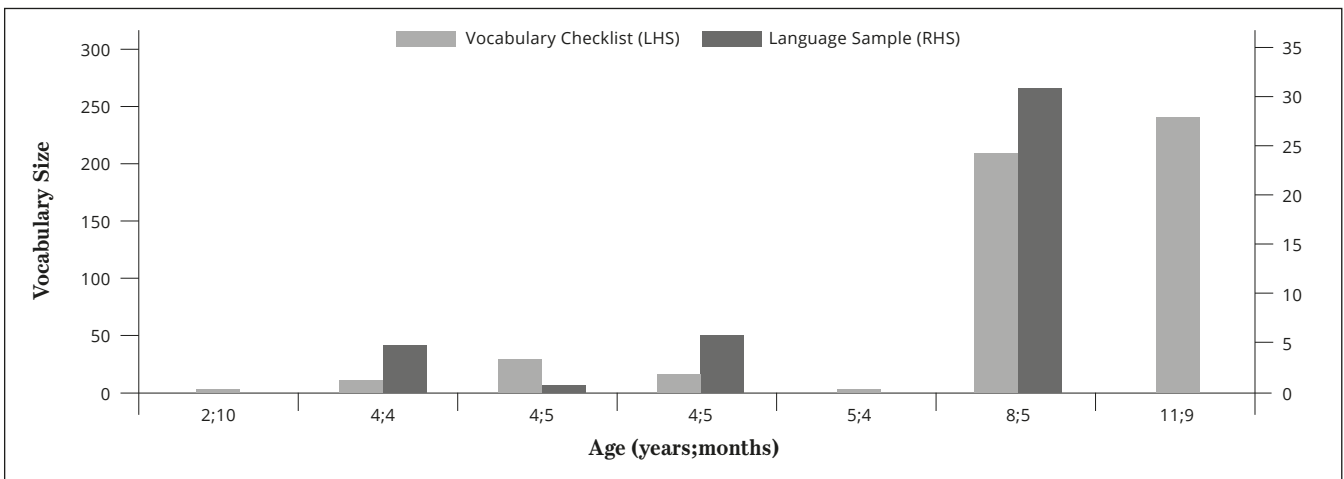


Figure 7. Function words recorded for each participant, with the vocabulary checklist (VC) scores plotted against the left hand side (LHS) and language sample (LS) scores plotted against the right hand side (RHS)

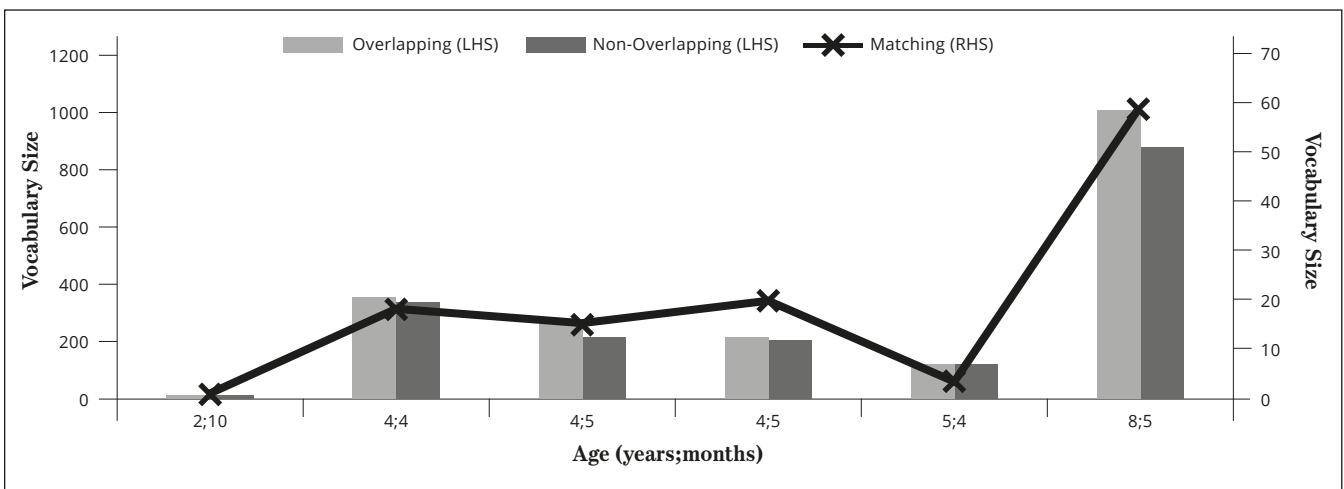


Figure 8. Total vocabulary (TV) including overlapping and non-overlapping scores plotted against the left hand side (LHS), and matching scores for each participant plotted against the right hand side (RHS)

VC, and eight in the LS. Thirteen function words including pronouns were identified in the VC, while an example ('*bhalu*') was expressed in the LS. A matching score of 18 was calculated across all three vocabulary measures.

C3, a 4;5-year-old girl, was primarily Maltese-speaking. The use of some English words was reported to be inevitable within the home setting. There was also some exposure to Italian television. C3 attended a state school where Maltese was the LI. Story exposure often varied between Maltese and English. C3 showed a TV of 225 words, with a percentage of 69% Maltese, 16% English and 15% Generic components. Despite minimal exposure to Italian, no spontaneous expression in this language was recorded. The VC data comprised recognised words only, with no words added in the recall section. A preference for Maltese was observed for verbal labelling during direct assessment, with only one word on the PNT and two words in the LS produced in English. The use of social (onomatopoeic) words was common in the LS e.g., the production of a clicking sound to represent 'horse'. Many of the sound effects sampled were correspondingly marked in the VC. Despite the production of various sounds to represent words, 169 content words were still recorded in the VC and 13 in the LS, while 31 function words were marked in the VC and only one was produced in the LS. The production of function words reported in the VC was not observed in the LS. Repetition of words was common in the LS, with 16 types and 48 tokens calculated. A matching score of 18 across assessment measures was identified.

C4, a 4;5-year-old boy, had one older TD brother. His first word was spoken at approximately 2;0 years and word combinations were emerging. Feeding problems, including aspiration and chewing difficulties, had been a hurdle in C4's development. These were under control at the time of data collection. The child's LI was English. However, both Maltese and English were used at the state school he attended. Media exposure consisted of English. A TV of 216 words was recorded across measures, of which 79% were English, 20% Generic and only 1% Maltese. The lowest percentage translated into the use of two Maltese words recognised by the caregiver in the VC, namely '*nanna*' and '*nannu*', which the child employed to refer to his grandparents. Content words totalled 164 in the VC and 12 in the LS, while the 17 function words reported in the VC were not observed among the six words counted in the LS. A matching score of 19 was calculated across the VC, PNT and LS.

C5, a boy aged 5;4 years, had two older TD sisters aged approximately seven and 10 years. C5's family was primarily Maltese-speaking, although mixing of Maltese and English within the home setting was common. Mixing was reported to be more evident in the first two years of C5's life, prior to enrolment in a state school. Adequate comprehension of both Maltese and English was reported, while verbal expression consisted mainly of Maltese with the inclusion of some English words. Television and stories comprised visual exposure through non-verbal programmes and picture books. Across measures, 130 spoken words were calculated for C5, of which 48% were Maltese. English and Generic components both amounted to 26%. The VC revealed the Maltese production of '*ballun*' (ball). The word 'ball' was not recognised by the caregiver in the VC, yet was expressed in English on the PNT. In the VC, 105 content words and four function words were reported. The LS revealed five content words and no use of function words. The VC showed the child's tendency to use sounds to represent animals, which was also noted in the LS. Evidence of C5's knowledge of words to represent animals also in Maltese was observed. A total of three matching words were counted.

C6, a girl of 8;5 years, was approximately 2;6 years old when she spoke her first word. The child attended a Church school where English was the primary language of exposure with limited inclusion of Maltese. The latter, however, was the child's LI. C6's parents agreed that she was able to use both languages adequately to communicate her needs. Television and DVDs were provided in English, while exposure to stories took place in both languages. A TV of 953 spoken words was estimated across measures, comprising 55% Maltese, 31% English and 14% Generic words. The words calculated in the VC and LS consisted

mainly of Maltese items, while the PNT revealed a majority of English words. The VC showed the use of 628 content words and 210 function words. In the LS, 40 content words and 31 function words emerged. A matching score of 61 was calculated.

C7 (11;9 years) spoke her first word at around two years of age and began to form single word combinations at approximately four years. Maltese was reportedly used more than English among family members within the first few years of her life, yet English was considered her LI. C7 attended an independent school, which was also primarily English-speaking. Language exposure thus consisted mainly of English with the use of some Maltese words during communicative exchanges as well as television and story-telling exposure. A total of 878 words were calculated, based on the VC and PNT (61% Maltese, 29% English and 10% Generic words). A majority of Maltese words was recorded in the VC. No words were expressed in Maltese during the PNT. The VC revealed the use of 622 content words and 240 function words. No scores were available for the LS due to technological failure of the recording equipment.

3.2 Group analysis

Descriptive statistics showed that the number of spoken words gradually increased with participant age, particularly for participants beyond the ages of four to five years (Figure 1). A breakdown of language classification in terms of the total number of words recognised and recalled on the VC shows that 54% of the words reported were Maltese, 31% English and 15% Generic (Figure 2). Participant vocabulary grew by an average of 103.5 words per yearly increase in age, with the sharpest improvement at 8;5 years. Figure 3 depicts 38% of the words expressed in the PNT as Maltese, while 56% were English and 6% Generic. An average increase of one picture recognised per year was calculated. Based on a total possible raw score of 18 on the PNT, the highest score (94%) was achieved at 8;5 years of age, while an equal score of 67% was obtained by the two 4;5-year-olds. Participants aged 4;4 and 5;4 years achieved an equal score of 72%. Based on the computed type counts, the words produced in the LS were mostly Maltese (62%), followed by Generic (20%) and English (18%) words respectively (Figure 4). An average increase of 12.8 different words per year for the participant group was identified. A decline in spoken words was observed at 5;4 years, while a sharp increase was evident from this age up to 8;5 years. Generally, an increase in the number of different words produced by a participant was coupled with a comparable increase in tokens. The Maltese-dominant group (C2, C3, C5, C6) appeared to use a higher percentage of English words than the English-dominant group (C1, C4, C7) used Maltese words, with a difference of 24% (Figure 5). Comparable percentages of Generic words were spoken in both groups. A larger number of content words than function words was calculated in the VC than in the LS (Figure 6). A marked increase in content words, identified at 4;4 years, was interrupted by a gradual decrease until 5;4 years and once again exploded up to 8;5 years. More function words in the VC than in the LS were evident (Figure 7). A considerable difference in overlapping and non-overlapping vocabulary scores was evident in the maximal calculated TV, with a matching score of 61 represented at 8;5 years (Figure 8). The smallest composite vocabulary (TV) was identified in the youngest participant, followed by participant C5 aged 5;4 years.

4 Discussion

This study aimed to investigate early lexical production skills of bilingual Maltese children with DS. Findings showed that vocabulary grew with participant age, corresponding with findings for TD Maltese children aged 1;0 to 2;6 years (Gatt, 2010). More specifically, a considerable growth in vocabulary development beyond four and five years was identified.

Parent-reported information showed first words to appear at an average age of 2;3 years. This corresponded with findings from

Berglund, Eriksson and Johansson's (2001) study, where the onset of lexical acquisition varied between the ages of one and two years in children with DS. While the VC indicated a TV of 19 different words in the youngest participant (2;10 years), Oliver and Buckley (1994) estimated a comparable number of approximately 24.4 words spoken at 2;6 years, also according to parent-reported information. In the current study, the largest improvement across vocabulary measures was prominent at 8;5 years and no advancement at a higher age point was evident. The participant with the widest vocabulary appeared to be the most talkative, which corresponded with Gatt's (2010) findings and hence confirmed the phenomenon of wider expressive vocabularies among more talkative children.

One must keep in mind that classification of words according to their grammatical features is difficult in early lexical development (Caselli et al., 1995). The grammatical categories probed in this study highlighted word forms based on content words and function words generated by checklist data and sampling measures. Content words were used more frequently than function words on both the VC and LS measures. While children with the smallest vocabularies produced little to no function words, the latter were more evident with increasing age and consequently larger vocabularies, further complementing Caselli et al.'s (1995) findings. The results suggested a trend in vocabulary development not only for TD children across languages, but also among children with DS, as far as demonstrated by the limited dataset in the current study.

In terms of language use (i.e., either Maltese or English), the highest percentage of words spoken per participant matched the child's reported LI. The occurrence of over-extensions⁴ among the majority of participants, irrelevant of chronological age or vocabulary size, was observed. These were mainly expressed through the use of sound effects (e.g., to represent animals) and semantic associations (such as 'brush' instead of 'comb').

In the PNT, it is possible that word meaning conveyed by the participants did not necessarily coincide with the conventional form. Nevertheless, the misinterpretation of picture items may have led to erroneous responses. Picture naming resulted in the preference of English labels (56%) over Maltese ones (38%). A likely reason for this is the formal structure of the PNT, which may have imposed a certain pressure on participants, thus leading to conventional responses with the intention to meet expectations. Caselli et al. (1995) proposed that word usage is most likely subject to preference, not ability. However, it is also likely that academic and therapeutic routines may have influenced performance. Checklist data confirmed a higher predominance of Maltese words in relation to recognised and recalled items. This sheds light on methodological bias that may be associated with situational impact. For example, the VC was based on parent-reported lexical expression across a range of daily settings, whereas the LS provided an informal opportunity for word use during free play.

The Maltese-dominant group generally appeared to use more English words (25%) than the English-dominant group used Maltese (1%), while Generic words were relatively on a par in both language groups. A likely reason for the use of English lexemes is the absence of Maltese equivalents, as proposed by Gatt et al. (2008). Moreover, Feltmate & Kay-Raining Bird (2008) acknowledged code mixing in adult input as an obvious factor influencing children's vocabularies. The latter authors claimed that the vocabulary of bilingual children with DS may in fact surpass that of their monolingual counterparts. With this in mind, it may be accepted that bilingualism should not affect lexical acquisition in children with DS.

Some limitations in the present study were identified. A condensed sample size was not the original intention of the research design. However, the inclusion criteria allowed a constrained group of eligible participants. Methodological biases, namely parental inclination in the VC and response constraints in the PNT, may have impinged on the

data. Missing LS scores for participant C7 must also be considered. Still, consistency emerging across the triad of assessment measures employed signifies validity in results.

5 Conclusion

The current study revealed that productive vocabularies of Maltese bilingual children with DS escalated with increasing age, notwithstanding inevitable individual variation. Findings further extend existing research by demonstrating that, based on the sample group, Maltese bilingual children with DS were indeed able to develop expressive vocabulary skills in the context of their exposure to both Maltese and English languages. Moreover, they, too, had the potential to use the two languages functionally.

Further research may benefit from a multiple baseline approach across ages, to investigate sequential development of bilingual expressive vocabulary. Investigation of the effect of primarily monolingual versus balanced bilingual input for children with DS on language development may assist clinical decisions taken by professionals for optimal language exposure in the local context of bilingualism.

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7 Conflicts of interest

The authors report no conflicts of interest.

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⁴ The use of a word for a broader range of referents than in the adult language.

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